



Risk and Protective Factors of Anxiety in Nurses During the COVID-19 Pandemic: A Systematic Review

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ABSTRACT

The COVID-19 pandemic has significantly impacted nurses, exposing them to challenges that have affected their overall well-being. Most nurses have experienced psychosocial problems, including anxiety. This study aims to identify the protective and risk factors associated with anxiety among nurses during the COVID-19 pandemic. A systematic review was used as a method in this study. Eight databases were used Science Direct, PubMed, CINAHL, Embase, ProQuest, Scopus, Taylor & Francis, and JSTOR. The literature search was conducted using keywords derived from the Medical Subject Headings (MeSH) framework. The search terms included: Nurses OR "staff nurses" OR "healthcare professionals", AND "factors associated with anxiety" OR "risk factors" OR "protective factors", AND "COVID-19" OR "COVID-19 pandemic". The data were further analyzed by critically assessing the quality of the articles using the JBI and CASP checklists. The research articles included in the review were cross-sectional studies published between 2020 and 2022, written in English, available in full text, and specifically focused on protective and risk factors for anxiety. A risk of bias assessment was conducted using the Joanna Briggs Institute quality assessment checklist. A total of 33 articles were reviewed, revealing two primary themes of protective and risk factors: internal and external factors. Internal factors included variables such as age and gender, while external factors encompassed aspects such as hospital status. Based on the findings, it is recommended that hospitals implement mental health and psychosocial support interventions as promotive and preventive efforts to improve the nurses' psychological well-being.

Keywords: COVID-19, Anxiety, Nurses, Protective, Risk

1. Introduction

The COVID-19 pandemic has significantly increased the prevalence of anxiety among nurses compared to pre-pandemic levels (Gao et al., 2012; de Pinho et al., 2021; Shen X et al., 2020; Li et al., 2020; Ariasti & Handayani, 2019; Setiawati et al., 2021). In Indonesia, the prevalence of anxiety before the COVID-19 pandemic was reported to be 18% (Ariasti & Handayani, 2019), while during the pandemic it rose to 33% (Setiawati et al., 2021). This indicates that the prevalence of anxiety doubled after the COVID-19 Pandemic.

Anxiety is closely associated with risk factors and protective factors (World Health Organization, 2020; Lulli et al., 2021). Protective factors are characteristics or conditions that mitigate the impact of risk factors or act as positive aspects to ward off life events or stressors (VicHealth, 2019). Conversely, risk factors are characteristics or conditions that negatively affect individuals, such as illness or health-related problems. Each

individual possesses both risk factors and protective factors that influence their ability to manage changes or stressors that occur (Factors et al., 2006).

For nurses working during the COVID-19 pandemic, protective factors include preventive measures such as using personal protective equipment (PPE), wearing masks, and engaging in regular physical activity. Adequate knowledge and training on PPE use and other relevant procedures enhance nurses' competence, thereby reducing anxiety associated with COVID-19 (Zhong et al., 2021). Peer support and hospital support play a critical role in mitigating anxiety as a supportive environment helps regulate negative emotional reactions among nurses. Social support, resilience, and positive coping mechanisms are also key protective factors (Cook et al., 2021). Research conducted in Indonesia highlighted family support as the significant motivator for health workers during the pandemic (Windarwati et al., 2021).

On the other hand, various risk factors contribute to anxiety among nurses. For instance, direct contact with sources of infection increases their risk of contracting COVID-19 (ICN, 2021). Witnessing patients' suffering or the loss of colleagues to the virus serves as a significant source of stress (Zakeri et al., 2021). Additionally, societal stigma directed at nurses further exacerbates anxiety levels (Peng et al., 2021).

This study aims to identify the risk factors and protective factors associated with anxiety among nurses. Its findings are expected to support hospitals in promoting nurses' well-being and provide valuable insights for future research. Understanding these factors is crucial for developing strategies to prevent and reduce anxiety while fostering a healthy work environment. Research on the impact of COVID-19 continues to grow rapidly, requiring an updated review.

2. Methods

A systematic review was conducted to analyze the literature on risk and protective factors for anxiety. This method is particularly valuable when a topic has not been thoroughly reviewed. The study commenced by identifying relevant research on risk and protective factors for anxiety among nurses working during the COVID-19 pandemic. This process involved screening articles for eligibility and suitability with the inclusion criteria. Exclusion criteria encompassed studies unrelated to nurses, duplicates involving non-medical health workers, articles not focused on anxiety during the COVID-19 pandemic, incomplete texts, and studies conducted in community settings. Following the initial screening process, 173 articles were identified based on their titles and abstracts. Of these, 163 articles proceeded to the review stage, and 33 met the criteria for detailed extraction of relevant information (Figure 1). The removal and inclusion of articles were systematically approved by the researchers. Reasons for exclusion included studies that did not specifically address nurses, failed to examine anxiety within the context of COVID-19, did not focus on hospital-based nurses, contained duplicate data, or provided incomplete texts.

Studies were selected in accordance with the research protocol. Relevant data were mapped and extracted into an Excel sheet for systematic organization. Then, the researchers compiled, summarized, and reported the results in tables and charts according to the main themes, accompanied by an analytical summary of the findings.

The reviewed articles were primarily cross-sectional studies, written in English, and comprised full-text journal articles published between 2020 and 2022. Researchers employed a combined search strategy using emerging keywords and Medical Subject Headings (MeSH). Keywords included Nurse OR "nurse staff" OR "healthcare professional workers" AND "factors associated with anxiety" OR "risk factors" OR "protective factors" AND "COVID-19" OR "COVID-19 pandemic," connected by Boolean operators to ensure consistency across all databases. Data were sourced from ScienceDirect, PubMed, CINAHL, Embase, ProQuest, Scopus, Taylor & Francis, and JSTOR.

An extraction form was used to collect research-related information, including: (1) Study identification (e.g., first author, title, year of publication), (2) Study characteristics (e.g., country, design), (3) Population characteristics (e.g., sample size), and (4) Risk and protective factors. Each included article was meticulously recorded in Excel. Risk and protective factors were subsequently categorized into two main groups: internal and external factors. The Joanna Briggs Institute risk of bias assessment tool was employed to evaluate the quality of the included articles. The cross-sectional checklist consists of eight items, with articles rated as good quality if they met at least two-thirds of the criteria (a total score of 5-8). Articles scoring 3-5 were classified as moderate quality, while those scoring 0-2 were deemed poor quality.

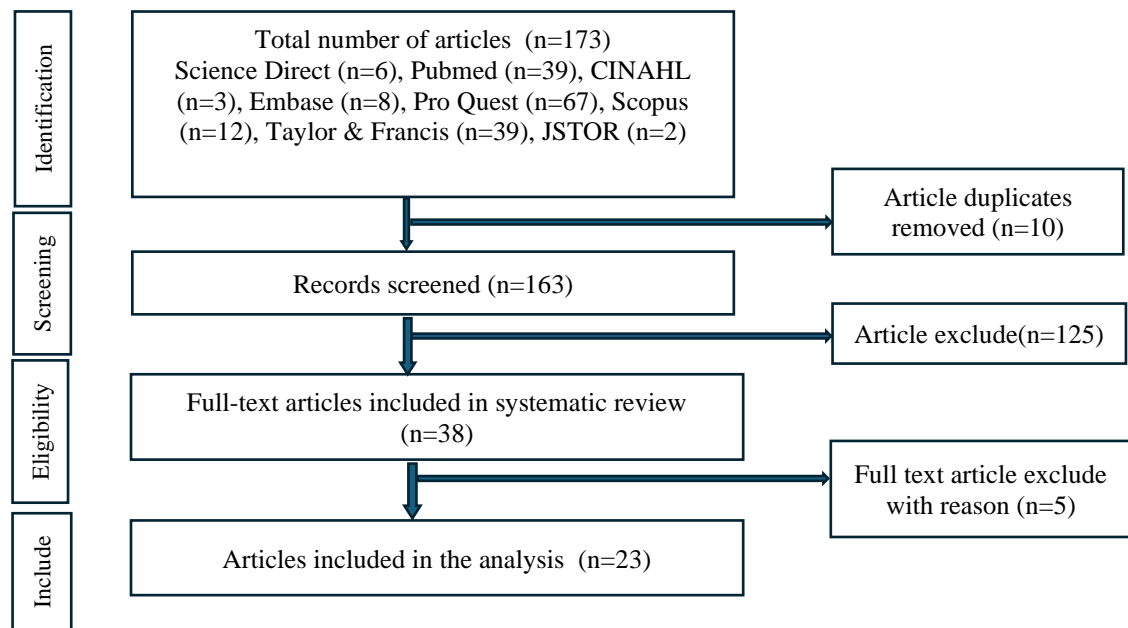


Figure 1 PRISMA flowchart

3. Results

This study found that of two to three articles, the majority originated from non-Western countries (n=15), while the remainder were from Western countries (n=8). The findings highlighted two primary themes: risk factors and protective factors, specifically related to anxiety. These factors were further categorized into two major themes: internal and external factors. Internal factors include gender, age, nurses' skills and knowledge, healthy living behaviors, transmission prevention, health conditions, emotional states (e.g., worry, fear, stress), negative perceptions, self-esteem, coping skills, and social support. External factors include hospital support, work-related challenges, and hospital status. A detailed summary of the findings is presented in Table 1.

Table 1 Characteristics of the included studies

No	Author	Method	Results
1	Gupta et al (2021)	Cross Sectional	Risk factors: female gender, age, unmarried and job profile (nurse). Protective factor: having provided services for more than 20 years.
2	Zheng et al (2020)	Cross Sectional	Risk factors: good occupational protection practices, working in an isolation room or fever clinic, having a patient suspected or confirmed of COVID-19. Protective Factors: personal protective equipment (PPE) that meets work requirements, training for information related to COVID-19.
3	Fountoulakis et al (2021)	Cross Sectional	Risk factors: higher in women and nurses. Protective factors: positive beliefs about COVID-19.
4	Zhu et al (2020)	Cross Sectional	Risk factors: history of depression or anxiety. Protective factors: coping.
5	Osorio et al (2021)	Cross Sectional	Risk factors: occupation. Protective Factors: having positive professional prospects, support provided by colleagues, older age and male, satisfaction with physical protection measures implemented by the hospital institution.
6	Zhang et al (2022)	Cross Sectional	Risk factors: non-frontline staff.
7	Hammam i et al (2021)	Cross Sectional	Risk factors: women, have a history of psychiatric illness, and use public transportation. Protective factors: use of protective equipment, physical activity.
8	Wang et al (2020)	Cross Sectional	Risk factors: having an intermediate technical title, working on the frontline, inadequate training for protection, and lack of confidence in protective measures. Protective Factors: not worry about infection.

Table 1 Continued

No	Author	Method	Results
9	Morawa et al (2020)	Cross Sectional	Risk factors: increased fear of being infected with COVID-19.
10	Lixia et al., (2021)	Cross Sectional	Risk factors: female gender; need for psychological help; contact with severe COVID-19 patients; high stress at work; single or divorced marital status; inadequate social support.
11	Kovner et al (2021)	Cross Sectional	Risk factors: Younger RNs, White RNs, working in the ICU, clinical nurses, have a bachelor's degree, RNs without children.
12	Şahan and A. Tangılntız (2022)	Cross Sectional	Risk factors: women, have a lifetime mental illness, experience mental symptoms and consult a psychiatrist, have children, work in an isolation room, do not use complete PPE and live alone at home.
13	Dubovi et al (2022)	Cross Sectional	Protective Factors: having a deeper science-based understanding of COVID-19.
14	Akman et al (2021)	Cross Sectional	Risk factors: accessibility to personal protective equipment during the COVID-19 pandemic, years of work experience, overtime work during the COVID-19 pandemic.
15	Han et al., (2020)	Cross Sectional	Risk factors: working 9.40 ± 7.638 years, female gender and married, Nurses who have children or elderly relatives. Nurses who ask for leave from work due to concerns about COVID-19, avoiding contact with family and friends, and low knowledge related to COVID-19.
16	Tolentino et al (2022)	Cross Sectional	Risk factors: spirituality peace and low confidence.
17	Zhong et al (2021)	Cross Sectional	Risk factors : age 25-35 years, male, former smoker or drinker, frontline medical personnel, self-employed, exposure to wild animals, or have chronic diseases, suspected SARS-CoV-2 infection, current symptoms of SARS-CoV-2 infection, regular physical activity , history of contact, or meeting relatives or friends who came from Hubei in the past month, Knowledge of self-protection measures, frontline medical personnel, chronic diseases, suspected SARS-CoV-2 infection, self-employed, age, race, wearing a mask, gender, symptoms of infection, regular physical activity, exposure to wild animals, meeting relatives who came from Hubei, former smokers, and history of contact . Protective Factors: 24 years old, wearing a mask or having knowledge of personal protective measures.
18	Maharaj (2020)	Cross Sectional	Anxiety was not related to age, gender, facilities, shift work, type of shift, length of shift, job satisfaction, physical problems.
19	Yildirim (2022)	Cross Sectional	Risk factors: fear of coronavirus.
20	Al-Amer (2022)	Cross Sectional	Risk factors: women, working in referral hospitals, suspected of being infected with COVID-19, inadequate PPE.
21	Mattila (2021)	Cross Sectional	Risk factors: young age, working in a university hospital, problems with cooperation between co-workers, difficulty concentrating at work, physical and psychological workload that threatens health, and fear of infection.
22	Luo et al (2021)	Cross Sectional	Risk factors: women, nurses, frontline, never exercise, and low income. Protective factors: Social support including objective support, subjective support, support utilities, and regular exercise more than 3 times per week.
23	Cho et al (2021)	Cross Sectional	Risk factors: Caring for COVID-19 positive patients, Hospital safety climate, living with a partner, type of work done, work experience of more than 3 months, marital status, living with a partner, living with children, type of work done, perception of safety in using PPE, hospital safety climate.

4. Discussion

Protective and risk factors were grouped into internal and external categories. Internal factors consist of demographic characteristics such as age and gender, as well as nurses' skills and knowledge, healthy living behaviors, transmission prevention, health conditions, emotional states (e.g., worry, fear, and stress), negative perceptions and self-esteem, coping skills and social support. External factors comprise hospital support, work-related issues, and hospital status.

4.1 Internal Factors

Gender plays a dual role as both a risk and a protective factor for nurses. Research indicates that being female is a significant risk factor for anxiety, with women being 18 times more likely to experience anxiety than men. Other studies have identified male gender as a risk factor for anxiety. While the female gender is protective against risks such as violence, neglect, health hazards, socioeconomic challenges, aging-related psychological risks, and interpersonal conflicts, males are more vulnerable to certain negative risks. Women are more likely to seek emotional support, whereas men are reported to display greater resilience to disasters or hazards. However, women are generally more susceptible to psychosocial problems, while men demonstrate better adaptability to stressors (Gupta et al., 2021; Osório et al., 2021).

Age serves as both a risk and protective factor for nurses in the context of anxiety. Research indicates that nurses within the age range of 20–35 years are at higher risk for experiencing anxiety. Other studies suggest that a younger age (14–24 years) acts as a protective factor, while male gender and ages between 25–35 years are identified as risk factors for anxiety. Additionally, evidence shows that anxiety is significantly associated with older age, specifically individuals over 41 years. Older age is often linked to declining health conditions, which may result from chronic diseases or comorbidities, contributing to elevated levels of anxiety. Chronic illnesses can exacerbate anxiety in individuals, especially when coupled with the responsibility of caring for COVID-19 patients who experience complications or fatalities. Interestingly, older health workers report lower levels of anxiety compared to their younger counterparts. This trend may be attributed to the correlation between age and greater work experience, which fosters increased confidence in managing new and challenging situations (Rayani et al., 2022 ; Mattila et al., 2021) .

Healthy behaviors, such as engaging in physical activity and using protective equipment, are significant protective factors in preventing anxiety among nurses (Hammami et al., 2021; Zhang et al., 2022). Positive attitudes from colleagues and the elimination of nosocomial infections are the primary factors that alleviate psychosocial problems in nurses. Additionally, nursing training has been identified as an effective intervention in reducing nurses' anxiety related to COVID-19 (Khalid et al., 2016).

Skills and abilities contributing to reduced anxiety include nurses' work experience of more than 20 years, specific training, knowledge related to COVID-19, and self-protection strategies. Other influential factors include coping resources, such as the ability to manage stress and maintain positive beliefs, which are associated with job satisfaction and professionalism. Nurses' positive feelings, such as not worrying excessively about COVID-19 infection, and their perceptions or beliefs about COVID-19 also play a crucial role in mitigating anxiety (Zheng et al., 2021 ; Dubovi et al., 2022) .

Positive coping skills are another protective factor for nurses. Coping resources, which are essential for managing stressors, encompass personal abilities, social support, material assets, and optimistic beliefs (Stuart et al., 2016). A study conducted in a hospital in Medan City showed that the majority of nurses relied on ego-oriented coping mechanisms during the COVID-19 pandemic (Khadafi et al., 2022). These coping strategies serve as protective factors and can be further improved to equip nurses in managing stressors and anxiety related to COVID-19 cases or other future challenges. Furthermore, social support is a critical element that reinforces nurses' resilience (Zhu et al., 2020 ; Wang et al., 2020).

Knowledge on managing anxiety can be enhanced by training nurses through generalist nursing therapies (deep breathing relaxation, positive conversation distraction, five-finger hypnosis relaxation, and spiritual activities), as well as specialist nursing therapies (Keliat et al., 2019). Adequate knowledge and training on PPE and procedures that support nurses' work competence can significantly reduce their anxiety about COVID-19. It can be concluded that knowledge and training related to professional competence and infection prevention serve as protective factors for nurses. Drawing from experiences during the SARS outbreak, it is evident that knowledge and attitudes towards infectious diseases influence the degree of emotional distress, which can further complicate efforts to curb the spread of the disease (Zheng et al., 2021).

Support from the surrounding environment and coworkers also acts as a protective factor. Social support, including objective support, subjective support, utility support, and engaging in regular exercise more than three times per week, is a nurse's protective factor. Peer group support and assistance from the surrounding environment are pivotal protective measures for managing anxiety. Moreover, coworker and environmental support helps regulate negative emotional reactions. Social support and resilience are thus significant protective factors for nurses. Family support is particularly crucial as it represents the primary source of motivation for health workers in Indonesia.

Social support serves as an essential coping mechanism for individuals to mitigate anxiety. Institutional support, such as hospitals providing appropriate PPE tailored to work demands, is another critical protective factor. Strengthening workplace safety protocols for nurses during the COVID-19 pandemic should be

prioritized to address psychological challenges. The psychosocial problems faced by health workers stem from factors such as the proliferation of life-threatening diseases, rising case numbers, increasing mortality rates, fear of contracting and transmitting infections to loved ones, immense workloads, and potential lack of personal attention.

The safety and security of nurses from exposure to COVID-19 can be a protective factor for nurses. Health workers with access to comprehensive PPE provided by hospitals report significantly lower anxiety levels compared to those facing PPE shortages. Consequently, implementing stringent COVID-19 Prevention and Safety Protocols, including the availability and proper use of PPE, is essential for alleviating anxiety among nurses (Luo et al., 2021).

Feelings of worry due to nurses' exposure to toxins, viruses, and bacteria, driven by the rising number of infection cases, represent a risk factor for anxiety. During the COVID-19 pandemic, nurses have been particularly vulnerable to exposure and mortality resulting from suspected, probable, and confirmed COVID-19 cases, as well as close contacts, travelers, total isolation, and underlying comorbidities (Decree of the Minister of Health of the Republic of Indonesia, 2020). The highly contagious nature of COVID-19 has served as a significant stressor for nurses, increasing their risk of contracting the virus and transmitting it to others. Globally, close contact has contributed to 3.8% of health workers confirmed with COVID-19. Furthermore, an average of 6–10% of healthcare workers across countries have been infected, with infection rates reaching up to 30% of all recorded cases (Arnetz et al., 2020 ; Karimi et al., 2020 ; Peng et al., 2021).

A person's health condition, particularly the presence of comorbidities, is another critical risk factor for anxiety. Cardiovascular/respiratory disorders, endocrinological issues, neurological problems, substance-related disorders, and withdrawal syndromes are known contributors to anxiety. Biological factors, such as personal medical history and current health conditions, play a pivotal role in emotional and mental disorders (EMDs). Fatigue, often associated with excessive workloads during pandemics, can increase irritability and anxiety. Individuals with comorbidities were especially vulnerable to COVID-19 exposure during the pandemic (Arnetz et al., 2020 ; Karimi et al., 2020 ; Peng et al., 2021).

Fatigue is associated with increased irritability and heightened feelings of anxiety (Decree of the Minister of Health of the Republic of Indonesia, 2020). During the COVID-19 pandemic, fatigue among nurses was predominantly caused by excessive working hours, the prolonged use of masks and personal protective equipment (PPE), and significant changes in work patterns. Furthermore, a history of psychological conditions contributed to biological stress experienced by nurses treating COVID-19 patients. Additional health factors, including lack of rest or sleep, existing illnesses, and drug dependency, were identified as risk factors for mental health disorders. However, physical and psychological health statuses are modifiable risk factors, as regular medication and adequate rest can mitigate the mental health risks, even in nurses experiencing comorbidities and fatigue (Fahim Irandoost et al., 2020 ; Sun et al., 2021).

Feelings of worry, fear, stress, suspicion, diminished self-esteem, and perceptions related to work and education challenges further increase psychological distress. Workplace challenges—such as conflicts between task completion and personal safety, witnessing coworkers or patients being treated for COVID-19, personal experiences of falling ill, and the deaths of colleagues due to COVID-19—intensify discomfort among nurses. These negative emotions and beliefs act as significant risk factors for anxiety by impairing a nurse's sense of independence. Moreover, low emotional regulation and inadequate self-regulation skills contribute to poor behavioral control, a negative self-concept, diminished self-efficacy, and reduced resilience (Zakeri et al., 2021 ; Hoseinabadi et al., 2020) .

4.2 External factors

External factors were not reviewed. The lack of support from hospitals and co-workers is a significant risk factor for anxiety. This can be attributed to the importance of social experiences and the levels of social integration and connectedness for individuals (Stuart, 2013). In line with the above, risk factors for emotional mental disorders (EMDs) include the absence of supportive relationships, such as insufficient social support, social isolation, and a lack of connection with partners. Poor socialization experiences can cause anxiety. Specifically, insufficient hospital support regarding the availability of personal protective equipment (PPE) and a deficient occupational safety climate can increase anxiety levels among healthcare workers. Nurses, as professionals who provide care and maintain direct patient contact for 24 hours, face a 1.5 times higher risk of anxiety due to COVID-19 compared to doctors. This heightened anxiety among nurses is linked to the inadequate provision of personal protective equipment (PPE) and limited information about the disease, including its transmission and the proper use of PPE (Cho, 2021).

Furthermore, the results showed that a robust hospital safety climate is significantly associated with reduced negative emotional reactions among nurses working with COVID-19 patients. The perceived risk of

exposure to infection sources amplifies fear, depression, and anxiety. Psychosocial challenges are inversely related to a positive hospital safety climate and lower perceived COVID-19 risk. Therefore, fostering safety measures, providing feedback, and ensuring effective communication within hospital environments can substantially enhance the mental health of nurses handling COVID-19-related tasks (Yıldırım et al., 2022)

Job-related problems, such as high job demands, negatively impact the mental health and well-being of nurses, which, in turn, affects their productivity, quality of care, and compromises patient safety. Workplace stressors, including inadequate support systems, unclear policies, care uncertainties, staff shortages, and insufficient personal protective equipment, contribute to the stress experienced by nurses. Additionally, systemic issues within hospitals, such as insufficient institutional support and unclear organizational status, worsen these challenges.

Anxiety, depression, and sleep disorders are among the most prevalent psychosocial issues affecting frontline healthcare workers, particularly those working in emergency rooms and district hospitals (Luo et al., 2021). Healthcare workers, whether students or seasoned professionals, are at significant risk of developing psychosocial problems that adversely influence their professional and personal lives. Nurses employed at university (teaching) hospitals report higher levels of anxiety compared to their counterparts in central hospitals. This discrepancy may be attributed to the highly specialized expertise and skills required to manage complex care and procedures in teaching hospitals, rendering nurses more susceptible to the psychological effects of job-related changes.

Health workers in primary care hospitals face an elevated risk of anxiety and depression compared to those in tertiary care hospitals. This is primarily because primary hospitals serve as basic healthcare providers and screening centers for COVID-19 cases, often managing substantial patient loads. A study conducted in India revealed significant deficiencies in primary care services within Indian hospitals compared to tertiary hospitals, highlighting the difficulties in controlling disease transmission during interactions with suspected/confirmed COVID-19 patients.

5. Conclusion

The study results identified two primary themes: protective factors and risk factors, both internal and external. It is recommended that hospitals implement mental health and psychosocial support interventions as promotional and preventive measures to enhance the psychological well-being of nurses. By minimizing risk factors and strengthening protective factors, mental health and psychosocial support interventions can effectively reduce the incidence of anxiety.

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