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Self-efficacy and family support in the relationship between stress and readiness for disaster response among nurses: a mediation analysis

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Self-efficacy and family support in the relationship between stress and readiness for disaster response among nurses: A mediation analysis

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Self-efficacy and family support in the relationship between stress and readiness for disaster response among nurses: A mediation analysis

Abstract

Background: Nurses' readiness for disaster response is influenced by stress, self-efficacy, and family support. Understanding these mediating roles is crucial for enhancing readiness and ensuring effective patient care during disasters. This study examined whether self-efficacy and family support can mediate the relationship between stress and readiness for disaster response among nurses.

Methods: This cross-sectional study included 476 registered nurses. Data regarding demographics, work-related characteristics, perceived family support, and the Perceived Stress Scale-14, General Self-Efficacy Scale, and Readiness for Disaster Response Scale were collected. Descriptive statistics and Pearson's correlation were used to analyze the data. The mediating roles of self-efficacy and family support were assessed using the PROCESS macro in SPSS; the indirect effects were evaluated using 10,000 bootstrap samples.

Results: Nurses' stress negatively correlated with self-efficacy and family support, whereas self-efficacy positively correlated with family support. Nurses' readiness for disaster response negatively correlated with stress, and positively correlated with self-efficacy

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and family support. Self-efficacy significantly mediated the relationship between stress and readiness for disaster response; however, family support did not show any significant indirect effect.

Conclusions: These findings suggest that self-efficacy may play an important role in the relationship between stress and readiness for disaster response conversely, family support—although beneficial—did not significantly mediate this relationship. Considering the cross-sectional nature of the study, causal relationships cannot be inferred. Potential strategies to foster self-efficacy and readiness may include skill training, scenario-based drills, supportive workplace policies, and family engagement.

Keywords: nurse, Self-efficacy, Family support, Stress, Disaster readiness, Disaster preparedness, Readiness for disaster response

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Background

The United States Agency for International Development reported an annually increasing frequency of natural and human-made disasters. Nurses frequently serve on the front line during disasters, making their readiness for disaster response crucial to ensure optimal patient outcomes, as well as to maintain the resilience and sustainability of healthcare systems [1]. Taiwan experiences frequent natural disasters—including typhoons, floods, landslides, and earthquakes—due to its location within a geographical fault zone and the impacts of climate change. The water park explosion in 2015 and coronavirus disease 2019 (COVID-19) pandemic in 2020 underscore the critical need for an efficient and effective disaster response among nurses, particularly hospital nurses, in Taiwan [2]. Understanding the mechanisms that influence disaster readiness among Taiwanese nurses is critical to ensuring the timely and effective provision of disaster care.

A disaster is defined as a hazardous event (natural or induced) that seriously disrupts the normal functioning of society and causes widespread human, material, or environmental losses that exceed the ability of the affected society to cope using only its resources [3]. Readiness involves a series of activities to develop operational capacity and enable an effective response in the event of a disaster [4]. Disaster readiness encompasses preparedness measures and resilience-building efforts undertaken by individuals, communities, and institutions to mitigate the adverse effects of disasters [5-6],

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and the effectiveness of nursing care largely depends on nurses' readiness [4, 7].

Despite their predeployment experience with trauma, wound care, infection control, and perioperative care, nurses may still feel unprepared and unable to care for patients during disasters [2, 8-9]. Readiness for disaster response among nurses may vary based on individual factors, such as their knowledge of epidemiology, physiology, pharmacology, psychology, technical skills, cultural background, and experience in disaster response and emergency or intensive care. Readiness is highly linked to willingness; thus, the development of educational programs and remuneration models aimed at increasing nurses' willingness enhance their readiness to care for high-risk patient groups, particularly during a pandemic [10]. Organizational factors, such as staffing levels, available resources, and support systems, also play a critical role [2, 6]. Therefore, nurses' self-perceived readiness is multifaceted and can differ significantly from their typical working environment, potentially affecting their ability to respond effectively to disasters [2].

A disaster undoubtedly constitutes a significantly stressful event, particularly for nurses who bear the responsibility of medical care during such crises. Stress encompasses the psychological and physiological responses of the body to perceived threats or challenges, constituting a fundamental aspect of the human experience that includes cognitive, emotional, behavioral, and

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physiological dimensions [11]. The coping theory suggests that when individuals face threats or challenges, they employ diverse coping strategies to manage stress and regain a sense of equilibrium [11]. However, the effectiveness of these coping mechanisms may diminish when confronted with extreme events—such as disasters. The depletion or potential loss of coping resources induces stress and hinder adaptive functioning, thereby compromising readiness for disaster response [12].

Readiness for disaster response among nurses may also vary based on their self-efficacy and family support, which are related to an individual's abilities and psychological support. Self-efficacy refers to an individual's belief in their ability to perform the behaviors required to achieve specific goals or outcomes [13]. According to the self-efficacy theory, an individual's belief regarding their ability to influence situations strongly affects their capacity to competently confront challenges and the decisions they are likely to make [13]. Self-efficacy empowers nurses and nursing students to manage stress, make prompt decisions, and effectively deliver critical care under pressure [14]. An elevated level of self-efficacy correlates with heightened confidence in managing emergencies, thereby enhancing readiness and facilitating effective responses [6]. Family support is another important factor influencing readiness for disaster response. Family support includes emotional, instrumental, and informational assistance provided by family members [15] that significantly mitigates job-

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related stress and prevent burnout [16]. Supportive families are characterized by effective communication and contribute to children's adaptation by mitigating the effects of negative life events, thereby shielding them from facing developmentally inappropriate challenges [17].

Studies have reported that stress can impair cognitive function, decision-making abilities, and overall performance, potentially affecting nurses' readiness for disaster response and the ability to respond effectively to disaster situations. They have also shown that elevated stress levels correlate with reduced readiness for disaster response [18-20]. Factors such as workload, resource availability, personal resilience, and organizational support all are essential in influencing nurses stress levels and their readiness to respond effectively during emergencies [19, 21-22]. Therefore, understanding the impact of stress on nurses' disaster response readiness is essential to formulating effective strategies and ensuring optimal performance during crises.

A study conducted by Cabrera-Aguilar et al. [23] reported that resilience was positively correlated with self-efficacy and negative correlated with stress. Moreover, self-efficacy was found to mediate the connection between resilience and work engagement, as well as between stress and work engagement among nurses. Studies have consistently reported that higher levels of self-efficacy among nursing students are linked to enhanced readiness for disaster response [24-25]. Nurses are often at the forefront of

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disasters; therefore, self-efficacy influences their readiness and affects their capability to deliver effective care under high-stress conditions, playing an indispensable role in how individuals prepare for and respond to disasters.

Negative correlations have been observed between stress and family support [15]. Research has revealed that adolescents experiencing low-income family functioning reported higher levels of stress and a greater prevalence of psychotic-like experiences during the COVID-19 pandemic [16]. Family support systems are associated with enhanced psychological well-being, reduced stress levels, and improved coping mechanisms, all of which are crucial for effective readiness for disaster response. Investigating the role of family support in nurses' readiness for disaster response can assist in the development of appropriate health policies, and facilitate the establishment of robust support systems that enhance their readiness to effectively respond to disasters.

Studies have reported a critical need for further investigating the perception of psychological readiness for pandemic management, including the mediating influence of self-efficacy on the relationship between stress and quality of life [14]. Although numerous studies have explored disaster resilience [14, 22, 26], few have addressed nurses' readiness for disaster response. Recent studies on nurses' readiness for disaster response have focused on specific nursing divisions, such as emergency nurses, respiratory nurses, and nursing students [4, 24-25, 27-28]. Approximately one-

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third of these studies used a qualitative design [19, 28], and no study has investigated the mediating role of self-efficacy and family support in the relationship between stress and readiness for disaster response, particularly among nurses. Besides current disaster knowledge and skills, it is essential to explore psychosocial factors—such as stress, self-efficacy, and family support—to enhance the readiness of nursing staff for effective disaster response. Therefore, this study examined self-efficacy and family support as potential mediators in the relationship between stress and readiness for disaster response among nurses.

Methods

Study design

This cross-sectional study was conducted between July and October 2022 and adhered to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines [29].

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Setting and participants

This study was conducted at a medical center in Taiwan with a capacity of 1,700 beds, employing 1,800 nurses. The center included 27 medical and surgical wards, six intensive care units (ICUs), and one emergency room (ER).

Participants were recruited from this medical center through cluster sampling from various wards, ICUs, and the ER. The eligibility criteria included being a registered nurse employed at a

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medical center and providing consent to participate in the study. Of the 583 invited nurses, 107 declined, resulting in a completion rate of 81.6% and 476 participating nurses. Based on G*Power 3.1.9.7 software, the required sample size was estimated using multiple linear regression with a fixed model and R^2 increase, assuming two tails, a power of 95%, and Type I error (alpha) of 0.05 [30]. The required sample size was n = 314.

Measurements

Demographic and work-related characteristics among nurses

The nurses' demographic characteristics included age, sex, educational level, religious beliefs, and marital status. Work-related characteristics included years of nursing service, service ward (medical, surgical, ICU, or ER), involvement in special COVID-19 wards, education related to disaster readiness received in the past year, and experience in disaster participation.

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Perceived Stress Scale

The Perceived Stress Scale (PSS-14) was originally developed by Cohen et al. [12] and translated into Taiwanese by Chu and Kao [31], demonstrating satisfactory validity and reliability. This widely used psychological instrument measures the perception of stress—focusing on unpredictability, uncontrollability, and overload—and reflects the stress of an individual over the previous month. The scale comprises 14 items evenly divided into seven positive and

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seven negative statements, and the respondents rated each item on a scale ranging from 0 (never) to 4 (always). The scores for positive items were reversed to calculate the total score, which ranged from 0–56, with higher scores indicating greater levels of perceived stress. In this study, Cronbach's alpha for the PSS-14 was 0.791.

General Self-Efficacy Scale

The General Self-Efficacy Scale (GSES) was originally developed by Schwarzer and Jerusalem [32] and translated into 33 languages, including Chinese, by Mo et al. [33], demonstrating good validity and reliability. This scale assesses the general sense of perceived self-efficacy and predicts the ability to cope with daily hassles and adaptations following stressful life events. It comprises 10 items, each rated on a four-point Likert scale ranging from 1 (not at all true) to 4 (exactly true). The total score ranges from 10–40, with higher scores indicating higher levels of general self-efficacy. In this study, Cronbach's alpha for the GSES was 0.954.

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Perceived Family Support

Perceived family support was evaluated using a self-reported five-point single statement. The scale ranged from 1–5, with 1 indicating "no perceived support from family at all," 2 indicating "little perceived support," 3 indicating "moderate perceived support," 4 indicating "some perceived support," and 5 indicating "full perceived support from family."

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Readiness for Disaster Response Scale

The Readiness for Disaster Response Scale (RDRS) was developed by Tzeng et al. [2] to evaluate the preparedness of hospital nurses in Taiwan for disaster responses. Tzeng et al. [2] conducted an exploratory factor analysis of a 40-item questionnaire that identified four distinct subscales: personal preparation (16 items), self-protection (11 items), emergency response (six items), and clinical management (seven items). The scale uses a five-point Likert scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree); higher scores indicate a greater level of disaster readiness. Tzeng et al. [2] reported high internal consistency reliability for the RDRS and its subscales, with Cronbach's alpha values ranging from 0.85–0.97 based on a sample of 311 registered nurses. In this study, the RDRS demonstrated high internal consistency, with Cronbach's alpha values for the overall scale and its subscales ranging from 0.878–0.974.

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Statistical analysis

Data were organized using Microsoft Excel and analyzed using IBM SPSS Statistics for Windows (version 23.0) [34]. Descriptive statistics—including means, standard deviations (SD), and ranges—were used for continuous variables, whereas categorical variables were described as frequencies and percentages. Pearson's correlation coefficient (r) was calculated to evaluate the strength

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and direction of the relationships among perceived stress, self-efficacy, perceived family support, and readiness for disaster response. Mediation analyses were conducted using the PROCESS macro in SPSS to examine the mediating roles of self-efficacy and perceived family support. Indirect effects were evaluated using bootstrap confidence intervals derived from 10,000 bootstrap samples, with statistical significance set at $p < 0.05$.

Ethical Considerations

This study adhered to the Declaration of Helsinki to this effect. The Institutional Review Board of the Tri-Service General Hospital, National Defense Medical University, Taipei, Taiwan (IRB No. C202105130) approved this study. Following IRB approval, the principal investigator (PI) employed cluster sampling across the wards, ICUs, and ER. The PI contacted the head nurses of the Department of Nursing to provide a detailed explanation of the study. Nurses who met the inclusion criteria were invited to participate and required to provide written informed consent before data collection. Data were gathered through questionnaires that took each participant approximately 15 min to complete. The confidentiality of the data was maintained, and participants had the right to withdraw from the study at any time.

Results

Demographic and work-related characteristics among nurses

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The demographic and work-related characteristics of the 476 participating nurses are presented in Table 1. The mean age was 29.8 (SD: 6.9; range: 21.1–59.2) years, with 63.0% aged ˂30 years. Most were female (90.1%), held a bachelor's degree (87.4%), reported no religious affiliation (64.1%), and were single (81.5%).

Regarding work-related characteristics, the mean duration of service in nursing was 5.6 (SD: 6.2) years. Most nurses worked in medical (36.8%) and surgical wards (28.8%), followed by ICUs (21.4%) and the ER (13.0%). Nearly half (48.9%) of participants were assigned to special COVID-19 wards. More than half (54.2%) had received disaster readiness education in the past year, whereas 80% reported no prior experience in disaster participation.

Stress, self-efficacy, family support, and readiness for disaster response among the nurses

The descriptions of and correlations for stress, self-efficacy, family support, and readiness for disaster response among the 476 nurses are presented in Table 2. The mean stress score was 23.6 (SD: 6.5), ranging from 4–52. The mean self-efficacy score was 26.4 (SD: 5.4), with a range of 11–40. Family support had a mean score of 4.1 (SD: 0.7), with scores ranging from 2–5. The mean readiness for disaster response score was 127.6 (SD: 25.9), with scores ranging from 40–200.

Correlation analysis revealed significant relationships between variables. Stress negatively correlated with self-efficacy (r = -

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0.471; p <0.001) and family support (r = -0.245; p <0.001), whereas self-efficacy positively correlated with family support (r = 0.283; p <0.001) and readiness for disaster response (r = 0.433; p <0.001). Readiness for disaster response significantly negatively correlated with stress (r = -0.351; p <0.001), and positively correlated with family support (r = 0.261; p <0.001). Similar patterns were observed for the readiness for disaster response subscales, including personal readiness, self-protection, emergency response, and clinical management competence. Each subscale demonstrated significant negative correlations with stress and significant positive correlations with self-efficacy and family support.

Mediation effects of stress on readiness for disaster response and its subscales

Table 3 presents a comprehensive analysis of the total, indirect, and direct effects of stress on readiness for disaster response and its subscales (personal readiness, self-protection, emergency response, and clinical management). This comprehensive analysis accounts for significant differences in demographic and work-related characteristics among nurses in relation to readiness for disaster response and its subscales. The included variables were age, marital status, years of service in nursing, service ward, assignment to special COVID-19 wards, receiving education related to disaster readiness in the past year, and previous experience in

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disaster participation. The mediating roles of self-efficacy and family support were examined using a comprehensive mediation model involving 476 participants. As depicted in Figure 1, the results indicate that the relationship between stress and readiness for disaster response, along with its subscales, was significantly influenced by both self-efficacy and family support.

The total effect of stress on readiness for disaster response was significant (β = -0.340, 95% confidence interval [CI]: -0.427 to -0.251). The subscales for disaster readiness also demonstrated significant total effects: personal readiness competence (β = -0.345, 95% CI: -0.429 to -0.256), self-protection competence (β = -0.210, 95% CI: -0.306 to -0.112), emergency response competence (β = -0.252, 95% CI: -0.339 to -0.166), and clinical management competence (β = -0.394, 95% CI: -0.468 to -0.315).

The total indirect effect of stress mediated by self-efficacy was significant across all domains. Specifically, the total indirect effects were as follows: readiness for disaster response (β = -0.136, 95% CI: -0.197 to -0.081), personal readiness competence (β = -0.135, 95% CI: -0.193 to -0.082), self-protection competence (β = -0.108, 95% CI: -0.166 to -0.055), emergency response competence (β = -0.098, 95% CI: -0.156 to -0.044), and clinical management competence (β = -0.127, 95% CI: -0.187 to -0.073).

The direct effects of stress remained significant for readiness for disaster response (β = -0.162, 95% CI: -0.266 to -0.058), personal readiness competence (β = -0.164, 95% CI: -0.262 to -0.064),

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emergency response competence (β = -0.133, 95% CI: -0.242 to -0.026), and clinical management competence (β = -0.228, 95% CI: -0.324 to -0.133). However, the direct effects on self-protection competence (β = -0.069, 95% CI: -0.183 to 0.045) were not significant.

Discussion

Stress negatively correlated with self-efficacy, family support, and readiness for disaster response. Conversely, self-efficacy positively correlated with family support and readiness for disaster response, and family support positively correlated with readiness for disaster response. Self-efficacy emerged as a significant mediator in the relationship between stress and various competencies related to readiness for disaster response. The significant indirect effects of self-efficacy indicate that higher self-efficacy mitigates some of the negative impacts of stress. By contrast, the indirect effects of family support were insignificant across domains.

These findings revealed that stress negatively correlated with self-efficacy and family support. Self-efficacy refers to an individual's belief in their ability to influence situations, such as managing challenges or stressful conditions. The GSES used in this study assessed the broad perception of self-efficacy aimed at predicting coping abilities during daily challenges and adaptations following stressful life events. Therefore, this study examined the correlation between stress levels and self-efficacy, revealing that

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lower stress levels were associated with higher self-efficacy. Another study corroborated these findings by demonstrating that perceived stress adversely affects protective factors, with significant correlations between stress levels and self-efficacy [27]. As an internal protective factor, self-efficacy can mitigate the adverse effects of stress on an individual's health [35]. Family support is negatively associated with perceived stress and psychotic experiences [15-16], and enhanced family functioning significantly reduces the impact of stress on psychotic experiences [16]. Increased self-efficacy and family support can therefore mitigate stress.

Self-efficacy positively correlated with family support and readiness for disaster response. Family support, an integral component of social support, encompasses a family's perceived sense of support and is crucial in positively contributing to the reduction of stress levels [15]. Considering that self-efficacy negatively correlated with stress, and that stress negatively correlated with family support, self-efficacy was positively associated with family support. Regarding disaster readiness in this study, each subscale of the RDRS—including personal preparation, self-protection, emergency response, and clinical management—showed significant positive correlations with self-efficacy and perceived family support. Elevated levels of self-efficacy correlate with heightened confidence in managing emergency scenarios and stressful situations, thereby enhancing readiness and facilitating

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effective response measures [6]. These findings align with those of a prior study emphasizing the significant positive influence of self-efficacy on enhancing individual disaster readiness behaviors [24].

Another finding was that stress negatively correlated with readiness for disaster response. Each subscale of the RDRS significantly negatively correlated with stress. A systematic review identified three categories of factors that influence nurses' capacity to deliver effective care during disaster response: (1) factors that enhance nurses' abilities, such as knowledge, skills, experience, training in self-efficacy, and psychological adjustment; (2) barriers to the effective delivery of nursing care, including fear, unsafe environments, stress, inadequate tools, and lack of equipment; and (3) support mechanisms necessary to sustain nurses' capabilities, such as organizational and family support [19]. Therefore, self-efficacy, family support, and stress are related to readiness for disaster response. Stress impair cognitive function, decision-making abilities, and overall performance, potentially reducing disaster readiness [18, 20, 36]; thus, stress management is crucial for enhancing nurses' readiness for disaster response.

These findings reveal that self-efficacy is a significant mediator in the relationship between stress and various competencies related to disaster readiness. The significant indirect effects of self-efficacy indicate that higher self-efficacy mitigates some of the negative impacts of stress. Disasters are extremely stressful, and according to the coping theory, individuals mobilize diverse coping strategies

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to effectively manage stress and regain a sense of equilibrium [11]. Considering that self-efficacy significantly contributes to stress and well-being [25], it represents a crucial coping strategy for managing stress, including during disasters. Studies have demonstrated the mediating role of self-efficacy in the relationship between stress and resilience [14, 23, 27]. Resilience refers to an individual's ability to adapt to challenging situations and overcome hardships through effective coping mechanisms [22]. Readiness refers to the operational capacity required to facilitate an effective response to an event. The concept of disaster readiness is similar to that of resilience, which may explain why self-efficacy mediates the relationship between stress and readiness for disaster response. Strengthening self-efficacy enhances the mental health of frontline nurses, enabling them to better cope with disaster-related stress and ultimately improve disaster readiness. This improvement can positively impact the quality of disaster nursing care and contribute to nurses' psychological well-being.

Family support was not a significant mediator in the relationship between stress and disaster readiness. While Berdida et al. [27] found that social support mediates the relationship between stress and psychological well-being, these findings diverge from those of previous research, suggesting that family support acts as a protective factor by moderating stress's harmful effects [15, 22]. Family support may become more influential in extreme situations, such as stringent quarantine restrictions during a pandemic, when

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it provides essential psychological assistance to nurses facing unexpected challenges.

Here, positive relationships were revealed between self-efficacy, family support, and readiness for disaster response; however, the indirect effects of family support were not significant across the disaster readiness subdimensions. Mediation analysis further indicated that family support had no significant direct effect on stress-disaster readiness, particularly on the self-protection competence subscale. The direct and indirect effects were clarified in our analysis to ensure a more detailed presentation of the impact of each pathway on readiness for disaster response. However, owing to the marginal effect size of this relationship, we did not incorporate it into the primary model because its contribution to the overall mediation pathway was minimal.

The influence of family support may also vary according to specific demographic and departmental characteristics. In this study sample, 63% of participants were aged ˂30 years, most likely balancing family responsibilities with childbearing and caregiving roles. Economic factors and dual-income family dynamics may influence the level of family support; however, these variables were not collected in this study. Additionally, self-protection competence requires specialized training, typically beyond the scope of family support, which may help explain the limited mediating role of family support in this context.

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Clinical experience alone may not equip nurses in disaster situations; thus, hospital administrators and nursing educators should emphasize strategies for enhancing self-efficacy and family support. Such efforts could strengthen nurses' readiness for disaster response, improve patient care quality, and foster greater job satisfaction among nurses.

Limitations and recommendations

Although this study provides valuable insights into the factors influencing nurses' disaster readiness, it has several limitations. First, the cross-sectional design limited the ability to infer causality. Future studies should use longitudinal designs to observe changes in stress, self-efficacy, and readiness for disaster response over time to provide a more dynamic understanding of these relationships. Second, the data were collected during the COVID-19 pandemic, a period of heightened stress and unprecedented challenges for nurses. This context may have influenced participants' perceptions of readiness for disaster response, particularly as pandemics are explicitly recognized as a type of disaster. Future research should consider replicating this study in nonpandemic contexts to determine whether these findings are generalizable beyond the unique pressures of a global health crisis. Third, this study focused on stress, self-efficacy, and family support as key factors. Future studies should also explore other potential mediators or moderators, such as organizational support or team

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cohesion, which may play critical roles in shaping readiness for disaster response. Finally, data collection relied on self-report measures, introducing the potential for common method variance (CMV), which may inflate observed relationships [37]. The use of a single-item measure for perceived family support is a limitation which may underestimate the true variance or mediation potential of the construct. To address this limitation, future studies should employ validated multi-item scales to assess perceived family support, as this would provide a more reliable measurement, capture greater variance, and allow for a more accurate evaluation of its potential mediating effects. To address the potential issue of CMV in the survey's scale, we conducted a confirmatory factor analysis (CFA) of the four predetermined latent variables: emergency, clinical, protection, and readiness. The CFA revealed satisfactory levels of absolute fit indices, including a Root Mean Square Error of Approximation of 0.106, and a Standardized Root Mean Square Residual of 0.096 [38]. However, the incremental fit indices, such as the Comparative Fit Index (0.784) and Tucker–Lewis Index (0.770), indicated only a moderate fit [38]. These findings suggest that the scale used in this study has some limitations in validity, potentially leading to a degree of measurement error. This error may arise from the scale itself, as well as from the responses provided by study participants.

Implications for nursing and health policy

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These findings have significant implications for nursing management and policymaking, particularly in the development of disaster readiness training programs. Self-efficacy encompasses knowledge, attitudes, skills, and psychological readiness, and can be strengthened through targeted interventions such as skills training, simulation exercises, and stress management techniques. Nursing managers should establish pandemic management plans, develop strategies for pandemic prevention and control, formulate multiple-casualty incident plans, and conduct regular scenario drills to foster teamwork, build capacity, and enhance readiness for disaster response.

These findings also highlight the role of family support, suggesting that it amplifies the positive effects of self-efficacy. Nursing leaders should consider initiatives such as family engagement events to foster understanding and appreciation of nurses' contributions, thereby creating a supportive family atmosphere. Additionally, healthcare institutions should implement supportive workplace policies that address the sources of stress, cultivate an environment that enhances psychological readiness, and better prepare nursing staff for disaster responses.

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Conclusions

This study identified that self-efficacy statistically mediated the relationship between perceived stress and readiness for disaster response, including its subscales, among nurses. However,

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considering the cross-sectional and correlational nature of the data, causal relationships cannot be inferred. These findings may inform the development of holistic, evidence-based interventions aimed at mitigating the effects of stress on nurses, thereby potentially enhancing readiness for disaster response in the nursing workforce.

List of abbreviations

coronavirus disease 2019, COVID-19; intensive care units, ICUs; emergency room, ER; Perceived Stress Scale, PSS-14; General Self-Efficacy Scale, GSES; Readiness for Disaster Response Scale, RDRS; standard deviations, SD; Institutional Review Board, IRB; principal investigator, PI; confidence interval, CI; common method variance, CMV; confirmatory factor analysis, CFA; Root Mean Square Error of Approximation, RMSEA; Root Mean Square Residual, SRMR; Comparative Fit Index, CFI; Tucker-Lewis Index, TLI

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board (IRB) of the Tri-Service General Hospital in Taipei City, Taiwan (IRB No. C202105130). All participants provided written informed consent

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prior to enrollment.

Consent for publication

Informed consent was obtained from each participant for the use of their anonymized data for publication purposes before the study.

Availability of data and materials

The data, analytic methods, and study materials on which the manuscript is based will be made available per request. This study is not preregistered.

Competing interests

The authors declare no competing interests.

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Authors' contributions

HHP and CPC design of the work; PCH and KJC perform the acquisition; CL analyzed and interpreted data; KJC, SYL and HHP wrote the manuscript and prepared tables and figure. All authors reviewed the manuscript.

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Table 1 Demographic and work-related characteristics among nurses (N=476)

Variable	Mean (SD) / N(%)
Demographic characteristics	
Age	29.8±6.9
Range	21.1 ~ 59.2
<30	296(63.0)
≥30	174(37.0)
Gender	
Female	429(90.1)
Male	47(9.9)
Educational level	
Junior college	60(12.6)
Bachelor above	416(87.4)
Religious Belief	
No	305(64.1)
Yes	171(35.9)
Marital Status	
Single	388(81.5)
Married	88(18.5)
Work-related characteristics	
Years of service in nursing	5.6±6.2
Service ward	
Medical ward	175(36.8)
Surgical ward	137(28.8)
Intensive care unit	102(21.4)
Emergency room	62(13.0)
Special COVID-19 wards	
Yes	233(48.9)
No	243(51.1)
Receiving education related to disaster readiness in the past year	
Yes	258(54.2)
No	218(45.8)
Previous experience in disaster participation	
Yes	95(20.0)
No	381(80.0)

SD=standard deviation

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Table 2 Descriptive characteristics and Pearson Correlation analyses of stress, self-efficacy, family support, and readiness for disaster response (N=476)

Variable	Mean±SD	Range	Stress (r)	Self-efficacy (r)	Family support (r)
Stress	23.6±6.5	4-52	1		
Self-efficacy	26.4±5.4	11-40	-0.471***	1	
Family support	4.1±0.7	2-5	-0.245***	0.283***	1
Readiness for disaster response	127.6±25.9	40-200	-0.351***	0.433***	0.261***
Personal readiness competence	52.5±11.6	16-80	-0.353***	0.430***	0.292***
Self-protection competence	31.7±8.3	11-55	-0.222***	0.318***	0.189***
Emergency response competence	17.8±4.7	6-30	-0.274***	0.320***	0.122***
Clinical management competence	25.7±4.8	7-35	-0.393***	0.434***	0.254***

*<0.05, **<0.01, ***<0.001, SD=standard deviation

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Table 3 Summary of total, indirect and direct effects of stress on readiness for disaster response and its subscales (personal readiness, self-protection, emergency response, and clinical management competence) with self-efficacy and family support as mediators in a comprehensive model (N=476)

	Readiness for disaster response	Personal readiness competence	Self-protection competence	Emergency response competence	Clinical management competence
Total effect	-0.340 (-0.427, -0.251)	-0.345 (-0.429, -0.256)	-0.210 (-0.306, -0.112)	-0.252 (-0.339, -0.166)	-0.394 (-0.468, -0.315)
Total indirect effect	-0.167 (-0.226, -0.113)	-0.170 (-0.228, -0.118)	-0.132 (-0.187, -0.080)	-0.111 (-0.166, -0.058)	-0.155 (-0.213, -0.102)
Self-efficacy	-0.136 (-0.197, -0.081)	-0.135 (-0.193, -0.082)	-0.108 (-0.166, -0.055)	-0.098 (-0.156, -0.044)	-0.127 (-0.187, -0.073)
Family support	-0.031 (-0.057, -0.010)	-0.035 (-0.062, -0.013)	-0.024 (-0.047, -0.004)	-0.013 (-0.035, 0.005)	-0.028 (-0.055, -0.007)
Direct effect	-0.162 (-0.266, -0.058)	-0.164 (-0.262, -0.064)	-0.069 (-0.183, 0.045)	-0.133 (-0.242, -0.026)	-0.228 (-0.324, -0.133)

Note 1: This accounted for age, marital status, years of service in nursing, service ward, assignment to special COVID-19 wards, receiving education related to disaster readiness in the past year, and previous experience in disaster participation

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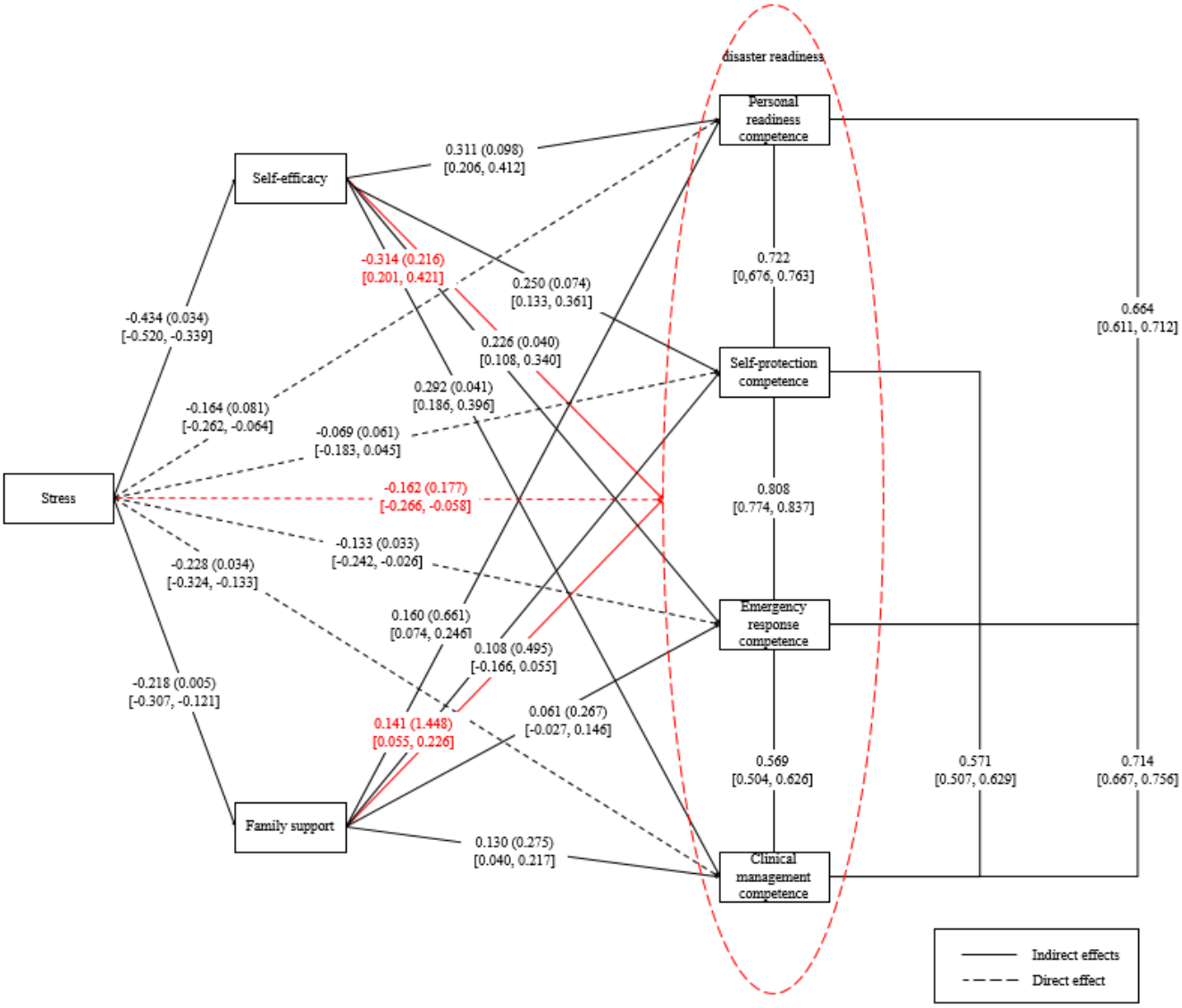

Figure 1 Mediation model for the effect of self-efficacy and family support on the relationships between stress, readiness for disaster response, and its subscales standardized coefficients, errors terms, and 95% confidence interval for each path are provided. Solid lines indicate indirect effects; dashed lines indicate direct effect; red color indicate the readiness for disaster response; black color indicate the subscales of readiness for disaster response.