The Mediating Effect of Stress Coping Between Mental Health and Sleep Quality in Clinical Nurses

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Abstract

Abstract: Objective: This study aims to explore the relationship among mental health, sleep quality, and stress coping among nurses, and to investigate the mediating effect of stress coping between mental health and sleep quality. Methods: The Pittsburgh Sleep Quality Index, Symptom Checklist-90, and Coping Style Scale were used to survey 289 nursing staff from Shanxi Provincial People' s Hospital. Pearson correlation analysis was employed to examine the correlations between nurses' stress coping and mental health and sleep disturbance, and the SPSS PROCESS macro was used to construct a mediation effect test model to analyze the mediating effect of stress coping between mental health and sleep disturbance. Results: The scores of stress coping, mental health, and sleep quality were significantly correlated pairwise ($P<0.01$), wherein stress coping was positively correlated with mental health ($P<0.01$), mental health was positively correlated with sleep quality ($P<0.01$), and stress coping was positively correlated with sleep quality ($P<0.01$). Between mental health and sleep quality, the standardized indirect effect of stress coping was 0.12, and the mediating effect accounted for 20.69% of the total effect. Conclusion: There is a positive correlation among nurses' stress coping, mental health, and sleep quality; positive stress coping is positively correlated with better sleep quality, and sleep quality is positively correlated with mental health. That is, actively coping with stress can improve mental health levels and sleep quality. Stress coping exists as a mediating variable between mental health and sleep quality and exerts a partial mediating effect.

Full Text

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Abstract

Objective: This study examines the relationships among mental health, sleep quality, and stress coping in nurses, and investigates the mediating effect of stress coping between mental health and sleep quality. **Methods:** A total of 289 nursing staff from Shanxi Provincial People' s Hospital were surveyed using the Pittsburgh Sleep Quality Index (PSQI), Symptom Checklist-90 (SCL-90), and Coping Style Questionnaire (CSQ). Pearson correlation analysis was used to examine the relationships between nurses' stress coping, mental health, and sleep disturbances. The SPSS PROCESS macro was employed to construct a moderated mediation model to analyze the mediating effect of stress coping between mental health and sleep disturbances. **Results:** Stress coping, mental health, and sleep quality scores were all significantly correlated with each other ($P<0.01$). Specifically, stress coping showed a positive correlation with mental health ($P<0.01$), mental health showed a positive correlation with sleep quality ($P<0.01$), and stress coping showed a positive correlation with sleep quality ($P<0.01$). Between mental health and sleep quality, the standardized indirect effect of stress coping was 0.12, with the mediating effect accounting for 20.69% of the total effect. **Conclusion:** Nurses' stress coping, mental health, and sleep quality are positively correlated. Positive stress coping is associated with better sleep quality, which in turn is associated with better mental health. In other words, actively coping with stress can improve mental health and sleep quality. Stress coping functions as a mediating variable between mental health and sleep quality, exerting a partial mediating effect.

Keywords: stress coping styles; sleep quality; nurse psychology; Pittsburgh Sleep Quality Index; Symptom Checklist-90

Clinical nurses constitute an indispensable component of healthcare institutions, bearing critical nursing responsibilities. In high-pressure work environments, they frequently endure substantial work-related stress and psychological burden, which not only affects their mental health but may further compromise sleep quality. Poor sleep quality can lead to problems such as decreased attention and slower reaction times during work, potentially impacting the quality of nursing care. Therefore, understanding nurses' stress coping, mental health, and sleep quality is of significant importance. Previous research has demonstrated close associations among stress coping, mental health, and sleep quality. Coping styles refer to individuals' behavioral and cognitive efforts to manage internal and external demands arising from person-situation interactions, representing

strategic responses to changing environmental demands [1]. When confronted with high-level occupational stress, individuals may develop suspicion, irritability, sleep disturbances, and burnout [2,3].

Stress coping represents the psychological and behavioral strategies individuals employ when facing stress, exerting important influences on mental health. Individuals with good mental health status can adopt positive coping strategies when facing stress, thereby mitigating the negative impact of stress on physical and mental well-being. Sleep quality, in turn, represents a crucial manifestation of physical and mental health, closely related to mental health. In recent years, numerous domestic studies have examined sleep problems among nurses in special occupational contexts. Although these studies employed different assessment methods, their results consistently show that nurses' sleep quality is poorer than that of the general population, with a higher prevalence of sleep disturbances. Their sleep problems primarily manifest as insufficient sleep, decreased sleep quality, and post-insomnia reactions [4-12].

1. Subjects and Methods

1.1 Study Subjects

Using convenience sampling, 289 frontline clinical nurses from our hospital were selected as study subjects in April 2024. **Inclusion criteria:** (1) active clinical nurses; (2) age range 18-55 years; (3) employment at our hospital for more than one year; (4) signed informed consent and voluntary participation. **Exclusion criteria:** nurses on leave. Structural equation modeling requires a sample size-to-variable ratio of at least 10:1 and no fewer than 280 cases [13]. This study included 28 observed variables: 5 demographic variables, 6 dimensions of stress coping, 7 dimensions of sleep quality, and 10 dimensions of mental health. Considering potential sample attrition, an additional 10% was added, requiring a minimum sample size of 308. This study was approved by our hospital' s ethics committee.

1.2 Instruments

1.2.2 Pittsburgh Sleep Quality Index (PSQI) Developed by Buysse et al. [14] in 1989, this self-assessment scale evaluates sleep quality. The scale comprises 7 dimensions: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each dimension is scored from 0 to 3, with the cumulative sum representing the total score. The total score ranges from 0 to 21, with higher scores indicating poorer sleep quality. A total score $ $7 indicates sleep disturbances [15]. In this study, the scale' s Cronbach' s α coefficient was 0.712.

1.2.3 Symptom Checklist-90 (SCL-90) Compiled by Derogatis in 1973 [16] and translated into Chinese by Wang Zhengyu [17], this scale has been

widely used in mental health research in China. It includes 10 factors: somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, and additional items (sleep and diet), comprising 90 items total. The positive detection standard is a total score exceeding 160 or more than 43 positive items [18]. The Cronbach' s α coefficients for each factor ranged from 0.77 to 0.99.

1.2.4 Coping Style Questionnaire (CSQ) The CSQ [19] consists of 62 items across 6 dimensions: problem-solving, self-blame, help-seeking, fantasy, avoidance, and rationalization. In this study, the scale' s Cronbach' s α coefficient was 0.776. Problem-solving and help-seeking represent positive, mature coping methods; avoidance, self-blame, and fantasy represent negative, immature coping methods; and rationalization represents a neutral coping method.

1.3 Data Collection

Researchers distributed questionnaires to participants via an online survey platform. Participants anonymously completed the questionnaire by scanning a QR code with WeChat. Quality control measures included: (1) a standardized introductory page explaining the purpose, significance, and completion method, with online anonymous submission after completion; (2) all items marked as required to ensure data validity and completeness; and (3) restriction to one submission per IP address. Researchers reviewed all collected data and excluded questionnaires that did not meet requirements. A total of 308 electronic questionnaires were distributed and collected, of which 6 were completed too quickly and 13 had missing items and were excluded. The final sample included 289 valid questionnaires, yielding a valid response rate of 93.83%.

1.4 Statistical Analysis

SPSS 27.0 software was used for statistical analysis. Measurement data are described as mean ± standard deviation (±s). Between-group comparisons used t-tests or ANOVA, and count data are described as frequency or percentage (%). Pearson correlation analysis examined relationships, and the SPSS PROCESS macro was used to construct a moderated mediation model to analyze the mediating effect of stress coping between mental health and sleep disturbances. $P<0.01$ was considered statistically significant.

2. Results

2.1 General Information of Study Subjects

A total of 308 electronic questionnaires were distributed and collected, with 289 valid questionnaires obtained, yielding a valid response rate of 93.83%. The general characteristics of the 289 clinical nurses are presented in .

2.2 Scale Scores

2.2.1 PSQI Scores Nurses' PSQI scores ranged from 0-18, with a total score of 5.52$±$3.67. Among them, 156 nurses (53.98%) had good sleep quality, 49 (16.96%) had fair sleep quality, and 84 (29.07%) had poor sleep quality. The detection rates for factor scores $ $2 were, in order: sleep latency (40.83%, 118 nurses), subjective sleep quality (29.41%, 85 nurses), daytime dysfunction (25.61%, 74 nurses), sleep efficiency (18.34%, 53 nurses), sleep disturbances (14.19%, 41 nurses), sleep duration (13.84%, 40 nurses), and use of sleeping medication (6.57%, 19 nurses).

A comparison of each dimension and total score of the Pittsburgh Sleep Quality Index with national norms is shown in . The mean PSQI total score was $5.52\$\pm\$3.67, significantly higher than the national norm of 3.88±2.52 [20] (P<0.01), with all dimension scores also significantly higher (P<0.01).

2.2.2 SCL-90 Scores The Cronbach' s α coefficients for each subscale ranged from 0.77 to 0.99, with an overall questionnaire Cronbach's α coefficient of 0.893, all exceeding 0.7, indicating good reliability. Among the surveyed nurses, 63 had total scores exceeding 160, accounting for 21.80%. Compared with the national norm for nurses, the scores for somatization, obsessive-compulsive symptoms, anxiety, and psychoticism were slightly higher than the national nurse norm, the depression factor score was equal to the national nurse norm, and the scores for interpersonal relationships, hostility, phobic anxiety, and paranoid ideation were lower than the national nurse norm.

The comparison of each dimension score of clinical nurses' mental health with the national norm is shown in .

2.2.3 CSQ Scores Using the Coping Style Questionnaire developed by Xiao Jihua [22], "yes" responses were scored as 1 and "no" as 0, with a total possible score of 62. Based on this, coping styles were categorized as mature, immature, or mixed, with higher scores indicating poorer coping ability. The detailed scores are presented in .

2.3 Correlation Analysis Among Nurses'Mental Health, Sleep Quality, and Stress Coping

Pearson correlation analysis revealed that the total stress coping score was positively correlated with the total mental health score (P<0.01), the total mental health score was positively correlated with the total sleep quality score (P<0.01), and the total stress coping score was positively correlated with the total sleep quality score (P<0.01). These results are summarized in .

2.4 Mediating Effect Test of Stress Coping Between Mental Health and Sleep Quality

Following the procedure outlined by Wen Zhonglin et al. [23], we first tested the total effect (c) of the initial variable (sleep quality) on the outcome variable (mental health). The results showed that c was significant, allowing us to proceed with subsequent steps. We then conducted the Judd and Kenny mediation test. The results indicated that both a and b were significant, suggesting that the effect of sleep quality on mental health was at least partially mediated by stress coping. After retesting the direct effect of the initial variable (sleep quality) on the outcome variable (mental health) as c' , the results showed that c' was also significant, indicating only partial mediation—meaning the effect of sleep quality on mental health was only partially achieved through the mediating variable.

Examining the model, we observed that the positive factor loading on the sleep quality → mental health path was significant, indicating that sleep quality significantly positively predicted mental health. After the intervention of stress coping, sleep quality still had an effect on mental health, demonstrating the mediating effect of stress coping as a mediating variable between sleep quality and mental health. Finally, we calculated the ratio of the mediating effect to the total effect as a×b/c = 0.30×(0.40)/(0.58) = 0.207. To test the significance of the mediating effect, we used the Bootstrap method to resample 5,000 times from our study sample, calculating the average path coefficients from each sample as estimates. The results indicated that the 95% confidence interval for the mediating effect (0.0676, 0.1755) did not include 0, confirming that the mediating effect was significant. The mediating pathway is illustrated in [Figure 1: see original paper], and the mediating effect test results are presented in .

3. Discussion

3.1 Current Status of Stress Coping, Mental Health, and Sleep Quality in Clinical Nurses

This study revealed that the overall stress coping score among clinical nurses was $34.02\$\pm10.19, with subscale scores of problem-solving(0.81\pm0.13), fantasy(0.43\pm0.26), rationalization(0.53\pm0$ $seeking(0.71\pm0.18), and self-blame(0.32\pm\$0.26)$. These findings are similar to those of Li Caixia et al. [24] but slightly lower, possibly due to differences in work environments, as clinical ward nurses encounter fewer critically ill patients than emergency department nurses. Among the six dimensions of stress coping, problem-solving scored highest while self-blame scored lowest, indicating that nurses tend to adopt relatively mature coping strategies when dealing with stress, demonstrating mature personality characteristics and behavioral patterns.

Regarding gender differences, females scored higher than males on self-blame and help-seeking dimensions. In terms of age, younger nurses scored higher on help-seeking, while the opposite pattern was observed for fantasy, avoid-

ance, and rationalization. Higher professional titles were associated with higher scores on problem-solving, self-blame, fantasy, avoidance, and rationalization, but lower help-seeking scores. Head nurses scored lower than staff nurses across all dimensions. Among married nurses, scores for help-seeking, fantasy, and self-blame were higher than among unmarried nurses, while scores for avoidance, rationalization, and problem-solving were lower.

Research has shown that individuals under high stress who lack good coping methods have a 43.3% increased risk of psychological damage, representing double the risk of the general population [25]. Conversely, good coping strategies can effectively help individuals alleviate pressure from life events and resulting psychosomatic symptoms [26]. Therefore, hospitals should consider providing psychological counselors or establishing psychological nursing clinics to cultivate positive lifestyles and improve psychological resilience among nurses according to their age, gender, and professional title, thereby reducing work-related psychological stress. Nursing managers should also fully consider individual constitution, professional competence, stress resistance, and coping ability during personnel selection [27,28].

This study also found that the mean sleep quality score was 5.52$\pm$3.67, $significantlyhigherthanthenationalno$ with all dimension scores also higher. A PSQI score >7 indicates poor sleep quality. This study identified 84 nurses (29.07%) with poor sleep quality, a prevalence higher than that reported for the general population (19.1%) with sleep problems [29], with all dimension scores exceeding national norms. This indicates a high prevalence of sleep problems among nurses. In nursing practice, long-term tense doctor-patient relationships can cause sleep disturbances [30]; poor colleague relationships can lead to self-doubt and increased work pressure; and disharmonious family relationships, particularly for parents with multiple children who face greater responsibilities, can create chronic tension that affects sleep quality. Therefore, nurses should manage interpersonal relationships well to improve sleep quality.

This study also revealed that 21.80% of nurses were identified as having abnormal mental health status through positive screening, a finding consistent with the results of Sun Li and Luo Zebin et al., indicating that the proportion of clinical nurses in China with positive mental health screening is relatively high and unsatisfactory. Compared with the national norm, nurses scored higher on somatization, obsessive-compulsive symptoms, anxiety, and psychoticism factors, equal on depression, and lower on interpersonal relationships, hostility, phobic anxiety, and paranoid ideation. This may be significantly related to heavy nursing workloads. One survey of 95 hospitals in China found an average doctor-to-nurse ratio of only 1:1.4, far below the Ministry of Health standard of 1:2 [33]. Insufficient nurse staffing places nurses in a state of chronic overload.

3.2 Relationships Among Stress Coping, Mental Health, and Sleep Quality in Clinical Nurses

This study' s results demonstrate positive correlations among nurses' stress coping, mental health, and sleep quality. Specifically, actively coping with stress can improve mental health and sleep quality, findings similar to those of Sun Lijuan [34] and Zhang Wanlin [35]. Huang Yeli and Huang Haiyan [36] reported that positive coping strategies can reduce individual stress and improve ability to cope with external pressure, while negative coping strategies are detrimental to physical and mental health. Most research concludes that different coping styles have different effects on health and quality of life [37], even influencing the course of diseases, particularly chronic conditions such as cancer and diabetes [38].

Nurses represent a special occupational group with strong professional demands. As medical technology continuously updates, nurses are forced to constantly learn and update their knowledge while also facing theoretical and practical examinations organized by hospitals, creating significant mental pressure. In daily life, nurses often juggle multiple roles—professional, family, and social—predominantly female, and with the implementation of two-child and three-child policies, many face maternity leave, leading to nursing staff shortages. This places nurses in a state of chronic high tension and overload, causing physical and mental exhaustion that affects sleep quality and mental health. Therefore, nursing managers should enhance nurses' ability to cope with stress positively, provide them with proper psychological guidance and intervention, and encourage positive coping strategies at work to help reduce psychological pressure, thereby improving mental health and sleep quality.

3.3 Mediating Effect of Stress Coping Between Mental Health and Sleep Quality

Mediation analysis revealed that stress coping functions as a mediating variable between mental health and sleep quality, exerting a partial mediating effect. Two pathways influence mental health: first, nurses' sleep quality directly affects mental health with a direct effect of 0.40, playing a positive predictive role—consistent with correlation analysis results. This suggests that improving nurses' sleep quality can enhance mental health status. The second pathway is indirect: nurses' sleep quality influences mental health through stress coping, with an indirect effect of $0.30 \times (0.40) = 0.12$, also playing a positive predictive role.

This indicates that stress coping is an internal motivational factor for nurses. When facing work pressure, it can mobilize nurses' positive psychological qualities in a timely manner, thereby actively adjusting their psychological state [39]. Simultaneously, sleep quality serves as an external motivational factor for nurses. When nurses cannot relieve work pressure on their own, they can seek help from psychological counselors to adjust their mental state. Therefore, as nursing managers, improving nurses' sleep quality can enhance their mental

health while also improving their stress coping abilities. As a mediating variable, coping style influences the nature and intensity of stress responses and moderates the relationship between stress and health or disease [40]. Thus, improving nurses' sleep quality can enhance mental health and simultaneously improve stress coping levels.

In summary, this survey reveals that the status of nurses' mental health, sleep quality, and stress coping is not optimistic and should attract managers' attention. How to improve nurses' sleep quality, enhance their mental health, help them cope with stress positively and effectively, and stabilize the nursing workforce are key issues urgently needing resolution in China' s nursing team construction. If nursing managers can provide more psychological support to nurses and intervene in their sleep quality, timely intervention measures should be taken once mental health issues or negative attitudes are detected, which will contribute to the continuous development of the nursing talent pool. Additionally, nurses themselves should strengthen self-cultivation, continuously improve professional knowledge and skills, cultivate positive emotions, enhance psychological resilience, improve sleep quality, and promote mental health.

This study only examined demographic variables and relevant indicators from psychological scales, without considering physiological influences. Future research should conduct multi-clinical, multi-dimensional, and multi-hospital investigations. Additionally, latent profile analysis could be performed for each scale, using multiple statistical methods to contribute to building a stronger nursing workforce.

3.4 Limitations of This Study

First, due to time and manpower constraints, convenience sampling was used, which may have introduced some degree of sample bias. Second, the study subjects were limited to certain departments in a single comprehensive hospital in Shanxi Province, making the conclusions insufficient for generalization to the entire hospital or national level. Therefore, future research should conduct multi-center, large-sample surveys and further develop prospective or longitudinal studies to understand the dynamic change characteristics of each variable and deeply analyze the relationships among dimensions of the scales.

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Note: Figure translations are in progress. See original paper for figures.