

Nurses' Personality Traits and Perceived Work Environments During Public Health Emergencies: Implications for Nursing Workforce Planning

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Background: The nursing workforce faces substantial challenges, particularly in the aftermath of the COVID-19 era. Developing an effective strategy for workforce maintenance and the strategic deployment of nurses is crucial.

Purpose: This study aimed to explore and categorize nurses' personality traits, with a focus on analyzing differences in their perceptions of the nursing work environment.

Participants and Methods: Between January 2023 and February 2023, a multi-center cross-sectional study was carried out involving nurses from 12 tertiary hospitals actively engaged in frontline COVID-19 response duties. Through cluster sampling, surveys were distributed among eligible nursing staff, comprising a general information questionnaire, the Chinese Big Five Personality Questionnaire-Short Form, subjective evaluations of emergency nursing management, and the Chinese Nursing Work Environment Scale for Public Health Emergencies. Various statistical analyses, such as descriptive analysis, cluster analysis, non-parametric tests, and general linear model analysis, were employed to investigate the correlation between personality types and the perception of nursing work environments.

Results: The analysis encompassed 1059 valid questionnaires, reflecting the experiences of frontline nurses. The majority of these nurses possessed 1–5 years of experience, held junior professional titles, volunteered for their roles, and served as attending nurses. Categorization based on personality traits revealed three groups: resilient (35.60%), ordinary (16.15%), and distressed (48.25%) types. Significantly distinct perceptions of nursing work environments emerged among these categories, with resilient and ordinary types expressing notably higher satisfaction compared to the distressed group (H value = 256.487, $p < 0.001$).

Conclusion: This study illustrates the connection between nurses' perceived working environment and their personality traits. Nursing managers should factor in nurses' personality traits when choosing and deploying frontline responders during public health emergencies. Prioritizing resilient-type nurses and crafting a supportive work environment that aligns with nurses' characteristics is indispensable for an effective emergency response.

Keywords: workforce management, cross-sectional studies, human resources, health system

Introduction

The escalation of public health emergencies (PHEs), exemplified by the global Covid-19 outbreak in early 2020, has significantly impacted the nursing workforce,¹ generating immense demands and stressors.^{2,3} Studies reveal that nurses have grappled with considerable challenges, encompassing physical strain, post-traumatic stress, and psychological issues, resulting in decreased well-being and adverse job outcomes.⁴ Consequently, there has been a noticeable decline in job satisfaction, a surge in occupational burnout, and an increased intention to leave. These trends bear long-term consequences on the workforce's resilience in coping with subsequent PHEs.^{5,6} Research indicates that fostering a supportive nursing work environment is pivotal for the mental and physical well-being of nurses. This not only improves the quality of patient care but also advances health equity, offering viable strategies to mitigate job dissatisfaction and fortify organizational resilience during PHEs.⁷ The nursing work environment is shaped by various factors

including organizational management style, job designations, and organizational culture. It encompasses facets such as leadership and management approaches, autonomy, professional growth opportunities, support from colleagues, recognition initiatives, system enhancements and innovations, workload management, provision of resources, rights, and security measures, among other elements related to nursing management.⁸ These components are often intangible, relying heavily on nurses' perceptions, rooted in their values and unique needs, and with manifestations in action in real-world. By acknowledging and addressing these multifaceted aspects that contribute to a supportive work environment, organizations can substantially enhance the well-being of their nursing staff, thereby fortifying their capacity to navigate future public health emergencies effectively.

According to the Person-Environment Fit theory, an individual's physiological and psychological characteristics dynamically interact with the organization they are part of. When an individual's personality, needs, goals, and values align closely with the traits of their workplace, a complementary relationship emerges, fostering positive work attitudes, behaviors, and outcomes.⁹ While existing research has primarily concentrated on the alignment between nurses and stable work environments, there's a dearth of studies exploring nurses' perceptions of the nursing work environment amid PHEs responses. Given that individual personality traits influence stress coping patterns and adaptation to the environment,^{10,11} previous research has revealed that nurses' personality traits during emergencies significantly impact their perception of nursing management characteristics. These perceptions, in turn, bear substantial effects on job satisfaction, competence, retention, and various other occupational outcomes.^{12,13} Notably, nurses' assessments of task assignments, workload, and human resource factors were found to be mediated or moderated by their personality, highlighting the intricate relationship between nurses' traits and their perception of management performance.

A healthy work environment aids in alleviating healthcare professionals' negative perceptions of resource scarcity and work stress during emergencies, fostering positive interactions between nurses and the emergency work environment, thereby serving as an effective measure to enhance emergency response efficiency and outcomes.⁷ However, despite the critical role of a conducive work environment, systematic research focusing on the alignment between individuals and their work environment during PHEs remains limited due to the dynamic and task-driven nature of emergency nursing teams.

Study Objectives and Hypothesis

In light of the necessity for resilient healthcare systems post-pandemic and the crucial need for strategic human resource planning, this study aims to explore the personality traits of frontline nurses and their correlation with perceptions of the nursing work environment during PHEs. Through empirical evidence, the study seeks to offer practical insights to improve the effectiveness of nursing management in responding to future PHEs.

By employing a person-environment matching framework, the hypothesis of this study proposes that nurses' personality traits play a role in shaping their perceptions of the work environment during PHEs, with significant variations anticipated in profile types.

Materials and Methods

Study Design

This research adopted a cross-sectional study design, employing a digital survey administered across 12 tertiary hospitals situated in Shanghai. The study findings were reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.¹⁴

Participants

This study targeted registered nurses employed within the 12 hospitals designated as official training bases for the Shanghai Public Health Emergency Team-Nursing, a component of the Shanghai regional public health Rapid Response Team. Utilizing a method of simple cluster sampling, a total of 3731 nurses who were actively involved in frontline duties during the Covid-19 outbreak or had previous experience in similar roles during incidents such as Ebola, SARS, earthquakes, and comparable PHEs, were identified and their information was recorded in a digital database. Additionally, eligible participants were required to meet the following criteria: (1) possess a minimum of one year of

work experience, and (2) be willing to participate in the survey. Nurses in part-time positions or serving as nursing interns were excluded from the study.

Instruments

The general information encompassed two main components: social demographic data of the participating nurses and an exploration of their experiences during PHEs. Developed by our research team, this comprehensive form integrated key factors identified to influence nurses' preparedness during emergencies, drawing from insights gathered through interviews with nursing managers associated with the SH-PHE-nursing team (under peer-review). The form delved into essential details such as job tenure, professional titles, held positions, weekly work hours, work locations, and specific role functions during PHEs.

Assessment of nurses' personality traits utilized the Chinese version of the Big Five Personality Inventory Brief Version (CBF-PI-B), established by Wang Mengcheng et al.¹⁵ Widely employed in Chinese contexts, especially among nursing populations, this inventory comprises 40 items rated on a 6-point Likert scale, gauging five dimensions: extraversion, neuroticism, conscientiousness, openness, and agreeableness. The inventory showcased strong internal consistency in this study, evidenced by a calculated Cronbach's alpha coefficient of 0.866.

The evaluation of nurses' perceptions of the nursing work environment during PHEs was conducted using the Chinese version of the Nursing Work Environment Scale for Public Health Emergencies (C-NWE-PHE).¹⁶ This scale utilizes a 6-point Likert scale comprising 28 items distributed across five dimensions: Workforce and Deployment Support, Leadership and Emergency Management, Autonomy and Empowerment, Teamwork and Collaboration, and Logistics and Humanistic Care. With robust content validity (S-CVI/Ave = 0.93) and strong model fit indices (CFI 0.97, TLI 0.97, RMSEA 0.065, GFI 0.97, AGFI 0.86), the scale demonstrated high reliability and validity. The Cronbach's alpha coefficients for each dimension ranged from 0.96 to 0.98, indicating strong internal consistency across all dimensions.

The evaluation of nurses' perceptions of working characteristics was conducted through a four-question survey designed by our research team, drawing insights from prior studies focusing on prevalent strategies utilized to enhance organizational resilience.¹⁷ It assessed various facets, such as the appropriateness of task assignments, perceived workload suitability, and overall appraisal of nursing management performance. Using a 10-point scoring system, the survey aimed to quantify these dimensions, providing nurses with the opportunity to offer detailed and nuanced evaluations of these critical elements in nurse management performance.

Data Collection

Before initiating the formal survey, the research team involved nine experts to validate the survey format and quality control measures. Additionally, a questionnaire pre-test was conducted with 20 clinically qualified nurses who met the inclusion criteria. This pre-test aimed to evaluate the readability, structure, and feasibility of data collection in the questionnaire. Between January 2023 and February 2023, over a period of 60 days, the Chaoxing platform, integrated with the nurse information database, a digital system with ID-authorized access, was utilized to distribute survey invitations across the 12 affiliated hospitals. These invitations outlined the research objectives and emphasized the benefits of participation. The questionnaire commenced with an initial item confirming participants' eligibility and securing their informed consent. Subsequently, out of the cluster of 3731 nurses, 1156 participants responded, resulting in a response rate of 30.98%.

Data Analysis

The data extracted from the Chaoxing platform were transferred into Excel format and managed and analyzed using SPSS 28.0 software. The required sample size was estimated using G*Power 3.1 software. Based on a study clustering nurses' personality using five dimensions of CBF-PI-B, effect sizes ranging from 0.34 to 0.53 were determined for differences among nurses' groups.¹⁸ To achieve 95% power to detect an effect size of 0.34 at a 5% level of significance using the F-test method, a minimum total of 432 participants was deemed adequate. For analysis, invalid questionnaires lacking frontline experiences were identified and excluded, resulting in 1059 valid questionnaires available for analysis.

Descriptive statistics, including frequency percentages and mean standard deviations, were calculated for describing the participants' characteristics.¹⁹ To determine suitable analysis methods, Q-Q plots confirmed the normal distribution of CBF-PI-B data, allowing for the standardization of clustered variables through z-scores. Subsequently, systematic clustering was performed, initially considering 2–4 clusters for nurse personality types. Additionally, K-means clustering analysis was selected to determine the best-fitting clusters, considering the sample size, number of latent classes and variables, and proportion balance.^{20,21} This analysis resulted in the identification of three distinct clusters. Building on previous research on nurses' personality traits and occupational burnout,¹⁸ three distinct nurse personality types were named: adaptive, ordinary, and distressed. Then, the Analysis of Variance method was utilized to test the differences in personality traits among the three clusters. Partial eta square (η^2) was estimated to showcase the effect size of personality traits contributing to the identified clusters of nurses. An η^2 value of 0.25 or higher was considered ideal, representing a moderate effect.²²

Given the non-normal distribution of scores in the C-NWE-PHE, statistical differences in nurses' perception of the work environment across different clusters were tested using non-parametric tests and pairwise comparisons, specifically the Kruskal–Wallis H non-parametric method. Within the hypothesis of person-environment fitting, the general linear regression model was specifically applied to evaluate the impact of nurses' subjective evaluations of management performance and the interaction with their personality traits on the perceived nursing work environment. This method was suitable for examining the relationship between categorized variables and a dependent variable measured on a continuous scale.²³

Ethical Approval

This study adhered to the principles of the Declaration of Helsinki. Ethical clearance was obtained from the ethics committee of Shanghai Jiao Tong University School of Medicine (Approval No. SJUPN-202120), and the investigation protocol involving 12 affiliated hospitals received additional approved (Approval No. SJUPN-HY-202304-3-KS1). All participants were informed of the study objectives and provided written digital consent agreement before participation.

Results

Participants' Characteristics

Among the 1059 included nurses, a significant proportion had 1–5 years of experience as registered nurses (43.8%), held primary professional titles (82.8%), and voluntarily participated (43.5%). The majority (81.3%) served as attending nurses employed by hospitals and were deployed to various frontline locations across Shanghai, including community services, designated hospitals, carbine hospitals, public health centers, customs, and offered support in other provinces like Hainan and Wuhan. In terms of workload, most nurses reported working 5–8 hours per day (54.4%) and less than or equal to 5 days per week (75.2%).

The Assessment of Nurses' Perceived Management Performances and Working Environment

The comprehensive evaluations by nurses of emergency nursing management within their teams reflected ratings for human resource allocation (6.6 ± 4.2), task assignment (6.6 ± 4.2), workload (6.4 ± 4.2), and emergency management (6.7 ± 4.2) (Table 1). Non-parametric Spearman correlation analysis revealed moderate positive correlations between nurses' overall scores evaluating management performance and their perceptions of the nursing work environment (correlation coefficients ranged from 0.255 to 0.296, $P < 0.001$).

The Categorization of Nurses' Personality Traits

Using systematic and K-means clustering analysis, nurses were categorized into three clusters: resilient-type ($n=377$, 35.60%), ordinary-type ($n=171$, 16.15%), and distressed-type ($n=511$, 48.25%) nurses. Table 2 presents the various personality traits contributing to these identified clusters, with effect sizes ranging from 0.302 to 0.606 ($\eta^2 > 0.25$). Analysis of variance revealed statistically significant differences in scores across dimensions among the three nurse groups (P -value < 0.001). Figure 1 illustrates score distributions across personality trait dimensions for these nurse clusters.

Table 1 Characteristics of the Participants (n=1059)

Work experience	Frequency and percentage	Work experience	Frequency and percentage
Job experience		Job positions	
<5years	464 (43.8)	Nurse leader	34(3.2)
5–10 years	235(22.2)	Nurse manager	79(7.5)
10–15 years	159(15.0)	Specialist nurse (infectious control)	40(3.8)
15–20 years	91(8.6)	Coordinator nurse	45(4.2)
>20 years	110(10.4)	Attending nurse	863(81.3)
Title level		Workplace (ever and current)	
Primary	877 (82.8)	Local residence community	112(10.57)
Intermediate	169(16.0)	Fangcang Shelter	315(29.7)
Deputy senior or above	13(1.2)	Public health centre	61(5.8)
Willingness		Designated hospital	345(32.6)
Organization assignment	183 (17.3)	Customs airport	20(1.9)
Organization orders	135 (12.7)	Hainan Province	176(16.6)
Voluntary participation	461 (43.5)	Wuhan City	27(2.5)
Not report	281 (26.5)	Other places	94(8.9)
Work shift		Nurses' perceptions of working characteristics (Means \pm SD)	
0–4 hours per day	382(36.1)	Human resources	6.6 \pm 4.2
5–8 hours per day	576(54.4)	Task assignment	6.6 \pm 4.2
>8 hours per day	101(9.2)	Workload	6.4 \pm 4.2
Workdays		Nursing management	6.7 \pm 4.2
≤ 5 days per week	796(75.2)		
> 5 days per week	263(24.8)		

Abbreviation: SD, Means \pm SD.

Table 2 The Scores of Personality Traits of Three Types of Nurse Groups

Personality traits	Overall (n=1059)	Resilient-type (n=377)	Ordinary-type (n=171)	Distressed-type (n=511)	F-value	ηp^2
Neuroticism	23.87 \pm 8.47	15.99 \pm 5.23	34.71 \pm 5.41	26.07 \pm 5.33	312.914*	0.606
Conscientiousness	36.55 \pm 6.06	41.34 \pm 4.05	39.53 \pm 3.66	32.01 \pm 4.35	603.018*	0.533
Agreeableness	36.24 \pm 5.94	41.37 \pm 4.26	34.95 \pm 4.80	32.89 \pm 4.56	394.146*	0.427
Openness to experience	34.14 \pm 7.19	37.73 \pm 5.90	41.05 \pm 4.81	29.17 \pm 4.87	465.053*	0.468
Extraversion	30.53 \pm 6.19	33.66 \pm 6.15	34.13 \pm 4.31	27.01 \pm 4.64	228.203*	0.302

Notes: The F-value was calculated using the method of Analysis of Variance. * denotes the statistically significant level that $P < 0.001$.

Abbreviation: ηp^2 , Partial eta square.

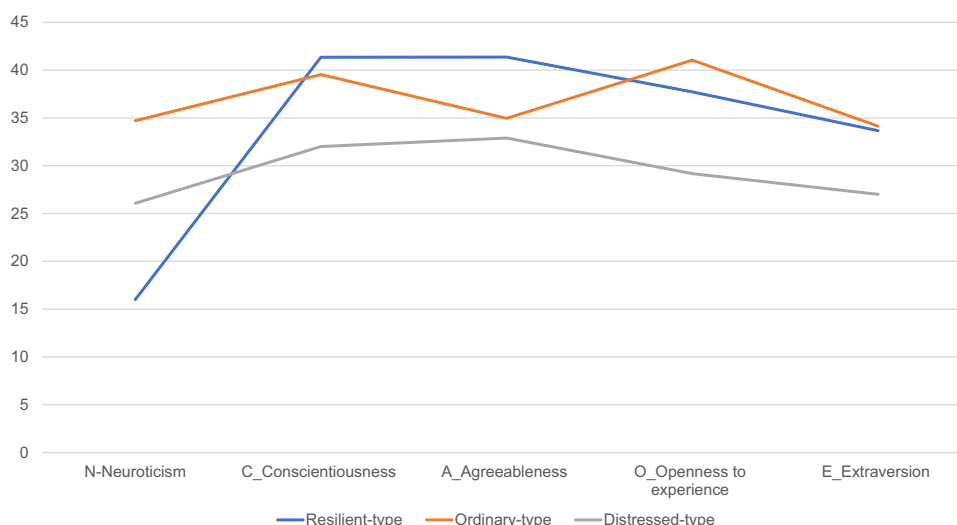


Figure 1 Profiling nurses' personality traits using K-means clustering analysis.

Profiling Nurses' Personality Traits and Differences in Perceived Nursing Work Environment

Through the Kruskal–Wallis H non-parametric test, differences were observed in the perception of nursing work environments among nurses with different personality types. As shown in Table 3, resilient-type and ordinary-type nurses reported better overall scores than distressed-type nurses ($H = 256.487$, $p < 0.001$). Regarding specific dimensions, resilient-type nurses outperformed ordinary-type nurses, who in turn outperformed distressed-type nurses in workforce and deployment support, teamwork and collaboration, as well as logistics and humanistic care. Additionally, leadership and emergency management, as well as autonomy and empowerment, were areas where resilient-type and ordinary-type nurses excelled compared to distressed-type nurses.

The analysis of a linear regression model enabled the calculation of interaction effects between nurses' personality traits and their subjective perceptions of working characteristics. The findings revealed a significant interaction between nurses' personality traits and their assessments of task assignment ($F\text{-value}=1.966$, $P\text{-value}<0.05$) and nursing management evaluation ($F\text{-value}=2.835$, $P\text{-value}<0.001$). These interactions notably impacted the perception of the nursing work environment, as outlined in Table 4.

Table 3 Profiling Nurses' Personality Traits in Perception of Nursing Work Environment

Subscales	Overall (n=1059)	Resilient-type (n=377)	Ordinary-type (n=171)	Distressed-type (n=511)	Pairwise comparison $P<0.05$	H-value	Sig.
Workforce and Deployment Support	5.3 (1.0, 6.0)	5.9 (2.6, 6.0)	5.8 (1.0, 6.0)	4.9 (1.0, 6.0)	Resilient-type>ordinary-type>distressed-type	234.849	<0.001
Leadership and Emergency Management	5.1 (1.0, 6.0)	5.9 (3.0, 6.0)	5.8 (1.0, 6.0)	4.9 (1.0, 6.0)	Resilient-type, ordinary-type>distressed-type	228.098	<0.001
Autonomy and Empowerment	5.2 (1.0, 6.0)	5.9 (4.0, 6.0)	5.8 (1.0, 6.0)	4.9 (1.0, 6.0)	Resilient-type, ordinary-type>distressed-type	244.465	<0.001
Teamwork and Collaboration	5.3 (1.0, 6.0)	5.9 (4.0, 6.0)	5.9 (1.0, 6.0)	5.0 (1.0, 6.0)	Resilient-type>ordinary-type>distressed-type	269.579	<0.001
Logistics and Humanistic care	5.2 (1.0, 6.0)	5.9 (1.5, 6.0)	5.8 (1.0, 6.0)	4.9 (1.0, 6.0)	Resilient-type>ordinary-type>distressed-type	235.309	<0.001
Overall scale	5.2 (1.0, 6.0)	5.9 (3.5, 6.0)	5.8 (1.0, 6.0)	5.0 (1.0, 6.0)	Resilient-type, ordinary-type>distressed-type	256.487	<0.001

Notes: The H-value was calculated using the Kruskal–Wallis H non-parametric test. The "sig". column refers to the significance level, with the criteria based on the p-value.

Table 4 Nurses' Personality and Perceptions of Working Characteristics Interactively Influencing Work Environment (n=1059)

Overall evaluation	III-type quadratic sum	Df	Mean square	F-value	Sig.
Personality & Human resources	11.054	15	0.737	1.641	0.057
Personality & Task assignment	12.612	14	0.901	1.966	0.017
Personality & Workload	12.199	17	0.718	1.568	0.066
Personality & Nursing management	16.448	13	1.265	2.835	<0.001

Notes: The F-value was calculated using a general linear regression model. The "sig". column refers to the significance level, with the criteria based on the p-value.

Abbreviation: Df, degree of freedom.

Discussion

This study represents the inaugural exploration of nurses' personality traits and their perceived work environment amid PHEs. Grounded in the theoretical framework of Person-Environment Fit, the research identifies three discernible patterns of nurses' personality traits, each demonstrating notable associations with their perceptions of the work environment. Additionally, an optimal pattern for PHEs duties is discerned from the analysis. The findings not only outline the current landscape of both personal attributes and contextual perceptions among nurses but also offer a managerial strategy to address the critical shortage in the nursing workforce, particularly in preparation for future PHEs.

This study's findings unveiled a significant departure from prior assessments of nurses' personality traits within standard hospital environments,¹⁸ notably showcasing situational specificity. Particularly during emergency scenarios, nurses identified as resilient showcased distinctive attributes: lower neuroticism, heightened conscientiousness and agreeableness, along with moderate levels of openness and extraversion. Crucially, this resilient cohort perceived a notably healthier nursing work environment in comparison to their counterparts categorized as ordinary-type and distressed-type nurses. Research indicates that nurses with lower neuroticism and higher extraversion tend to demonstrate superior psychological resilience, effectively managing stress and experiencing reduced burnout risks.^{13,24} Additionally, resilient-type nurses showed more pronounced perceptions in crucial areas such as human resource allocation, teamwork, collaboration, and providing essential guarantees of humanistic care. These aspects strongly align with the core focuses of emergency nursing management during PHEs,^{4,25,26} as evidenced by interaction effect analysis within this study.

Moreover, this study reveals that a majority of nurses fall into the ordinary and distressed types, characterized by lower levels of conscientiousness and agreeableness. Notably, a study by Paiman et al demonstrated a positive correlation between these personality traits and knowledge transfer, reception, and sharing among academic populations.²⁷ This finding underscores the necessity of these traits in the demanding learning and collaborative environments often encountered during PHEs, fostering trust, supportive atmospheres within organizations and teams, and enhancing job performance. However, traits such as openness to experience and extraversion, linked to personal psychological interest diversity,²⁸ were not prominently observed in resilient, ordinary, and distressed types. Given the temporary construction of nursing organizations and teams for PHEs frontline duties, these personality aspects appear less critical, showing lower effect sizes in contributing to the identified nurse clusters. These findings offer new perspectives for personality studies, especially in crisis response and coping contexts, necessitating further research focusing on human resources in such situations.

Considering the vulnerability of nurses to negative emotions, occupational burnout, and increased turnover rates during PHEs,⁶ it's crucial for nursing managers to carefully factor in nurses' personality traits when making decisions about their roles on the frontline. Leveraging the available nursing workforce, prioritizing resilient-type nurses or individuals exhibiting lower neuroticism, higher conscientiousness, and agreeableness traits can notably bolster the capabilities of emergency nursing teams. This strategic approach can significantly aid in navigating high-pressure

environments, strengthening teamwork dynamics, and fostering a sustainable and healthy work environments.²⁹ Additionally, it highlights the pivotal role of managers in providing intense care and support within the workplace, especially for nurses displaying ordinary or distressed tendencies. Proposing tailored training and leadership support solutions designed for knowledge development, specifically tailored for resource-constrained settings, is crucial.^{30,31} This approach aims to cultivate a workplace culture that is more supportive, empathetic, and capable of meeting the diverse needs of nurses during challenging circumstances.

An intriguing discovery was that nurses perceived the nursing work environment more positively during emergency situations than in standard hospital settings, a trend consistent with the findings of Cheng et al.³² This change in perspective could partly be linked to the increased attention towards nursing teams by global healthcare systems post the Covid-19 outbreak.^{33–35} These efforts were aimed at bolstering logistical support and enhancing frontline work conditions, resulting in improved efficiency during emergency responses.³⁶ Additionally, there was a significant emphasis on the critical role of disaster preparedness education, covering indispensable knowledge and skills essential for effective emergency responses. Another noteworthy factor contributing to the enhanced professional autonomy and empowerment during emergencies,^{37,38} compared to standard hospital settings, is the ability to apply specialized knowledge, skills, and experience for prompt decision-making concerning various complex health issues and conditions. However, it's important to acknowledge that our study's specific sample might have influenced the findings related to emergency work environments. Since 2020, the establishment of the Shanghai rapid response nursing team, designed as a long-term workforce strategy for regional health systems, underwent training grounded in competency-driven programs.^{39–41} These initiatives were centered on enriching nurses' expertise. Within management practices, nursing leaders gravitated towards transformational leadership and empathy,^{42–44} esteeming team knowledge, experience, and actively promoting teamwork.^{45,46} By focusing on nurses' physical and logistical requirements while providing mental health care, ensuring fundamental needs—comprising physical, safety, and psychological well-being—are met becomes crucial in mitigating burnout, enhancing work efficiency, and bolstering job satisfaction. Moreover, nursing managers prioritize supporting nurses' families, recognizing its impact on enhancing overall nursing quality.⁴⁷ When striving to build a resilient emergency nursing work environment, it's vital to consider various facets. This includes understanding nurses' individual characteristics, adapting the workforce and assignments as per the demands of emergency tasks, delivering comprehensive emergency training, ensuring essential logistical supplies, fostering shared decision-making, and advancing the provision of compassionate, human-centered care.

Through empirical investigation, the study's findings significantly advance the theory of person-environment fit by revealing how nurses' personality traits correlate with their perceived work environment, particularly during PHEs. These findings were initially tested to elucidate the formation mechanism of person-environment fit, with a focus on situational specificity. Nursing work environments during PHEs encompass critical elements such as professional identity, organizational structure, position within the team, group relationships, and leadership dynamics. These components are closely intertwined with nurses' personalities and exert a profound influence on their practice and job performance. The observed alignment between specific personality traits and the perceptions of the work environment suggests a heightened level of fit between their personality and job requirements. This fitting ultimately contributes to fostering positive outcomes such as job satisfaction, resilience, and psychological well-being among nurses in the context of PHEs.

Limitations and Strengths

The findings of this study offer valuable insights into managing nursing staff resources through the lens of person-environment fit. However, it's important to acknowledge certain limitations that should be considered when interpreting the results. One limitation is the sample size and diversity, given the focus on specific geographical regions and health policies tailored to Shanghai City. However, the deliberate selection of nursing staff with extensive experience in frontline work during PHEs can bolster the validity of the results, particularly in exploring the alignment between personal traits and environmental characteristics—an area of research that has been relatively underexplored. On the flip side, the strategies for nursing workforce planning derived from Shanghai could offer significant insights, particularly for mega-cities and during the post-Covid-19 recovery period. Nonetheless, it's essential to recognize the limitations of relying on cross-sectional studies and self-reported data. This approach may hinder the ability to establish causality and could introduce response bias or subjective interpretations. Future studies employing longitudinal and case study designs

could overcome these limitations and provide a more comprehensive understanding of the relationship between personality traits and perceived work environment among nurses during PHEs. Such approaches would facilitate systematic analysis and shed further light on the factors influencing nurses' experiences in emergency contexts.

Implications for Workforce Management

The identification of an optimal pattern of nurses' personality traits for PHEs duties, viewed through the lens of person-environment fit, holds promise for enhancing job performance. This suggests that specific combinations of personality traits may offer advantages when selecting nurses for frontline roles and allocating them to suitable positions and functions during emergencies, underscoring the importance of aligning individual characteristics with environmental demands. Thus, prioritizing resilient-type nurses with certain personality traits for PHE frontline duties could yield substantial benefits.

Moreover, the investigation into the association between nurses' personality traits and perceived environmental characteristics aims to aid nursing managers in cultivating a supportive work environment. Empowering team leaders at different levels to plan the nursing workforce is crucial, as they possess firsthand knowledge of nurses' personality traits, needs, and capabilities. By addressing domains easily discernible by nurses, such as task appropriateness, workload suitability, and effective leadership, efforts can be directed towards improving the nursing working environment. Identifying various types of nurses based on personality traits can inform targeted interventions, underscoring the importance of recognizing individual differences when devising staffing strategies, organizational policies, and interventions to optimize fit and enhance outcomes for nurses working in PHEs contexts. Consequently, employing more strategic measures can effectively reduce nurses' intentions to leave, improve their job outcomes, and significantly enhance both their physical and psychological well-being.

Furthermore, healthcare policymakers and higher-level governmental and hospital managers should pay more attention to invest in organizational policies and culture cultivation, aligning with the identified personality traits conducive to success in PHE duties. This may involve promoting a culture of resilience, fostering open communication, and providing resources to support nurses' well-being. Such investments can lead to a more robust and adaptable healthcare workforce, better prepared to handle the challenges of PHEs.

Conclusion

Through the lens of workforce planning and person-environment fit, the findings revealed a significant association between nurses' personality traits and their perceptions of the working environment within the context of PHEs. This suggests a potential for these traits to influence decisions regarding the allocation and training of nursing staff. Further research is imperative to untangle the underlying mechanisms influencing job performance and perceived working conditions. This deeper comprehension holds significant importance in facilitating nurse deployment and enhancing work environments, especially in future responses to public health crises.

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Disclosure

The authors report no conflicts of interest in this work.

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