

## EMPIRICAL RESEARCH QUANTITATIVE

# Analysis of influencing factors of job demands of healthcare workers working in mobile cabin hospitals in China

Hongmei Yi<sup>1</sup> | Sha Wei<sup>2</sup> | Jingyan Song<sup>3</sup> | Mingzhao Xiao<sup>1</sup> | Huanhuan Huang<sup>3</sup> | Di Luo<sup>1</sup> | Qinghua Zhao<sup>3</sup>

<sup>1</sup>Department of Urology, The First Affiliated Hospital of Chongqing Medical University, Chongqing, China

<sup>2</sup>Department of Psychiatry, The First Affiliated Hospital of Chongqing Medical University, Chongqing, China

<sup>3</sup>Department of Nursing, The First Affiliated Hospital of Chongqing Medical University, Chongqing, China

## Correspondence

Qinghua Zhao, Department of Nursing, The First Affiliated Hospital of Chongqing Medical University, Chongqing, China.  
Email: [qh20063@163.com](mailto:qh20063@163.com)

## Funding information

Chongqing Social Science Planning Talents Program (Construction and Application of Active Home Intelligent Medical Care Model), Grant/Award Number: 2021YC053; Chongqing Talents and Famous Teachers Project, Grant/Award Number: cstc2021ycjh-bgzxm0092; the Joint Project of Chongqing Science and Technology Committee and Chongqing Health Committee, Grant/Award Number: 2020FYYX003; the National Key R&D Program, Grant/Award Number: 2020YFC2005900; the Science and Technology Committee of Chongqing, China, Grant/Award Number: cstc2020jscx cyLhX0002

## Abstract

**Aim:** To explore the job demands of healthcare workers (HCWs) working in mobile cabin hospitals in Shanghai and identify the influencing factors.

**Design:** The study had a cross-sectional design.

**Methods:** Using the convenience sampling method, we selected 1223 HCWs (medical team members) working in these mobile cabin hospitals during April–May 2022. The findings of the general information questionnaire and the hierarchy scale of job demands of HCWs working in mobile cabin hospitals were used for the investigation.

**Results:** The total score of job demands of the included HCWs was  $132.26 \pm 9.53$ ; the average score of the items was  $4.73 \pm 0.34$ . Multivariate linear regression analyses showed that the following HCWs had significantly higher job demands: female HCWs and HCWs who received psychological training or intervention during the COVID-19 pandemic, were satisfied with the doctor/nurse–patient relationship, received support from family members/friends/colleagues, believed that the risk of working in mobile cabin hospitals was high, had adapted to the working environment of mobile cabin hospitals and had college/undergraduate level of education. They would benefit from increased social support and better training in terms of psychological coping mechanisms(both theoretical knowledge and applicable skills) and COVID-19 prevention, control and treatment abilities.

## KEYWORDS

healthcare workers, influencing factors, job demands, mobile cabin hospitals, Omicron

## 1 | INTRODUCTION

Since the outbreak of the SARS-CoV-2 Omicron variant in November 2021, the variant has rapidly spread to >100 countries. The variant is characterized by higher infectivity, faster transmission and milder symptoms compared to the preceding SARS-CoV-2 variants (Arora et al., 2022; Guo et al., 2022). Omicron broke out in Shanghai, China, on 28 March 2022. Therefore, the implementation of regional

dynamic sealing and control management was executed, representing another large-scale control performed after the pandemic in Wuhan, China. Twenty-two medical teams with more than 37,000 HCWs from all over the country were successively stationed in Shanghai mobile cabin hospitals to provide medical assistance (Feng et al., 2022; Tang, 2022a). As of 30 June 2022, Shanghai reported 630,000 confirmed cases and nearly 600 deaths from the Omicron variant (Tang, 2022b).

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2023 The Authors. *Nursing Open* published by John Wiley & Sons Ltd.

Mobile cabin hospitals are a place for isolation, treatment and monitoring of patients with mild COVID-19, and each such hospital can have 800–3000 beds. As a large number of patients could take care of themselves, medical staffs' main responsibilities were receiving new patients into the cabin and providing them with life care, specialist symptomatic treatment, nucleic acid testing, psychological care and health education as well as contacting the residential communities of patients to coordinate the patients' discharge from the cabin hospital. The use of mobile cabin hospitals for the treatment of large-scale infectious diseases allows for quick response, strict prevention and control, strong cooperation and massive scale (Chen et al., 2020; Shi et al., 2021).

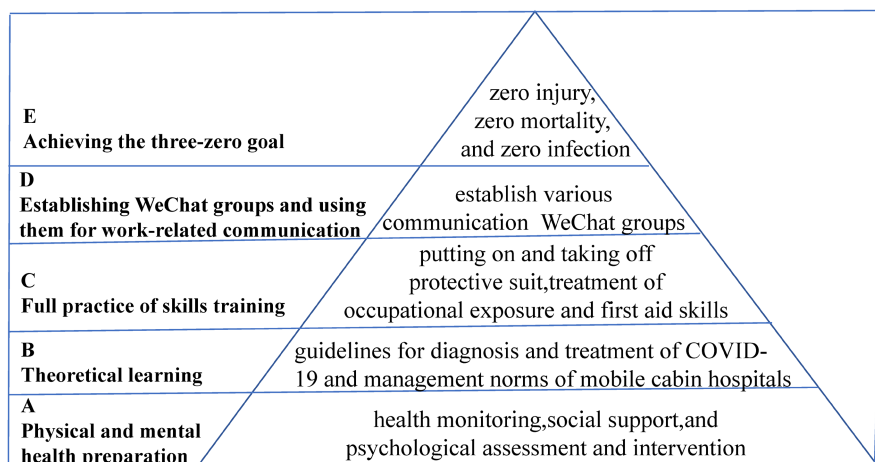
In the early stage of the pandemic, a systematic review of qualitative research on frontline HCWs working on COVID-19 treatment/prevention found that HCWs reported feeling like they had insufficient physical preparation (e.g. exhaustion), job burnout, insufficient equipment and information support, emotional distress (e.g. anxiety, depression and fear), a feeling of uncertainty about the future, insufficient social support (lack of protective equipment and HCWs and lack of support from family and friends), multi-faceted advice and reflection on anti-pandemic works (Billings et al., 2021; Joo & Liu, 2021; Koontalay et al., 2021; Zhang et al., 2022; Zhang, Sheng, et al., 2021). An American study reported that frontline HCWs accumulated stress from several sources: taking care of patients, assignments and workload, colleagues and personal life, lack of knowledge about COVID-19, the environment and hoping for community/social support and supervisor support (Ali et al., 2022). Based on these findings from a previous qualitative interview, the frontline HCWs have demands for better physical and mental health preparation (e.g., health monitoring, social support and psychological assessment and intervention), theoretical knowledge (e.g., guidelines for diagnosis and treatment of COVID-19 and management norms of mobile cabin hospitals), skills training (e.g., putting on and taking off protective suits, treatment of occupational exposure and first aid skills), information communication (e.g., establishing various communication WeChat groups) and goal realization (e.g., the three-zero goal – zero injury, zero mortality and zero infection; Figure 1).

In the present scenario wherein the prevention and control of the pandemic have normalized, when faced with a sudden outbreak of a new variant, HCWs working in mobile cabin hospitals still face difficulties of rapidly changing work protocols, lack of familiarity with the work process, fear of infection, sleep barriers and lack of psychological care. Presently, the above issues remain to be effectively solved. Moreover, no relevant research has systematically evaluated the job demands and influencing factors of HCWs working in mobile cabin hospitals.

## 2 | BACKGROUND

Maslow's theory of motivation has remained influential, particularly in psychology and management, as a tool to understand people's motivation for behavioural change (Dohman et al., 2019). Maslow's hierarchy of needs theory includes five levels: physiological needs, safety needs, love and belonging needs, esteem needs and self-actualization needs. Modern theorists believe that even if people do not meet their basic needs, they will still have higher needs. Lussier (2019) reported that according to Maslow's hierarchy of needs, the workplace is the primary place for people to meet higher psychological needs, and it is also the ideal place to study and cultivate motivation. The responsibility of management personnel is not to force employees to undertake unpleasant tasks but to focus on employees' psychological and professional growth and help them develop in line with the organization's goals by exploring their intrinsic motivations.

A survey of students' motivation for choosing medicine based on Maslow's hierarchy of needs showed that science, society and humanitarianism were the main motivators behind the choice (Goel et al., 2018). Kim and Shin (2020) developed the Nurse Needs Satisfaction Scale based on Maslow's hierarchy of needs theory. It can be used for the development of nursing interventions to improve the needs satisfaction of clinical nurses. A qualitative analysis on the needs of HCWs in Singapore revealed that the five main themes were physical needs, safety needs, love and belonging needs, esteem



**FIGURE 1** The job demand model diagram.

needs and self-actualization needs (Poh et al., 2022). However, there are few studies on the needs of HCWs in makeshift hospitals.

The job demand-resource (JD-R) model was proposed by Demerouti et al. (2001). Job demands pertain to factors associated with body, society or organization in work that require continuous physical or psychological effort. These are influenced by physical and mental consumption, which are mainly attributed to workload, role conflicts and emotional demands. Job resources refer to work factors that can support and help workers, such as social support, autonomy, work remuneration and performance feedback. These factors help workers achieve work goals, reduce work requirements and related physical and mental problems and motivate their personal growth, learning and development.

A study on employees' well-being based on the JD-R model showed that support from colleagues and family could reduce employees' emotional exhaustion (Usman et al., 2021). Another study showed that quantitative job demand overloads and perceived risk of being infected were positively associated with higher levels of emotional exhaustion among job demands (Guidetti et al., 2022). Ghanayem et al. (2020) found job resources to be moderators of the relationship between job demands and occupational strain. Assessment of the overall level of well-being within healthcare organizations revealed that the JD-R model may well explain the differences in the work environment and that personality enables coping with negative effects of work environment settings (Tomo & Simone, 2019). A study of nurses in Jordan showed that perceived organizational support and self-efficacy increase work engagement (Al-Hamdan & Issa, 2021). A study on the mental health of medical workers during COVID-19 has shown that individual-level demands included emotional load and resources included resilience and motivation; group-level demands included social distancing and resources included team support and cohesion; leader-level demands included managers' workload and resources included leader support; and organizational-level demands included work reorganization and resources included mental health initiatives (Giusino et al., 2022). During and after the current pandemic, nursing management decisions should aim to resolve any lack of formal rewards, secure sustainably professional resources and strengthen the autonomy of nurses and their interpersonal relationships (Bartsch et al., 2021). At present, there are few researches on the JD-R of HCWs in makeshift hospitals.

The aim of this study was to explore the job demand level and influencing factors of frontline HCWs in mobile cabin hospitals. We herein sought answers to the following questions: 1. What is the job demand level of frontline HCWs in mobile cabin hospitals? 2. What are the factors affecting the job demand level of first-line HCWs in mobile cabin hospitals? We hypothesized that the job demand level of frontline HCWs in mobile cabin hospitals is high and that it is affected by many demographic factors (e.g., gender, education background, epidemic-related training, awareness of risks associated with working in mobile cabin hospitals, social support and physical conditions).

## 3 | THIS STUDY

### 3.1 | Design

This study followed the STROBE reporting standard for cross-sectional studies. Based on Maslow's hierarchy of needs theory and the JD-R model, we herein established the hierarchy scale of job demands of HCWs working in mobile cabin hospitals (Zhao et al., 2023) and extracted general demographic data of frontline HCWs.

### 3.2 | Samples and participants

For selecting study participants, the convenience sampling method was used to select HCWs who provided medical assistance in mobile cabin hospitals in Shanghai, China, from April 2022 to May 2022. The participant selection criteria were as follows: (1) voluntary participation in this research; (2) minimum education: college degree; and (3) work profile: frontline HCWs fighting against the pandemic in mobile cabin hospitals. The minimum sample size of this study was estimated based on the rule of a minimum of 10 events per variable (EPV). This study was designed to consider 40–50 variables (including the number of dummy variables), and therefore, the minimum sample size was 500 cases. To better explore the correlation between dependent variables and independent variables, 1223 HCWs from different provinces and cities in China working at mobile cabin hospitals in Shanghai were finally included. The sample size of this study comprised physicians, nurses, pharmacists and logistics and management personnel.

### 3.3 | Data collection

Data were collected from 25 May 2022 to 9 June 2022 through an online questionnaire platform called Wenjuanxing ([www.wjx.cn](http://www.wjx.cn)). Convenience sampling was used to select frontline healthcare workers working in six mobile cabin hospitals in Shanghai for the survey. A total of 2100 questionnaires were distributed, and non-responders received up to two reminders on Wenjuanxing. A total of 1278 responses were received, indicating a response rate of 60.85%. After excluding 55 invalid questionnaires, 1223 (95.70%) valid responses were included. The frontline HCWs included reported their demographic characteristics and expressed their job demands. We stopped data collection when no new data were obtained for 5 consecutive days. Participation in this study was entirely voluntary.

### 3.4 | Instrument

#### 3.4.1 | Demographic data

As per the researchers' design, demographic data for HCWs were collected for 19 items, including gender, age, working years,

occupation, marital status, parental status, education level, original work department, title, adaption to work, workload, sleep quality, risk of working in mobile cabin hospitals, whether or not they ever participated in the rescue of major public health emergencies, whether or not they received psychological intervention or training for fighting against COVID-19, whether or not they received support from family members, friends or colleagues during the pandemic, whether or not they had physical discomfort during the pandemic and satisfaction with the doctor/nurse–patient relationship.

### 3.4.2 | The hierarchy scale of job demands of healthcare workers working in mobile cabin hospitals

The investigation was conducted using a hierarchy scale of job demands of HCWs working in mobile cabin hospitals prepared by Zhao et al. (2023) (Table S1). Based on Maslow's hierarchy of needs theory and the JD-R model (Demerouti et al., 2001), the scale was prepared after reviewing domestic and foreign literature and consulting the experts. The scale comprised 28 items across 5 dimensions, including physical and mental health preparations (6 items covering the physical and mental health status of HCWs), theoretical learning (5 items covering theoretical knowledge, such as COVID-19 guidelines, epidemic prevention/control, quality control of mobile cabin hospitals and regulations), full practice of skills training (6 items covering emergency skills, such as epidemic prevention/control, occupational exposure and first aid), establishing WeChat groups and using them for work-related communication (6 items covering the establishment of WeChat communication groups) and achieving the *three-zero* (zero mortality, zero infection and zero injury) goal (5 items). The 5-point Likert scale (1–5 points) was used, with 1 representing “very unimportant” and 5 representing “very important.” The total score on the scale ranged from 28 to 140 points, and all items were scored positively. A higher score indicated higher job demands of HCWs working in mobile cabin hospitals. The content validity, Cronbach's  $\alpha$  coefficient and the retest reliability of the scale were 0.962, 0.970 and 0.841, respectively, indicating good reliability and validity. The results of confirmatory factor analysis showed that standardized path coefficients of each item were 0.47–0.90, and the other parameters were as follows:  $\chi^2/\text{df}=2.815$ , root mean square residual=0.011, root mean square error of approximation=0.050, the goodness-of-fit index=0.922, the Tucker–Lewis index=0.956, the comparative fit index=0.964 and the incremental fit index=0.965; the goodness-of-fit of this model was high.

### 3.5 | Ethics approval

The present study was approved by the Ethics Committee of the First Affiliated Hospital of Chongqing Medical University (No: 2022–208). The study aim was explained and the initial permission was sought and obtained from various department heads and hospital administrators before the release of the recruiting information and questionnaire. The researchers informed the respondents that the collected

data would be anonymized and kept confidential. Finally, although the questionnaire link was sent to all frontline HCWs in mobile cabin hospitals, data were collected only from frontline HCWs who volunteered and provided consent after reading the informed consent form. Participants were also informed about their right to withdraw from the study at any point in time without any consequences.

### 3.6 | Statistical analyses

SAS 9.4 software (SAS Institute, Inc.) was used for data sorting and analysis. Normally distributed measurement data were expressed as mean $\pm$ SD; between-group comparisons were performed using analysis of variance test and *t*-test, and pairwise comparisons were performed using the SNK-*q* test. The variables with  $p<0.05$  in univariate analysis were included in the multivariate linear regression model and screened using a stepwise method, and a two-sided  $p$  value of  $<0.05$  was considered statistically significant. The following conditions were satisfied when multifactor linear regression was performed: the independent variable and the dependent variable should be roughly linear; the residuals satisfy normal distribution; the residual satisfies the homogeneity of variance; and the residual satisfies independence.

## 4 | RESULTS

### 4.1 | Characteristics of the participating healthcare workers

A total of 1223 valid questionnaires were recovered, and the responders were 195 men (15.94%) and 1028 women (84.06%), including 153 doctors (12.51%), 1006 nurses (82.26%) and 64 other HCWs (5.23%), which included staff of the hospital infection department, pharmacists and logistics and management personnel. Notably, the age of 384 participants was  $\leq 30$  years (31.40%) and that of 676 participants was 31–40 years (55.27%). Regarding the educational background, 1012 participants had a bachelor's degree (82.75%) and 544 (44.48%) and 553 (45.22%) participants had primary and intermediate titles respectively. Regarding marital status, 891 participants were married (72.85%) and 332 were single/divorced (27.15%).

### 4.2 | Scores of healthcare workers working in mobile cabin hospitals for job demands

In the hierarchy scale of job demands of HCWs working in mobile cabin hospitals, the mean total scores for job demands of HCWs working in mobile cabin hospitals were  $132.26 \pm 9.53$ , and the average score of the items was  $4.73 \pm 0.34$ . The scores of each dimension in descending order were  $4.82 \pm 0.34$  for theoretical learning,  $4.80 \pm 0.39$  for achieving the *three-zero* (zero mortality, zero infection and zero injury) goal,  $4.77 \pm 0.39$  for establishing WeChat

groups and using them for work-related communication,  $4.69 \pm 0.42$  for full practice of skills training and  $4.57 \pm 0.46$  for physical and mental health preparations. Refer to Table 1 for details.

### 4.3 | Univariate analysis of job demands of healthcare workers in different demographic scores in mobile cabin hospitals

The results of univariate analysis showed no statistical differences ( $p > 0.05$ ) in the scores of job demands of HCWs in mobile cabin hospitals for the following parameters: working years, marital status, parental status (having children or not), original work department, whether they participated in the rescue of major public health emergencies, whether they received psychological intervention during the pandemic, workload and sleep quality. Conversely, statistically significant differences ( $p < 0.05$ ) were noted in the scores of job demands of HCWs in mobile cabin hospitals for the following parameters: gender, age, occupation, education level, professional title, job adaptation, whether they received related psychological knowledge training during the pandemic satisfaction with the doctor/nurse-patient relationship, whether they received support from family members/friends or colleagues during the pandemic, whether they had physical discomfort during the pandemic and whether they believed that the risk of working in mobile cabin hospitals was high. Scores of HCWs in mobile cabin hospitals were higher for female HCWs, and HCWs who were aged  $\leq 30$  years had a bachelor's/college degree, had a primary professional title, were relatively adaptable to the work, received related psychological knowledge training during the pandemic, were satisfied with the doctor/nurse-patient relationship, received support from family members/friends or colleagues during the pandemic, was in good physical condition during the pandemic and believed that the risk of working in mobile cabin hospitals was high (Table 2).

### 4.4 | Multivariate linear regression analysis of the score of the job demands hierarchy theory of healthcare workers working in mobile cabin hospitals

The total scores of the scale and five dimensions were set as dependent variables, and the factors with statistically significant difference

( $p < 0.05$ ) in univariate analysis (gender, age, occupation, education level, professional title, adaption to the work, recognition of the risk of working in mobile cabin hospitals, whether or not HCWs received related psychological knowledge training during the pandemic, whether or not they received satisfaction from the doctor/nurse-patient relationship, whether or not they received support from family/friends or colleagues during the pandemic and whether or not they experienced physical discomfort during the pandemic) were set as independent variables to be included in the multivariate linear regression model. The variables were screened using the stepwise method.

The above binary classification unordered categorical variables (age, occupation, education level and professional title) were set as dummy variables, and the assignment of independent variables is shown in Table S2. The collinearity test results of the six multivariate linear regression models showed that the variance inflation factor of each variable was  $< 5$  and there was no collinearity between variables (Table 3; Table S3).

The total scores of job demands were set as the dependent variable. Scores of HCWs in mobile cabin hospitals were higher for female HCWs, and HCWs who received related psychological knowledge training during the pandemic were satisfied with the doctor/nurse-patient relationship, received support from family/friends or colleagues during the pandemic, believed that the risk of working in mobile cabin hospitals was high and was in good physical condition during the pandemic ( $p < 0.05$ ).

The dimension score of physical and mental health preparations was set as the dependent variable. Scores of HCWs in mobile cabin hospitals were higher for female HCWs, and HCWs who were more adaptable to the work received related psychological knowledge training during the pandemic, were satisfied with the doctor/nurse-patient relationship, received support from family/friends or colleagues during the pandemic, believed that the risk of working in mobile cabin hospitals was high and was in good physical condition during the pandemic ( $p < 0.05$ ).

The dimension score of theoretical learning was set as the dependent variable. Scores of HCWs in mobile cabin hospitals were higher for those who were satisfied with the doctor/nurse-patient relationship, received support from family/friends or colleagues during the pandemic and believed that the risk of working in mobile cabin hospitals was high ( $p < 0.05$ ).

Dimension	Total score of the dimension	Average score of items
Physical and mental health preparations	$27.43 \pm 2.78$	$4.57 \pm 0.46$
Theoretical learning	$24.12 \pm 1.70$	$4.82 \pm 0.34$
Full practice of skills training	$28.12 \pm 2.53$	$4.69 \pm 0.42$
Establishing WeChat groups and using them for work-related communication	$28.59 \pm 2.37$	$4.77 \pm 0.39$
Achieving the <i>three-zero</i> goal	$24.01 \pm 1.95$	$4.80 \pm 0.39$
Total score on the scale	$132.26 \pm 9.53$	$4.73 \pm 0.34$

TABLE 1 Scores of healthcare workers working in mobile cabin hospitals for job demand ( $\bar{x} \pm s$ ).

TABLE 2 Univariate analysis of job demands of healthcare workers in different demographic scores in mobile cabin hospitals (n = 1223).

Variables	No. of cases (%)	Total score	t/F	Physical and mental health preparations	t/F	Theoretical learning	t/F	Full practice of skills training	t/F	Establishing WeChat groups and using them for work-related communication	t/F	Achieving the three-zero goal	t/F
Gender													
Male	195 (15.94)	130.06 ± 10.03	-3.539 ***	26.71 ± 3.04	-3.669 ***	23.90 ± 1.92	-1.737	27.61 ± 2.57	-3.077 **	28.19 ± 2.55	-2.604 **	23.65 ± 2.36	-2.365 *
Female	1028 (84.06)	132.68 ± 9.38		27.57 ± 2.71		24.16 ± 1.65		28.21 ± 2.52		28.67 ± 2.33		24.07 ± 1.85	
Age (years)													
≤30	384 (31.40)	132.43 ± 10.04	1.613	27.60 ± 2.83	2.272	24.11 ± 1.83	0.175	28.22 ± 2.50	3.910 *	28.54 ± 2.48	0.836	23.96 ± 2.02	0.510
31-40	676 (55.27)	132.47 ± 9.25		27.43 ± 2.73		24.14 ± 1.59		28.18 ± 2.51		28.66 ± 2.29		24.05 ± 1.91	
≥41	163 (13.33)	131.02 ± 9.40		27.04 ± 2.86		24.05 ± 1.79		27.60 ± 2.66		28.42 ± 2.42		23.91 ± 1.91	
Working years (years)													
0-5	177 (14.47)	131.46 ± 10.85	1.406	27.41 ± 2.89	0.132	23.99 ± 1.98	0.821	28.02 ± 2.60	1.200	28.33 ± 2.66	2.043	23.71 ± 2.27	2.839
6-10	417 (34.10)	132.82 ± 9.17		27.49 ± 2.78		24.18 ± 1.63		28.27 ± 2.45		28.75 ± 2.26		24.13 ± 1.80	
≥11	629 (51.43)	132.12 ± 9.36		27.40 ± 2.75		24.11 ± 1.65		28.04 ± 2.57		28.56 ± 2.34		24.01 ± 1.94	
Occupation													
Doctor	153 (12.51)	130.52 ± 9.85	4.926 **	26.75 ± 2.94	7.400 **	23.99 ± 1.88	1.318	27.67 ± 2.55	5.700 **	28.34 ± 2.48	1.744	23.78 ± 2.34	1.809
Nurse	1006 (82.26)	132.66 ± 9.42		27.57 ± 2.74		24.15 ± 1.66		28.23 ± 2.51		28.65 ± 2.34		24.06 ± 1.88	
Others	64 (5.23)	130.23 ± 9.83		26.86 ± 2.78		23.88 ± 1.79		27.44 ± 2.72		28.28 ± 2.48		23.78 ± 1.96	
Marital status													
Married	891 (72.85)	132.18 ± 9.60	-0.513	27.41 ± 2.80	-0.541	24.09 ± 1.69	-0.765	28.07 ± 2.56	-0.982	28.61 ± 2.36	0.491	23.99 ± 1.97	-0.391
Single/divorced	332 (27.15)	132.49 ± 9.33		27.50 ± 2.72		24.18 ± 1.70		28.23 ± 2.46		28.54 ± 2.39		24.04 ± 1.88	
Parental status													
Parent	873 (71.38)	132.22 ± 9.58	-0.281	27.44 ± 2.79	0.077	24.11 ± 1.68	-0.339	28.05 ± 2.60	-1.367	28.61 ± 2.36	0.421	24.01 ± 1.96	0.009
Not a parent	350 (28.62)	132.39 ± 9.42		27.42 ± 2.76		24.14 ± 1.74		28.27 ± 2.37		28.55 ± 2.40		24.01 ± 1.92	
Education level													
College	122 (9.98)	132.18 ± 10.52	4.669 *	27.25 ± 3.08	5.068 **	23.94 ± 1.91	1.759	28.47 ± 2.33	9.453 ***	28.61 ± 2.50	1.901	23.92 ± 2.05	1.542
Bachelor's	1012 (82.75)	132.53 ± 9.29		27.53 ± 2.73		24.16 ± 1.65		28.17 ± 2.50		28.63 ± 2.34		24.05 ± 1.87	
Master's or above	89 (7.28)	129.33 ± 10.40		26.58 ± 2.81		23.89 ± 1.84		27.04 ± 2.91		28.12 ± 2.49		23.69 ± 2.51	
Original work department													
Infectious	42 (3.43)	132.55 ± 9.46	0.188	27.43 ± 2.56	0.610	24.12 ± 1.67	0.114	28.38 ± 2.42	0.581	28.57 ± 2.48	0.177	24.05 ± 1.96	0.058
Respiratory	127 (10.38)	131.91 ± 9.76		27.40 ± 2.87		24.08 ± 1.86		27.85 ± 2.79		28.53 ± 2.38		24.06 ± 1.84	
ICU	131 (10.71)	131.82 ± 9.66		27.14 ± 2.95		24.09 ± 1.65		28.18 ± 2.50		28.47 ± 2.39		23.95 ± 2.20	
EMC	55 (4.50)	132.87 ± 9.37		27.78 ± 2.58		24.25 ± 1.64		28.33 ± 2.36		28.53 ± 2.45		23.98 ± 1.88	
Others	868 (70.97)	132.33 ± 9.50		27.46 ± 2.77		24.12 ± 1.69		28.12 ± 2.52		28.63 ± 2.36		24.01 ± 1.93	
Title													
Primary	544 (44.48)	132.64 ± 9.79	2.600	27.58 ± 2.78	3.238 *	24.13 ± 1.73	0.611	28.28 ± 2.51	3.935 *	28.64 ± 2.43	1.254	24.03 ± 1.93	0.844
Intermediate	553 (45.22)	132.29 ± 9.12		27.42 ± 2.74		24.14 ± 1.61		28.08 ± 2.53		28.62 ± 2.26		24.04 ± 1.87	

(Continues)



TABLE 2 (Continued)

Variables	No. of cases (%)	Total score	t/F	Physical and mental health preparations	t/F	Theoretical learning	t/F	Full practice of skills training	t/F	Establishing WeChat groups and using them for work-related communication	t/F	Achieving the three-zero goal	t/F
Senior	126 (10.30)	130.5 ± 10.00		26.88 ± 2.89		23.96 ± 1.91		27.59 ± 2.60		28.28 ± 2.57		23.79 ± 2.33	
Adaption to work													
Adapted	1157 (94.6)	132.45 ± 9.44	2.870**	27.5 ± 2.75	3.639***	24.14 ± 1.68	2.372*	28.16 ± 2.51	2.533*	28.61 ± 2.35	1.186	24.03 ± 1.93	2.047*
Ordinary	66 (5.4)	129.00 ± 10.51		26.23 ± 3.09		23.64 ± 1.96		27.35 ± 2.84		28.26 ± 2.63		23.53 ± 2.16	
Have you ever participated in the rescue of major public health emergencies?													
Yes	630 (51.51)	132.69 ± 9.21	1.593	27.53 ± 2.76	1.225	24.14 ± 1.71	0.450	28.24 ± 2.38	1.809	28.71 ± 2.24	1.784	24.07 ± 1.92	1.114
No	593 (48.49)	131.82 ± 9.84		27.33 ± 2.80		24.09 ± 1.68		27.98 ± 2.69		28.47 ± 2.49		23.94 ± 1.97	
Have you received related psychological knowledge training during the pandemic?													
Yes	919 (75.14)	132.98 ± 9.25	4.582***	27.65 ± 2.71	4.716***	24.18 ± 1.66	2.367*	28.33 ± 2.39	4.865***	28.76 ± 2.26	4.016***	24.05 ± 1.92	1.462
No	304 (24.86)	130.11 ± 10.04		26.79 ± 2.90		23.92 ± 1.79		27.45 ± 2.84		28.09 ± 2.61		23.87 ± 2.02	
Have you received psychological intervention during the pandemic?													
Yes	286 (23.39)	131.95 ± 9.82	-0.629	27.27 ± 2.83	-1.159	24.01 ± 1.78	-1.173	28.23 ± 2.53	0.880	28.6 ± 2.39	0.035	23.85 ± 2.08	-1.593
No	937 (76.61)	132.36 ± 9.44		27.48 ± 2.76		24.15 ± 1.67		28.08 ± 2.54		28.59 ± 2.36		24.06 ± 1.90	
Satisfaction with the doctor/nurse-patient relationship													
Yes	1102 (90.11)	132.85 ± 9.15	5.658***	27.56 ± 2.71	4.401***	24.20 ± 1.61	4.329***	28.27 ± 2.42	5.439***	28.71 ± 2.28	4.608***	24.10 ± 1.86	4.200***
No	121 (9.89)	126.91 ± 11.15		26.26 ± 3.14		23.32 ± 2.18		26.69 ± 3.09		27.50 ± 2.81		23.14 ± 2.44	
Have you received support from family members, friends or colleagues during the pandemic?													
Yes	1206 (98.61)	132.36 ± 9.49	2.996**	27.47 ± 2.77	3.473**	24.14 ± 1.68	2.485*	28.14 ± 2.52	2.701**	28.61 ± 2.36	1.661	24.01 ± 1.94	1.144
Ordinary	17 (1.39)	125.41 ± 10.09		25.12 ± 2.91		22.71 ± 2.37		26.47 ± 3.24		27.65 ± 2.85		23.47 ± 2.21	
Have you had physical discomfort during the pandemic?													
Yes	276 (22.57)	130.82 ± 10.68	-2.631**	27.08 ± 3.02	-2.280*	23.96 ± 1.87	-1.591	27.70 ± 2.83	-2.862**	28.38 ± 2.57	-1.602	23.70 ± 2.32	-2.587*
No	947 (77.43)	132.69 ± 9.13		27.54 ± 2.70		24.16 ± 1.64		28.24 ± 2.43		28.66 ± 2.30		24.10 ± 1.81	
Workload													
Bearable	1148 (93.87)	132.24 ± 9.53	-0.339	27.42 ± 2.78	-0.838	24.11 ± 1.71	-0.515	28.14 ± 2.52	1.301	28.57 ± 2.37	-1.585	24.01 ± 1.91	0.124
Overloaded	75 (6.13)	132.63 ± 9.61		27.69 ± 2.73		24.20 ± 1.42		27.75 ± 2.74		29.01 ± 2.25		23.97 ± 2.43	
Sleep quality													
Decreased	467 (38.18)	131.88 ± 9.93	0.649	27.30 ± 2.86	0.817	24.04 ± 1.79	0.758	27.99 ± 2.64	1.026	28.61 ± 2.39	0.160	23.93 ± 2.00	0.579
Ordinary	714 (58.38)	132.48 ± 9.32		27.52 ± 2.73		24.16 ± 1.65		28.19 ± 2.49		28.57 ± 2.36		24.05 ± 1.92	
Improved	42 (3.43)	132.90 ± 8.44		27.45 ± 2.74		24.26 ± 1.29		28.29 ± 2.18		28.76 ± 2.32		24.14 ± 1.70	
Risk of working in mobile cabin hospitals													
High	966 (78.99)	132.80 ± 9.26	3.631***	27.62 ± 2.71	4.689***	24.20 ± 1.60	3.103**	28.21 ± 2.45	2.413*	28.69 ± 2.29	2.437*	24.08 ± 1.87	2.296*
Low	257 (21.01)	130.24 ± 10.26		26.72 ± 2.92		23.79 ± 1.97		27.75 ± 2.79		28.25 ± 2.62		23.74 ± 2.19	

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

**TABLE 3** Multivariate linear regression analysis of the score of job demands hierarchy theory of healthcare workers in mobile cabin hospitals ( $n=1223$ ).

Dependent variable	Independent variable	$\beta$ (95% CI)	SE	SD	t	p
Total score	Constant term	117.989 (113.173, 122.805)	2.455	0.000	48.067	<0.001***
	Gender					
	Female	2.591 (1.172, 4.010)	0.723	0.100	3.582	<0.001***
	Have you received related psychological knowledge training during the pandemic?					
	Yes	2.365 (1.147, 3.583)	0.621	0.107	3.809	<0.001***
	Satisfaction of the doctor/nurse–patient relationship					
	Satisfied	4.746 (2.960, 6.531)	0.910	0.149	5.215	<0.001***
	Have you received support from family/friends or colleagues during the pandemic?					
	YES	4.551 (0.082, 9.021)	2.278	0.056	1.998	0.046*
	Recognition of the risk of working in mobile cabin hospitals					
	High	2.463 (1.189, 3.738)	0.650	0.105	3.791	<0.001***
Physical and mental health preparations (A)	Physical condition during the pandemic					
	Good	1.722 (0.477, 2.967)	0.635	0.076	2.713	0.007**
	Constant term	22.423 (20.948, 23.897)	0.752	0.000	29.830	<0.001***
	Gender					
	Female	0.864 (0.450, 1.279)	0.211	0.114	4.094	<0.001***
	Adaption to the work					
	Adapted	0.789 (0.098, 1.479)	0.352	0.064	2.239	0.025*
	Have you received related psychological knowledge training during the pandemic?					
	Yes	0.775 (0.420, 1.131)	0.181	0.121	4.282	<0.001***
	Satisfaction of the doctor/nurse–patient relationship					
	Satisfied	0.779 (0.246, 1.312)	0.272	0.084	2.867	0.004**
Theoretical learning (B)	Have you received support from family/friends or colleagues during the pandemic?					
	YES	1.696 (0.387, 3.004)	0.667	0.071	2.542	0.011*
	Recognition of the risk of working in mobile cabin hospitals					
	High	0.856 (0.484, 1.228)	0.190	0.126	4.517	<0.001***
	Physical condition during the pandemic					
	Good	0.423 (0.058, 0.787)	0.186	0.064	2.275	0.023*
	Constant term	21.988 (21.163, 22.813)	0.421	0.000	52.284	<0.001***
	Satisfaction of the doctor/nurse–patient relationship					
	Satisfied	0.817 (0.501, 1.133)	0.161	0.144	5.069	<0.001***
	Have you received support from family/friends or colleagues during the pandemic?					
	Yes	1.089 (0.282, 1.895)	0.411	0.075	2.649	0.008**
Full practice of skills training (C)	Recognition of the risk of working in mobile cabin hospitals					
	High	0.404 (0.175, 0.633)	0.117	0.097	3.460	0.001**
	Constant term	24.417 (23.638, 25.195)	0.397	0.000	61.554	<0.001***
	Gender					
	Female	0.509 (0.129, 0.890)	0.194	0.074	2.627	0.009**
	Education level					
	Associate degree	1.135 (0.456, 1.815)	0.346	0.134	3.278	0.001**
	Bachelor's degree	0.919 (0.378, 1.459)	0.276	0.137	3.334	0.001**
	Have you received related psychological knowledge training during the pandemic?					
	YES	0.723 (0.399, 1.046)	0.165	0.123	4.377	<0.001***
	Satisfaction of the doctor/nurse–patient relationship					
	Satisfied	1.326 (0.856, 1.797)	0.240	0.156	5.532	<0.001***
	Recognition of the risk of working in mobile cabin hospitals					
	High	0.383 (0.042, 0.724)	0.174	0.062	2.203	0.028*
	Physical condition during the pandemic					
	Good	0.461 (0.130, 0.792)	0.169	0.076	2.731	0.006*

(Continues)



TABLE 3 (Continued)

Dependent variable	Independent variable	$\beta$ (95% CI)	SE	SD	t	p
Establishing WeChat groups and using them for work-related communication (D)	Constant term	26.516 (25.934, 27.097)	0.296	0.000	89.499	<0.001***
	Gender					
	Female	0.460 (0.102, 0.817)	0.182	0.071	2.523	0.012**
	Have you received related psychological knowledge training during the pandemic?					
	YES	0.559 (0.252, 0.867)	0.157	0.102	3.574	<0.001***
	Satisfaction of the doctor/nurse–patient relationship					
	Satisfied	1.055 (0.611, 1.499)	0.226	0.133	4.664	<0.001***
	Recognition of the risk of working in mobile cabin hospitals					
Achieving the <i>three-zero</i> goal (E)	Constant term	22.681 (22.219, 23.144)	0.236	0.000	96.201	<0.001***
	Gender					
	Female	0.392 (0.098, 0.686)	0.150	0.074	2.612	0.009**
	Satisfaction of the doctor/nurse–patient relationship					
	Satisfied	0.904 (0.543, 1.265)	0.184	0.139	4.915	<0.001***
	Recognition of the risk of working in mobile cabin hospitals					
	High	0.333 (0.068, 0.598)	0.135	0.070	2.464	0.014*
	Physical condition during the pandemic					
	Good	0.363 (0.104, 0.621)	0.132	0.078	2.754	0.006**

Note: Overall model ( $R^2=0.0742$ , adjusted  $R^2=0.0696$ ,  $F=43.915$ ,  $p<0.001$ ). A model ( $R^2=0.0755$ , adjusted  $R^2=0.0702$ ,  $F=24.501$ ,  $p<0.001$ ). B model ( $R^2=0.0395$ , adjusted  $R^2=0.0371$ ,  $F=30.205$ ,  $p<0.001$ ). C model ( $R^2=0.0777$ , adjusted  $R^2=0.0723$ ,  $F=43.697$ ,  $p<0.001$ ). D model ( $R^2=0.0435$ , adjusted  $R^2=0.0404$ ,  $F=29.538$ ,  $p<0.001$ ). E model ( $R^2=0.0379$ , adjusted  $R^2=0.0348$ ,  $F=27.164$ ,  $p<0.001$ ). \* $p<0.05$ ; \*\* $p<0.01$ ; \*\*\* $p<0.001$ .

Abbreviations:  $\beta$ , adjusted regression slope coefficient; SD, standard deviation; SE, standard error.

The dimension score of full practice of skills training was set as the dependent variable. Scores of HCWs in mobile cabin hospitals were higher for female HCWs, and HCWs who had a bachelor's/college degree received related psychological knowledge training during the pandemic, were satisfied with the doctor/nurse–patient relationship, believed that the risk of working in mobile cabin hospitals was high and was in good physical condition during the pandemic ( $p<0.05$ ).

The dimension score of establishing WeChat groups and using them for work-related communication was set as the dependent variable. Scores of HCWs in mobile cabin hospitals were higher for female HCWs, and HCWs who received related psychological knowledge training during the pandemic were satisfied with the doctor/nurse–patient relationship and believed that the risk of working in mobile cabin hospitals was high ( $p<0.05$ ).

The dimension score of achieving the *three-zero* goal was set as the dependent variable. Scores of HCWs in mobile cabin hospitals were higher for female HCWs, and HCWs who were satisfied with the doctor/nurse–patient relationship believed that the risk of working in mobile cabin hospitals was high and was in good physical condition during the pandemic ( $p<0.05$ ).

## 5 | DISCUSSION

Since the COVID-19 outbreak in December 2019, many studies have been conducted on anxiety, depression, sleep disorder, social support, coping behaviour, job burnout, resilience, post-traumatic

growth and self-efficacy of frontline HCWs fighting against COVID-19 (Labrague, 2021; Pappa et al., 2020; Zeng et al., 2021). However, the job demand level of HCWs working in mobile cabin hospitals remains unknown. Given that the present study investigates the relevant demands and influencing factors of HCWs contributing to anti-pandemic efforts in Shanghai mobile cabin hospitals, it is of great significance to establish and improve the standardized training system for the functioning of mobile cabin hospitals and building a scientific and standardized management mechanism. Furthermore, it also provides a theoretical reference for full physical and mental health, relevant professional knowledge and skill reserves for HCWs to respond to other public health emergencies.

The results of the study showed that the job demands of HCWs working in mobile cabin hospitals were high. Systematic review of nurses' JD-R model showed that the job demand level may be affected by individual personality characteristics and job perceptions. Appropriate job demands can improve their work engagement, and the work atmosphere and the significance of work were positively correlated with job engagement (Kato et al., 2021). In this study, all HCWs had a strong sense of mission, responsibility, achievement and professional pride, so they fully devoted themselves to their work in mobile cabin hospitals. This could be attributed to them having volunteered to provide medical assistance in mobile cabin hospitals in Shanghai, China. Among all the demands, the dimension of theoretical learning had the highest demand, which may be due to Omicron's characteristics of high infectivity, hidden transmission and difficulties with its prevention and control (Sun et al., 2022). HCWs who

came from other places to aid the anti-pandemic efforts in Shanghai were not familiar with the work process and environment of local mobile cabin hospitals and had inadequate training on the latest guidelines for epidemic prevention and control, specifications and quality control standards for construction of mobile cabin hospitals, pandemic prevention/first aid and other professional aspects. At the time of writing this report, it has been more than 2 years since the COVID-19 outbreak, and HCWs have already developed a good physical and mental state and a good social support system; therefore, the score of physical and mental health preparations was relatively low, but it was still a highly required trait. The high job demand level of first-line HCWs in mobile cabin hospitals may be related to inadequate training and the lack of familiarity of the working environment for HCWs who came from other places.

Our results revealed that the scores of demands of HCWs who believed that the risk of working in mobile cabin hospitals was high and the doctor/nurse–patient relationship was satisfactory for the five dimensions (physical and mental health preparations, theoretical learning, full practice of skills training, establishing WeChat groups and using them for work-related communication and achieving the *three-zero* goal) were high. Herein, 966 HCWs (78.99%) believed that the risk of working in mobile cabin hospitals was high, which may be related to the high infectivity of the Omicron variant and the collectivist culture of our country. Notably, HCWs were afraid of being infected and worried about infecting their colleagues, which would affect the collective honour of the team. Organizational support plays a crucial role in reducing frontline HCWs' stress resulting from working in a hectic environment, which may lead to emotional exhaustion and can affect HCWs' health and well-being (Ali et al., 2022). Notably, 1102 (90.11%) HCWs were satisfied with the doctor/nurse–patient relationship. In the battle against the pandemic, HCWs and patients established a good collaborative relationship in mobile cabin hospitals. Patients were deeply grateful to HCWs for their dedication during epidemic prevention and control, and HCWs could gain a new perspective and a deeper understanding of the doctor/nurse–patient relationship from this experience (Zhang, Sheng, et al., 2021; Zhang, Xiao, et al., 2021). However, in studies conducted before the pandemic in China, the doctor/nurse–patient relationship was reported to be a challenging demand that fosters goal accomplishment and stimulates positive work behaviour; this is consistent with the results of the present study (Zeng et al., 2022). Furthermore, HCWs with good physical and mental health, extensive theoretical knowledge, strong professional skills, a complete information support system and ability to set up work goals with self-realization are more likely to complete anti-pandemic tasks in mobile cabin hospitals with high quality.

The results of the survey showed that there were 1028 (84.06%) female HCWs. Compared with male HCWs, female HCWs scored higher on job demands for physical and mental health preparations, full practice of skills training, establishing WeChat groups and using them for work-related communication and achieving the *three-zero* goal. This is consistent with the findings of a study in Spain before the COVID-19 outbreak (Cañavate et al., 2023). Multiple studies

have shown that after experiencing severe post-traumatic emergency disorder, female HCWs were more prone to increased anxiety, depression, sleep disorders and perceived stress and lower levels of post-traumatic growth (Batra et al., 2020; Chen et al., 2021; Gu et al., 2022; Li et al., 2022; Peng et al., 2021; Zhang, Xiao, et al., 2021). This may be attributed to female HCWs having a greater propensity to pay more attention to their own inner feelings and psychological and social status as well as to them they were more sensitive to trauma. Hosseinabadi et al. (2019) found that female nurses were more prone to emotional exhaustion and cynicism than male nurses. Another study showed that female HCWs exhibited significantly more perceived work stress, psychotic behaviours and obsessive-compulsive behaviours than males (Lu et al., 2021). During the anti-pandemic efforts, male HCWs could better cope with difficulties and challenges in a short period of time, whereas female HCWs needed longer to adapt to the dynamic environment. Female HCWs already have made an indelible contribution during the fight against COVID-19, and they have more serious mental health problems and weaker psychological coping abilities (Batra et al., 2020). Therefore, it is suggested that female HCWs should be offered more psychological support to develop a better psychological mindset and improve their psychological resilience and coping abilities.

Herein, HCWs who had received related psychological knowledge training during the pandemic had higher job demands for physical and mental health preparations, full practice of skills training and could better establish WeChat groups and use them for work-related communication effectively. The results of a study conducted during early stages of the COVID-19 outbreak showed that 91.20% of HCWs desired a platform of psychological consultation for infection and 91.36% of HCWs felt less worried after the practice training in the epidemic-affected area (Zhao et al., 2020). Studies have reported that frontline HCWs contributing to anti-pandemic efforts; crisis management, emotion management and guidance on stress-coping methods were the most desired psychological services (Fang et al., 2021; Gomes et al., 2016). Studies have shown that personal cognitive evaluation had a mediating effect on stress (Sun et al., 2020). It is suggested that regular online training on psychological knowledge related to COVID-19 prevention should be held for HCWs working in mobile cabin hospitals to improve their psychological resilience level and emergency response abilities (Sun et al., 2020); this will help improve their physical and mental health, epidemic prevention abilities and online job communication abilities.

Notably, HCWs who were in good physical condition during the pandemic had higher demands for physical and mental health preparations, full practice of skills training and achieving the *three-zero* goal. HCWs in better physical condition were more likely to be self-disciplined, pay more attention to their physical and mental health and have a more positive attitude. According to Maslow's hierarchy of needs, people's needs were the driving force and the code of conduct for them to move forward, and physical and mental health belonged to the level of physiological demands, whereas full practice of skills training belonged to the level of safety (job security) and

achieving the *three-zero* goal belonged to the level of self-realization. For HCWs in better physical condition, their basic physiological demands are met, and they need continuous growth from the work of fighting against COVID-19 to achieve their goals of self-realization. It is suggested that when choosing frontline HCWs to participate in fighting against COVID-19, hospital management personnel should carry out strict screening for physical and mental health conditions to select HCWs with strong physical and psychological coping abilities.

Of note, HCWs who received support from family members/friends or colleagues during the pandemic had higher demands for physical and mental health preparations and theoretical learning. A study before the COVID-19 outbreak showed a negative correlation between social support and job demands, which is different from the results of this study (Abadi et al., 2020). This may be because HCWs with better social support had higher awareness about the pandemic; in addition, they paid more attention to their own health and were more willing to obtain pandemic-related theoretical knowledge. Therefore, the demands for physical and mental health preparations and theoretical learning were higher. In the context of Chinese culture, family is the core of society and the fundamental origin of ethics and morality. With good family support, the level of health literacy is higher (Zhong et al., 2021). Thus, such individuals may pay greater attention to their own health (Deng et al., 2021; Zhong et al., 2021) believed supervisor support was significantly positively associated with public service motivation (2021). Good social support can encourage HCWs to obtain more resources and information related to COVID-19 in social networks, improve their self-efficiency and enhance HCWs' willingness to learn theoretical knowledge of COVID-19 (Alinejad-Naeini et al., 2021).

Herein, HCWs with a college/bachelor's degree had higher demands for full practice of skills training than those with a post-graduate degree, and HCWs who were more adapted to the work had higher demands for physical and mental health preparations. A study showed that higher education level was associated with better awareness about COVID-19 and that such HCWs had comprehensive knowledge and skills related to COVID-19, particularly about prevention, control measures and patient prognosis; this contributed to and more proactive participation in prevention and control of sudden outbreaks of COVID-19 (Liu et al., 2022). Also, HCWs with a lower education level may not be as proficient in skills required for pandemic prevention. Therefore, the demand for skills training was higher.

As a protective factor for individuals to cope with stress, psychological resilience can change with the surrounding pressure and then play a positive role in regulating psychology and adapting to stress. Psychological resilience was found to be better for physical and mental health preparations in HCWs who were more adapted to the work (Dong et al., 2022; Finstad et al., 2021). Thus, the demand for physical and mental health preparations was higher (Dong et al., 2022; Finstad et al., 2021). Therefore, hospital management personnel can establish precise training and intervention measures

based on the influencing factors of job demands in mobile cabin hospitals to improve HCWs' emergency response ability and advance their career growth to achieve the purpose of normalized emergency prevention and control management.

## 5.1 | Limitations

The present study has several limitations. First, most participants were from Chongqing, other provinces like Hunan and Hubei and other cities like Xian. Therefore, the results of job demands of HCWs working in mobile cabin hospitals in China may not be representative. However, given the large number of samples included, we believe the results are still representative to a certain extent. Second, the use of a cross-sectional design limits the ability to establish causal relationships between the variables, and the reliance on self-report data could introduce bias and measurement error. Third, individual differences in coping styles were not included in the study variables, which could be controlled for in future research to better isolate the effects of the variables measured. Fourth, this study failed to control for confounding factors like the coping style, different levels of hospitals (e.g. district and county hospitals, affiliated hospitals of medical universities and secondary or tertiary hospitals from different provinces or cities) and different training and management methods of different medical teams. Future studies need to collect the above data to reduce the bias and strengthen the methods. In addition, the study sample comprised HCWs who volunteered to work in mobile cabin hospitals, which could limit the generalizability of the findings to other healthcare settings or populations. Finally, the study's focus on HCWs in Shanghai may not be representative of the experiences of HCWs in other regions or countries.

## 6 | CONCLUSION

The results of the present study revealed that the job demands of HCWs working in mobile cabin hospitals while aiding anti-pandemic efforts in Shanghai, China, were high. The following HCWs had higher job demands: female HCWs, HCWs who received relevant psychological knowledge training during the pandemic, HCWs satisfied with the relationship between doctor/nurse-patient, HCWs who received good social support, HCWs who considered the risk of working in mobile cabin hospitals to be high and HCWs who were in good health during the pandemic. The current findings establish the need for greater focus on job demands of HCWs in mobile cabin hospitals. This is because HCWs who came from other places to aid the anti-pandemic efforts in Shanghai were not familiar with the work process and environment of local mobile cabin hospitals and had inadequate training on various aspects of their work, such as the latest guidelines for epidemic prevention and control, specifications and quality control standards for the construction of mobile cabin hospitals, pandemic prevention/first aid and other professional aspects.

## 7 | IMPLICATIONS FOR NURSING PRACTICE

According to these results, it is necessary to strengthen HCWs' training on the aspects of pandemic-related theory, occupational skills and psychological coping knowledge to improve the epidemic prevention work. It is similarly essential to improve HCWs' skills of epidemic prevention/control/treatment, provide them good social support and formulate physical exercise plans to improve their physical health, stress resistance and satisfaction with the doctor/nurse–patient relationship. This will help improve their psychological resilience and emergency response capabilities and achieve the goals of zero mortality, zero infection and zero injury. Additionally, female HCWs and nurses comprise the majority of frontline personnel in the anti-pandemic efforts and have made indelible contributions to human health. It is highly recommended to improve their social status and salary level by optimizing the policy system. It is essential to provide nursing personnel with more opportunities and paths for career growth, stimulate their inner motivations and improve their sense of career achievement, happiness and self-worth to meet their high job demands.

### AUTHOR CONTRIBUTIONS

HY: Contributed to conceptualizing and designing the work, data acquisition, data analysis and interpretation and drafting the manuscript QZ: Contributed to conception and design of the study, analysis and interpretation of data and critical revision. WS, JS, MX, HH and DL: Data acquisition interpretation and critical revision. The authors affirm that the methods used in the data analyses are suitably applied to their data within their study design and context, and the statistical findings have been implemented and interpreted correctly.

### ACKNOWLEDGEMENTS

We thank all the medical personnel involved in the fight against Omicron in Shanghai, China, for their cooperation, support and assistance during this investigation.

### FUNDING INFORMATION

This study was the National Key R&D Program (2020YFC2005900), the Joint Project of Chongqing Science and Technology Committee and Chongqing Health Committee.

(2020FYYX003), Chongqing Social Science Planning Talents Program (Construction and Application of Active Home Intelligent Medical Care Model: 2021YC053), Chongqing Talents and Famous Teachers Project (cstc2021ycjh-bgzxm0092) and the Science and Technology Committee of Chongqing, China (cstc2020jscx-cylhX0002).

### CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### DATA AVAILABILITY STATEMENT

The present study was approved by the Research Ethics Committee of the First Affiliated Hospital of Chongqing Medical University. The data that support the findings of this study are available from the corresponding author upon reasonable request.

### INFORMED CONSENT

Informed consent was obtained from all participants.

### ORCID

Hongmei Yi  <https://orcid.org/0000-0001-8526-3317>

Huanhuan Huang  <https://orcid.org/0000-0003-0845-7526>

### REFERENCES

- Abadi, M. B. H., Taban, E., Khanjani, N., Konjin, Z. N., Khajehnasiri, F., & Samaei, S. E. (2020). Relationships between job satisfaction and job demand, job control, social support, and depression in Iranian nurses. *The Journal of Nursing Research*, 29(2), e143. <https://doi.org/10.1097/jnr.0000000000000410>
- Al-Hamdan, Z., & Issa, H. B. (2021). The role of organizational support and self-efficacy on work engagement among registered nurses in Jordan: A descriptive study. *J Nurs Manag*, 30, 2154–2164. <https://doi.org/10.1111/jonm.13456>
- Ali, H., Fatemi, Y., Ali, D., Hamasha, M., & Hamasha, S. (2022). Investigating frontline nurse stress: Perceptions of job demands, organizational support, and social support during the current COVID-19 pandemic. *Front Public Health*, 10, 839600. <https://doi.org/10.3389/fpubh.2022.839600>
- Alinejad-Naeini, M., Razavi, N., Sohrabi, S., & Heidari-Beni, F. (2021). The association between health literacy, social support and self-efficacy in mothers of preterm neonates. *The Journal of Maternal-Fetal & Neonatal Medicine*, 34(11), 1703–1710. <https://doi.org/10.1080/14767058.2019.1644620>
- Arora, S., Grover, V., Saluja, P., Algarni, Y. A., Saquib, S. A., Asif, S. M., Batra, K., Alshahrani, M. Y., Das, G., Jain, R., & Ohri, A. (2022). Literature review of omicron: A grim reality amidst COVID-19. *Microorganisms*, 10(2), 451. <https://doi.org/10.3390/microorganisms10020451>
- Bartsch, C. E., Dürr, L., Forster, A., & Koob, C. (2021). How are key resources and key demands associated with nurses' work engagement during the COVID-19 pandemic? A cross-sectional study. *Zeitschrift für Evidenz, Fortbildung Und Qualität Im Gesundheitswesen*, 167, 57–67. <https://doi.org/10.1016/j.zeffq.2021.09.008>
- Batra, K., Singh, T. P., Sharma, M., Batra, R., & Schvaneveldt, N. (2020). Investigating the psychological impact of COVID-19 among healthcare workers: A meta-analysis. *International Journal of Environmental Research and Public Health*, 17(23), 9096. <https://doi.org/10.3390/ijerph17239096>
- Billings, J., Ching, B. C. F., Gkoka, V., Greene, T., & Bloomfield, M. (2021). Experiences of frontline healthcare workers and their views about support during COVID-19 and previous pandemics: A systematic review and qualitative meta-synthesis. *BMC Health Services Research*, 21(1), 923. <https://doi.org/10.1186/s12913-021-06917-z>
- Cañavate, G., Meneghel, I., & Salanova, M. (2023). The influence of psychosocial factors according to gender and age in hospital care workers. *The Spanish Journal of Psychology*, 26, e1. <https://doi.org/10.1017/SJP.2023.1>
- Chen, R., Sun, C., Chen, J. J., Jen, H. J., Kang, X. L., Kao, C. C., & Chou, K. R. (2021). A large-scale survey on trauma, burnout, and post-traumatic growth among nurses during the COVID-19 pandemic.

- International Journal of Mental Health Nursing*, 30(1), 102–116. <https://doi.org/10.1111/inm.12796>
- Chen, S., Zhang, Z., Yang, J., Wang, J., Zhai, X., Bärnighausen, T., & Wang, C. (2020). Fangcang shelter hospitals: A novel concept for responding to public health emergencies. *Lancet*, 395(10232), 1305–1314. [https://doi.org/10.1016/S0140-6736\(20\)30744-3](https://doi.org/10.1016/S0140-6736(20)30744-3)
- Goel, S., Angeli, F., Dhirar, N., Singla, N., & Ruwaard, D. (2018). What motivates medical students to select medical studies: A systematic literature review. *BMC Med Educ*, 18(1), 16. <https://doi.org/10.1186/s12909-018-1123-4>
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Physiology*, 86(3), 499–512.
- Deng, J., Liu, J., Guo, Y., Gao, Y., Wu, Z., & Yang, T. (2021). What motivates medical students to select medical studies: A systematic literature review. *BMC Public Health*, 21(1), 1076. <https://doi.org/10.1186/s12889-021-11028-9>
- Dohlman, L., DiMeglio, M., Hajj, J., & Laudanski, K. (2019). Global brain drain: How can the maslow theory of motivation improve our understanding of physician migration? *International journal of environmental research and public health*, 16(7), 1182. <https://doi.org/10.3390/ijerph16071182>
- Dong, M., Nie, A., Liu, C., & Zheng, J. (2022). Psychological resilience of patients with bladder cancer after radical cystectomy and urinary diversion: A cross-sectional study. *Psychooncology*, 31(1), 21–29. <https://doi.org/10.1002/pon.5770>
- Fang, X.-H., Wu, L., Lu, L.-S., Kan, X.-H., Wang, H., Xiong, Y.-J., Ma, D.-C., & Wu, G.-C. (2021). Mental health problems and social supports in the COVID-19 healthcare workers: A Chinese explanatory study. *BMC Psychiatry*, 21(1), 34. <https://doi.org/10.1186/s12888-020-02998-y>
- Feng, C., Hong, S., Fan, R., Shi, X., Ma, Z., Li, C., Liu, C., He, C., Fan, M., & Wang, R. (2022). Age and sex differences among mildly symptomatic and asymptomatic patients with omicron infection in 2022 in Shanghai, China. *Journal of Multidisciplinary Healthcare*, 15, 1909–1919. <https://doi.org/10.2147/JMDH.S375724>
- Finstad, G. L., Giorgi, G., Lulli, L. G., Pandolfi, C., Foti, G., León-Pérez, J. M., Cantero-Sánchez, F. J., & Mucci, N. (2021). Resilience, coping strategies and posttraumatic growth in the workplace following COVID-19: A narrative review on the positive aspects of trauma. *International Journal of Environmental Research and Public Health*, 18(18), 9453. <https://doi.org/10.3390/ijerph18189453>
- Ghanayem, M., Srulovici, E., & Zlotnick, C. (2020). Occupational strain and job satisfaction: The job demand-resource moderation-mediation model in haemodialysis units. *Journal of Nursing Management*, 28(3), 664–672. <https://doi.org/10.1111/jonm.12973>
- Giusino, D., Angelis, M. D., Mazzetti, G., Christensen, M., Innstrand, S. T., Faiulo, I. R., & Chiesa, R. (2022). "we all held our own": Job demands and resources at individual, leader, group, and organizational levels during COVID-19 outbreak in health care. A multi-source qualitative study. *Workplace Health Saf*, 70(1), 6–16. <https://doi.org/10.1177/21650799211038499>
- Gomes, A. R., Faria, S., & Lopes, H. (2016). Stress and psychological health: Testing the mediating role of cognitive appraisal. *West J Nurs Res*, 38(11), 1448–1468. <https://doi.org/10.1177/0193945916654666>
- Gu, Y., Zhu, Y., & Xu, G. (2022). Factors associated with mental health outcomes among health care workers in the Fangcang shelter hospital in China. *The International Journal of Social Psychiatry*, 68(1), 64–72. <https://doi.org/10.1177/0020764020975805>
- Guidetti, G., Converso, D., Sanseverino, D., & Ghislieri, C. (2022). Return to work during the COVID-19 outbreak: A study on the role of job demands, job resources, and personal resources upon the administrative staff of Italian public universities. *Int J Environ Res Public Health*, 19(4), 1995. <https://doi.org/10.3390/ijerph19041995>
- Guo, Y. F., Han, J., Zhang, Y., He, J., Yu, W., Zhang, X., Wu, J., Zhang, S., Kong, Y., Guo, Y., Lin, Y., & Zhang, J. (2022). SARS-CoV-2 omicron variant: Epidemiological features, biological characteristics, and clinical significance. *Frontiers in Immunology*, 13, 877101. <https://doi.org/10.3389/fimmu.2022.877101>
- Hosseinabadi, M. B., Ebrahimi, M. H., Khanjani, N., Biganeh, J., Mohammadi, S., & Abdollahfar, M. (2019). The effects of amplitude and stability of circadian rhythm and occupational stress on burn-out syndrome and job dissatisfaction among irregular shift working nurses. *J Clin Nurs*, 28(9-10), 1868–1878. <https://doi.org/10.1111/jocn.14778>
- Joo, J. Y., & Liu, M. F. (2021). Nurses' barriers to caring for patients with COVID-19: A qualitative systematic review. *International Nursing Review*, 68(2), 202–213. <https://doi.org/10.1111/inr.12648>
- Kato, Y., Chiba, R., & Shimazu, A. (2021). Work engagement and the validity of job demands-resources model among nurses in Japan: A literature review. *Workplace Health Saf*, 69(7), 323–342. <https://doi.org/10.1177/21650799211002471>
- Kim, H. J., & Shin, S. H. (2020). Development and validation of the nurse needs satisfaction scale based on Maslow's hierarchy of needs theory. *Journal of Korean Academy of Nursing*, 50(6), 848–862. <https://doi.org/10.4040/jkan.20195>
- Koontalay, A., Suksatan, W., Prabsangob, K., & Sadang, J. M. (2021). Healthcare workers' burdens during the COVID-19 pandemic: A qualitative systematic review. *Journal of Multidisciplinary Healthcare*, 14, 3015–3025. <https://doi.org/10.2147/JMDH.S330041>
- Labrague, L. J. (2021). Psychological resilience, coping behaviours and social support among health care workers during the COVID-19 pandemic: A systematic review of quantitative studies. *Journal of Nursing Management*, 29(7), 1893–1905. <https://doi.org/10.1111/jonm.13336>
- Li, L., Mao, M., Wang, S., Yin, R., Yan, H. O., Jin, Y., & Cheng, Y. (2022). Posttraumatic growth in Chinese nurses and general public during the COVID-19 outbreak. *Psychology, Health & Medicine*, 27(2), 301–311. <https://doi.org/10.1080/13548506.2021.1897148>
- Liu, J., Tong, Y., Li, S., Tian, Z., He, L., & Zheng, J. (2022). Compliance with COVID-19-preventive behaviours among employees returning to work in the post-epidemic period. *BMC Public Health*, 22(1), 369. <https://doi.org/10.1186/s12889-022-12709-9>
- Lu, J., Yu, Y., Zhao, Y., & Jenkin, M. (2021). The correlation between workers' working pressure and physical and mental health analyzed by the job demand-resource stress model. *Work*, 69(2), 573–583. <https://doi.org/10.3233/WOR-213500>
- Lussier, K. (2019). Of Maslow, motives, and managers: The hierarchy of needs in American business, 1960–1985. *Journal of the History of the Behavioral Sciences*, 55(4), 319–341. <https://doi.org/10.1002/jhbs.21992>
- Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V. G., Papoutsis, E., & Katsaounou, P. (2020). Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, Behavior, and Immunity* (2020). *Brain Behav Immun*, 88, 901–907. <https://doi.org/10.1016/j.bbi.2020.05.026>
- Peng, X., Zhao, H.-Z., Yang, Y., Rao, Z.-L., Hu, D.-Y., & He, Q. (2021). Post-traumatic growth level and its influencing factors among frontline nurses. During the covid-19 pandemic. *Front Psychiatry*, 12, 632360. <https://doi.org/10.3389/fpsy.2021.632360>
- Poh, L. W., Teo, I., Tewani, K., Tan, H. K., Yoon, S., & Sung, S. C. (2022). Understanding the needs of health care workers in Singapore during the COVID-19 outbreak: A qualitative analysis. *Am J Infect Control*, 50(10), 1133–1139. <https://doi.org/10.1016/j.ajic.2022.06.004>
- Shi, F., Li, H., Liu, R., Liu, Y., Liu, X., Wen, H., & Yu, C. (2021). Emergency preparedness and Management of Mobile Cabin Hospitals in China during the COVID-19 pandemic. *Frontiers in Public Health*, 9, 763723. <https://doi.org/10.3389/fpubh.2021.763723>



- Sun, C., Xie, C., Bu, G.-L., Zhong, L.-Y., & Zeng, M.-S. (2022). Molecular characteristics, immune evasion, and impact of SARS-CoV-2 variants. *Signal Transduction and Targeted Therapy*, 7(1), 202. <https://doi.org/10.1038/s41392-022-01039-2>
- Sun, N., Wei, L., Shi, S., Jiao, D., Song, R., Ma, L., Wang, H., Wang, C., Wang, Z., & You, Y. (2020). A qualitative study on the psychological experience of caregivers of COVID-19 patients. *American Journal of Infection Control*, 48(6), 592–598. <https://doi.org/10.1016/j.ajic.2020.03.018>
- Tang, W. (2022a). *Medical teams with more than 37,000 people retrograded to guard Shanghai, which would be remembered by the people of Shanghai forever*. [EB/OL]. <http://wenhui.whb.cn/zhuzhan/ztqf/kxxgzbdffyq/20220516/466985.html>
- Tang, W. (2022b). Shanghai Municipal Health Commission. *Coronavirus disease 2019 (COVID-19) situation report in Shanghai: data as reported by June 11, 2022*. <https://www.shanghai.gov.cn/nw48574/20220519/061ad28146de4d14a65a85a3019024c4.htm>
- Tomo, A., & Simone, S. D. (2019). Using the job demands-resources approach to assess employee well-being in healthcare. *Health Services Management Research*, 32(2), 58–68. <https://doi.org/10.1177/0951484818787687>
- Usman, M., Cheng, J., Ghani, U., Gul, H., & Shah, W. U. (2021). Social support and perceived uncertainties during COVID-19: Consequences for employees' wellbeing. *Current Psychology*, 23, 1–12. <https://doi.org/10.1007/s12144-021-02293-3>
- Zeng, W., Ma, S., Callan, V. J., & Wu, L. (2022). Exploring the doctor-patient relationship as a challenge job demand: Application of the job demands-resources model in a Chinese public hospital. *Psychology, Health & Medicine*, 27(8), 1661–1671. <https://doi.org/10.1080/13548506.2021.1916952>
- Zeng, W., Wu, X., Xu, Y., Wu, J., Zeng, Y., Shao, J., Huang, D., & Zhu, Z. (2021). The impact of general self-efficacy on psychological resilience during the COVID-19 pandemic: The mediating role of post-traumatic growth and the moderating role of deliberate rumination. *Frontiers in Psychology*, 12, 684354. <https://doi.org/10.3389/fpsyg.2021.684354>
- Zhang, H., Xie, F., Yang, B., Zhao, F., Wang, C., & Chen, X. (2022). Psychological experience of COVID-19 patients: A systematic review and qualitative meta-synthesis. *American Journal of Infection Control*, 50(7), 809–819. <https://doi.org/10.1016/j.ajic.2022.01.023>
- Zhang, X., Sheng, Q., Wang, X., & Cai, C. (2021). The experience of front-line nurses four months after COVID-19 rescue task in China: A qualitative study. *Archives of Psychiatric Nursing*, 35(4), 358–363. <https://doi.org/10.1016/j.apnu.2021.05.007>
- Zhang, X.-B., Xiao, W., Lei, J., Li, M.-X., Wang, X., Hong, Y.-J., Xu, P., & Sun, J. (2021). Prevalence and influencing factors of anxiety and depression symptoms among the first-line medical staff in Wuhan mobile cabin hospital during the COVID-19 epidemic: A cross-sectional survey. *Medicine (Baltimore)*, 100(21), e25945. <https://doi.org/10.1097/MD.00000000000025945>
- Zhao, H., Xie, S., Yang, H., He, Q., & Li, X. (2020). Infection prevention and control-relevant demand of health care workers in medical team during fighting against COVID-19. *Chin J Infect Control*, 19(5), 398–403. <https://doi.org/10.12138/j.issn.1671-9638.20206548>
- Zhao, Q., Wei, S., Yi, H., Song, J., Wang, X., Yang, J., Yan, J., Qian, K. L., Zhang, D., & Chen, L. (2023). Construction of the work checklist for healthcare workers in mobile cabin hospitals. *Chinese Nursing Management*, 23, 105–108.
- Zhong, Y., Schroeder, E., Gao, Y., Guo, X., & Gu, Y. (2021). Social support, health literacy and depressive symptoms among medical students: An analysis of mediating effects. *International Journal of Environmental Research and Public Health*, 18(2), 633. <https://doi.org/10.3390/ijerph18020633>

## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Yi, H., Wei, S., Song, J., Xiao, M., Huang, H., Luo, D., & Zhao, Q. (2023). Analysis of influencing factors of job demands of healthcare workers working in mobile cabin hospitals in China. *Nursing Open*, 10, 7368–7381. <https://doi.org/10.1002/nop2.1991>