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Mediating role of emotional intelligence in the relationship between dual work stress and reflective ability among junior nurses



Mingfang Zhang^{1†}, Junxian Wu^{2†}, Yanting Yang¹, Jingru Song² and Qin Shen^{2*}

Abstract

Background Junior nurses constitute the backbone of the nursing workforce, and their reflective ability is essential for clinical decision-making, as well as for driving innovation and improvement in nursing practices. Although numerous studies emphasize the importance of enhancing reflective ability in junior nurses, the specific relationships among emotional intelligence, dual work stress, and reflective ability remain unclear.

Objective To explore the mediating effect of emotional intelligence on the relationship between dual work stress and reflective ability among junior nurses, with the aim of providing evidence-based guidance for nursing managers to improve reflective ability in clinical settings.

Methods A cross-sectional study was conducted between October 2023 and January 2024, involving 308 junior nurses from three tertiary hospitals in Jiaxing City, Zhejiang Province, selected through convenience sampling. Data were collected using a demographic questionnaire, the Challenge–Hindrance Stressor Scale, the Emotional Intelligence Scale, and the Reflective Ability Scale.

Results Challenge stress among junior nurses was 18.00 (13.00, 23.00), hindrance stress was 17.00 (12.00, 21.00), emotional intelligence was 54.00 (40.00, 67.00), and reflective ability was 59.00 (46.00, 71.00). Challenge stress showed positive correlations with emotional intelligence and reflective ability (r=0.382 and 0.379, respectively, P<0.01), while hindrance stress showed negative correlations with both (r=-0.279 and -0.381, P<0.01). Emotional intelligence was also positively correlated with reflective ability (r=0.378, P<0.01). In addition, emotional intelligence partially mediated the effects of both challenge stress and hindrance stress on reflective ability, with mediation values of 0.095 and -0.048, accounting for 32.0% and 16.7% of the total effect, respectively.

Conclusion Junior nurses demonstrated a moderate level of reflective ability and a moderately low level of emotional intelligence. Both hindrance stress and challenge stress were reported at moderate levels. These findings underscore the importance for nursing managers to acknowledge the impact of dual work stress and emotional intelligence on reflective ability. It is recommended to establish and implement effective stress management

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strategies with a focus on enhancing emotional intelligence among junior nurses. Such initiatives may improve reflective ability, thereby contributing to higher nursing quality and promoting professional development in the field.

Clinical trial number Not applicable.

Keywords Reflective ability, Emotional intelligence, Dual work stress, Mediating role, Junior nurse

Introduction

With the rapid development of medical advancements, the diversification of patient needs, and the evolution of nursing models toward precision, personalization, and interdisciplinary collaboration, nursing work has become increasingly complex, placing greater demands for the comprehensive abilities of nursing staff [1, 2]. Therefore, nurses not only need to possess solid professional knowledge and skills but must also continuously adapt their thinking to cope with the ever-changing clinical situations [3]. Reflective ability, as a core competencly for nurses to enhance self-awareness, optimize practice, and adapt to the healthcare environment, refers to an individual's capacity for self-examination, critical thinking, and improvement through the proactive review and analysis of professional experiences [4]. In this study, junior nurses are defined as those with less than five years (60 months) of clinical experience, following the classification used in the China Health Statistical Yearbook [5]. Junior nurses, an emerging force in the nursing workforce, play a crucial role in shaping the future healthcare model. Research indicates that nearly 60% of junior nurses encounter difficulties in translating theoretical knowledge into reflective practice [6]. This issue is particularly evident in high-stress work environments, where the reflective abilities of junior nurses are often underdeveloped, hindering their personal career growth. If their reflective abilities are not developed, it may pose a systemic challenge to the sustainable development of the nursing workforce.

In this context, it is particularly important to gain an deeper understanding of the factors and mechanisms influencing the development of reflective ability in junior nurses. Work stress presents dual characteristics, including challenge stress, which contributes to career development, and hindrance stress, which has a negatively impacts work performance. Challenge stress manageable stressors effectively managed by individuals and can positively influence career development, motivating individuals to overcome work difficulties and improve professional skills [7]. In contrast, hindrance stress refers to stress that individuals difficult to manage, which negatively affects work behavior and often leads to emotional distress and psychological fatigue [7]. Due to their relatively limited clinical experience and underdeveloped stress-coping strategies, junior nurses often struggle with emotional management in high-pressure work environments, displaying lower levels of emotional intelligence [8]. Emotional intelligence defined as the ability to recognize, understand, express, and regulate both one's own and others' emotions plays a crucial role in nurses' professional adaptation. In particular, when confronted with complex clinical situations, emotional intelligence can significantly impact their career development and psychological well-being [9]. Furthermore, when exposed to high levels of hindrance stress, junior nurses may experience excessive psychological burden, which can impair their self-awareness and diminish their capacity to regulate and recognize emotions [10].

Existing evidence suggests that emotional intelligence can effectively alleviate nurse burnout and positively contribute to the development of reflective ability [11]. However, research exploring the relationship among dual work stress, emotional intelligence, and reflective ability particularly in junior nurses remains limited. This research gap constrains a deeper understanding of the mechanisms underlying the development of reflective ability in high-pressure clinical environments. To address this gap, Gibbs' Reflective Cycle theory offers a valuable theoretical framework for examining how emotional intelligence influences reflective ability [12]. The cycle outlines six stages of reflection: description, feelings, evaluation, analysis, conclusion, and action plan. This model not only emphasizes the dynamic and iterative nature of reflection but also highlights the central role of emotions aligning closely with the key components of emotional intelligence: emotional recognition, understanding, expression, and regulation. In high-pressure work environments, the dual forms of work stress experienced by junior nurses may indirectly influence their reflective ability through emotional intelligence. Specifically, when facing challenge stress such as managing complex cases or learning new technologies positive emotions may be elicited, enabling junior nurses to more accurately identify and express emotions during the "feelings" stage of the reflective cycle. This emotional awareness, in turn, fosters deeper cognitive processing in the "analysis" stage and strengthens motivation for practical improvements in the "action plan" stage. Conversely, when confronted with hindrance stress such as insufficient resources or interpersonal conflict negative emotions may emerge, increasing psychological burden. In such cases, emotional intelligence enables junior nurses to manage emotions during the "feelings" stage

and maintain cognitive clarity in the "analysis" stage, thus preventing emotional disturbances from disrupting the reflective process.

On this basis, the present study aims to explore the mediating role of emotional intelligence in the relationship between dual work stress and reflective ability among junior nurses. Guided by Gibbs' Reflective Cycle theory, the study also examines how emotional intelligence shapes reflective development through different stages of the reflection process. The goal is to provide new theoretical insights and empirical evidence for enhancing reflective ability in junior nurses.

The specific research hypotheses are as follows:

Hypothesis 1 Emotional intelligence is positively correlated with reflective ability;

Hypothesis 2 Emotional intelligence is positively correlated with challenge stress and negatively correlated with hindrance stress;

Hypothesis 3 Reflective ability is positively correlated with challenge stress and negatively correlated with hindrance stress;

Hypothesis 4 Emotional intelligence plays a mediating role between dual work stress and reflective ability.

Objective

This study aims to: (1) Investigate the current status of reflective ability, emotional intelligence, and dual work stress among junior nurses; (2) Explore the interrelationships between reflective ability, emotional intelligence, and dual work stress among junior nurses; (3) Analyze the mediating role of emotional intelligence between dual work stress and reflective ability.

Methods

Study design and participants

This research utilized a cross-sectional design, in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [13]. A convenience sampling method was used to recruit junior nurses from three tertiary hospitals in Jiaxing, Zhejiang Province. The inclusion criteria were: clinically employed registered nurses with a valid nursing license, \leq 60 months of work experience, and informed consent for voluntary participation. Nurses who were interns, undergoing training at other institutions, or not on duty during the study period were excluded. The sample size was initially set at 250, considering a 20% invalid response rate, based on the general recommendation that the sample size for structural equation modeling (SEM) should be 10 times the number of model variables, with a minimum

of 200 participants. Ultimately, 320 questionnaires were collected, 12 of which were incomplete, resulting in 308 valid responses, yielding an effective response rate of 96.25%.

Instruments

General information questionnaire

A demographic questionnaire was developed based on the study objectives to collect personal and professional background information from junior nurses. It included 10 items covering variables such as gender, age, education level, marital status, professional title, monthly income, frequency of night shifts, average weekly overtime hours, participation in reflection-related training, and the habit of keeping a reflective diary.

The clinical nurse reflective ability scale

The Chinese version of the Clinical Nurse Reflective Ability Scale, originally developed by Nishimoto et al. [14] and translated by Shao Lijiao et al. [15], was used to assess the reflective ability of junior nurses. The scale comprises three dimensions: Reviewing Nursing Practice (8 items), Reflecting on Nursing Practice (6 items), and Expanding Nursing Practice (5 items), totaling 19 items. A 6-point Likert scale was applied, ranging from "strongly disagree" (1 point) to "strongly agree" (6 points), with total scores ranging from 19 to 114. Higher scores indicate a higher level of reflective ability. The Cronbach's α coefficient for the Chinese version was 0.901 overall, with subscale coefficients of 0.922, 0.918, and 0.885 for the three respective dimensions. In the present study, the overall.

Cronbach's α coefficient was 0.929, and the coefficients for the three dimensions were 0.933, 0.912, and 0.901, demonstrating high internal consistency and good reliability.

The challenge-hindrance stressor scale

The Challenge-Hindrance Stressor Scale, originally developed by Cavanaugh [16] and translated into Chinese by Zhang Yi et al. [17], was used to assess challenge and hindrance stress among junior nurses. The scale consists of two subscales: Challenge Stress (6 items) and Hindrance Stress (5 items), comprising a total of 11 items. A 5-point Likert scale was employed, with responses ranging from "no stress at all" (1 point) to "extreme stress" (5 points); higher subscale scores indicate greater perceived stress in the corresponding domain. The Cronbach's α coefficient for the Chinese version was 0.910 overall, with subscale values of 0.920 for Challenge Stress and 0.820 for Hindrance Stress. In the present study, the overall Cronbach's α was 0.878, with subscale coefficients of 0.894 and 0.860, respectively, demonstrating good internal consistency.

The emotional intelligence scale

The Chinese version of the Emotional Intelligence Scale, revised by Wong et al. [18], was used in this study. The scale comprises four dimensions: Self-Emotion Appraisal (4 items), Regulation of Emotion (4 items), Use of Emotion (4 items), and Others' Emotion Appraisal (4 items), totaling 16 items. A 7-point Likert scale was employed, with responses ranging from "strongly disagree" (1 point) to "strongly agree" (7 points). Total scores range from 16 to 112, with higher scores indicating greater emotional intelligence. The Cronbach's α coefficient for the Chinese version was 0.901, with subscale values of 0.832 for Self-Emotion Appraisal, 0.775 for Regulation of Emotion, 0.743 for Use of Emotion, and 0.728 for Others' Emotion Appraisal. In the present study, the overall Cronbach's α was 0.932, and the subscale values were 0.875, 0.874, 0.861, and 0.873, respectively, demonstrating strong internal consistency and reliability.

Data collection

Before data collection, the researchers obtained approval from the nursing managers of the selected departments and visited each unit in person to meet with all potential participants. This allowed for face-to-face verification of each nurse's registration status and inclusion eligibility. After being fully informed of the study purpose, procedures, and confidentiality principles, participants voluntarily signed an electronic informed consent form. The online questionnaire link was then distributed via platforms such as WeChat, and participants independently completed and submitted the survey using their personal mobile devices. The survey was conducted anonymously using Wenjuanxing, an online survey tool widely used in China that supports encrypted data collection, anonymous submission, and secure data export.

Data analysis

Data analysis was conducted using SPSS (version 26.0) and AMOS (version 24.0). Categorical variables were summarized as frequencies and percentages, while continuous variables with skewed distributions, determined by normality tests, were presented as medians and interquartile ranges (IQRs). Spearman correlation analysis was used to examine the relationships among reflective ability, challenge stress, hindrance stress, and emotional intelligence. To assess potential common method bias, Harman's single-factor test was performed by subjecting all items to unrotated principal component analysis. A variance explained by the first factor of less than 40% was considered indicative of negligible common method bias. Structural equation modeling (SEM) was then conducted based on the correlation results, using maximum likelihood estimation for parameter estimation and model fitting. Mediation effects were tested using the bootstrap method with 5,000 resamples. A 95% confidence interval excluding zero was considered evidence of statistical significance. A P-value < 0.05 was regarded as statistically significant.

Ethical considerations

The study was approved by the Medical Ethics Committee (Approval No. 2023-LY-427) and conducted in accordance with the Declaration of Helsinki. All participants provided informed consent, participated voluntarily, and retained the right to withdraw from the study at any time without any impact on their employment or personal life. Confidentiality was strictly maintained; all data were used exclusively for research purposes and were not disclosed to unauthorized individuals. The research team adhered fully to both national and international ethical standards throughout the study.

Results

Demographic characteristics

A total of 308 junior nurses participated in this study. The majority of participants were female (82.8%), with males accounting for 17.2%. In terms of age, most were between 26 and 30 years old (56.4%), followed by those aged 25 years or younger (39.3%), while only 4.3% were aged 31 or above. Regarding marital status, 51.7% were married and 48.3% were single. As for educational background, over half of the participants (55.8%) held an undergraduate degree, 35.7% had a junior college degree, and 8.5% had a master's degree or higher. With respect to professional title, the majority of participants (77.9%) held Primary title (1), while 22.1% held Primary title (2). Monthly household income was primarily concentrated in the 5001-7000 RMB range (48.1%), followed by those earning \leq 5000 RMB (36.4%), and only 2.2% reported an income of \ge 9001 RMB. In terms of work characteristics, most participants (59.7%) reported working 1–3 night shifts per month, 32.1% reported \geq 4 night shifts, and 8.2% had none. For average weekly overtime, 47.1% worked less than 5 h, 29.2% worked 5-10 h, 14.9% worked 11-15 h, 5.9% worked more than 15 h, and 2.9% reported no overtime. With respect to reflective practice, 59.1% of the participants reported keeping reflective diaries or notes, while 40.9% did not. Additionally, 68.1% had received training related to reflective ability, whereas 31.9% had not. Detailed information is presented in Table 1.

Testing for common method bias

The Harman's single-factor test was performed using unrotated exploratory factor analysis on all measurement items for challenge-hindrance work stress, emotional intelligence, and reflective ability. The results revealed the extraction of eight common factors with eigenvalues

Table 1 Data on demographic characteristics of the participants (n = 308)

| Demographic variable | Groups | Frequency(<i>n</i>) | Percentage(%) | |
|--|--------------------------|-----------------------|---------------|--|
| Gender | Male | 53 | 17.2 | |
| | Female | 255 | 82.8 | |
| Age(years) | ≤25 | 121 | 39.3 | |
| | 26–30 | 174 | 56.4 | |
| | ≥31 | 13 | 4.3 | |
| Relationship | Single | 149 | 48.3 | |
| status | Married | 159 | 51.7 | |
| | Widowedor separated | 0 | 0 | |
| Educational | Junior college | 110 | 35.7 | |
| levels | Undergraduate | 172 | 55.8 | |
| | Master degreeor above | 26 | 8.5 | |
| Professional | Primary title (1) | 240 | 77.9 | |
| title | Primary title (2) | 68 | 22.1 | |
| Monthly house- hold income | ≤ 5000 RMB | 112 | 36.4 | |
| | 5001-7000 RMB | 148 | 48.1 | |
| | 7001-9000 RMB | 41 | 13.3 | |
| | ≥9001 RMB | 7 | 2.2 | |
| Number | 0 | 25 | 8.2 | |
| of night shifts(months) | 1–3 | 184 | 59.7 | |
| | ≥4 | 99 | 32.1 | |
| Average weekly overtime hours | None | 9 | 2.9 | |
| | < 5 h/w | 145 | 47.1 | |
| | 5–10 h /w | 90 | 29.2 | |
| | 11–15 h/w | 46 | 14.9 | |
| | > 15 h/w | 18 | 5.9 | |
| Whether there | Yes | 182 | 59.1 | |
| is a habit of recording re- flective diaries or reflective notes | No | 126 | 40.9 | |
| Whether | Yes | 210 | 68.1 | |
| you have participated in training related to reflective ability | No | 98 | 31.9 | |

Note: Primary title (2) represents a higher entry-level title than Primary title (1) in the Chinese nursing hierarchy, with greater experience and qualification requirements; RMB=Renminbi (Chinese Yuan)

greater than 1, with the first factor explaining 28.8% of the variance, which is below the critical threshold of 40%. Therefore, it can be concluded that no significant common method bias exists in this study.

Scores for challenge-hindrance work stress, emotional intelligence, and reflective ability in junior nurses

Among the 308 junior nurses, the median scores for challenge stress, hindrance stress, emotional intelligence, and reflective ability were 18.00 (13.00, 23.00), 17.00 (12.00, 21.00), 54.00 (40.00, 67.00), and 59.00 (46.00, 71.00),

Table 2 The scores of challenge-hindrance stress scale, emotional intelligence and reflective ability of junior nurses $[n = 308, M (P_{25}, P_{75})]$

| ltem | Score | Score | Average score |
|--------------------------------|--------|---------------------|------------------|
| | range | | of articles |
| Reflective Ability | 19–114 | 59.00 (46.00,71.00) | 3.10 (2.42,3.73) |
| Refer Nursing Practice | 8–48 | 24.00 (18.00,34.00) | 3.00 (2.25,4.25) |
| Recall on Nursing Practice | 6–36 | 18.00 (12.00,25.00) | 3.00 (2.00,4.17) |
| Expand Nursing Practice | 5–30 | 15.00 (11.00,22.00) | 3.00 (2.20,4.40) |
| Challenge Stress | 6–30 | 18.00 (13.00,23.00) | 3.00 (2.17,3.83) |
| Hindrance Stress | 5-25 | 17.00 (12.00,21.00) | 3.40 (2.40,4.20) |
| Emotional Intelligence | 16-112 | 54.00 (40.00,67.00) | 3.38 (2.50,4.19) |
| Self - Emotional Appraisal | 4–28 | 13.00 (9.00,17.00) | 3.25 (2.25,4.25) |
| Regulation of Emotion | 4–28 | 13.00 (9.00,16.00) | 3.25 (2.25,4.00) |
| Use of Emotion | 4–28 | 13.00 (10.00,18.00) | 3.25 (2.50,4.50) |
| Others' Emotional Appraisal | 4–28 | 13.00 (9.00,16.75) | 3.25 (2.25,4.19) |

respectively. Given the theoretical medians of the emotional intelligence scale (56) and reflective ability scale (57), the results suggest a moderate-to-low level of emotional intelligence and a moderate level of reflective ability. The challenge stress (range: 6-30) and hindrance stress (range: 5-25) scores also fell near the midpoint of their respective ranges, indicating moderate levels of perceived work stress. Further details are presented in Table 2.

Correlation analysis of challenge-hindrance work stress, emotional intelligence, and reflective ability in junior nurses

The results of the Spearman correlation analysis indicated that the challenge stress score in junior nurses was positively correlated with both emotional intelligence and reflective ability total scores (r = 0.379, r = 0.382, both P < 0.01). Conversely, the hindrance stress score was negatively correlated with both emotional intelligence and reflective ability total scores (r = -0.381, r = -0.279, both P < 0.01). Additionally, the total score for emotional intelligence was positively correlated with the total score for reflective ability (r=0.378, P < 0.01). Further details are provided in Table 3.

Mediating effect of emotional intelligence between challenge-hindrance work stress and reflective ability in junior nurses

Construction and validation of the structural equation model AMOS 24.0 was used to construct the SEM, with challenge stress and hindrance stress as independent variables, emotional intelligence as the mediating variable, and reflective ability as the dependent variable. Maximum likelihood estimation was employed for model

| , | | | | | | | | | | | |
|------|----------|----------|----------|----------|----------|----------|---------|---------|---------|---------|----|
| | RNP | RONP | ENP | RA | CS | HS | SEA | ROE | UOE | OEA | El |
| RNP | 1 | - | - | - | - | - | - | - | - | - | - |
| RONP | 0.286** | 1 | - | - | - | - | - | - | - | - | - |
| ENP | 0.507** | 0.644** | 1 | - | - | - | - | - | - | - | - |
| RA | 0.812** | 0.716** | 0.859** | 1 | - | - | - | - | - | - | - |
| CS | 0.228** | 0.298** | 0.458** | 0.379** | 1 | - | - | - | - | - | - |
| HS | -0.272** | -0.359** | -0.378** | -0.381** | -0.384** | 1 | - | - | - | - | - |
| SEA | 0.260** | 0.330** | 0.400** | 0.397** | 0.346** | -0.276** | 1 | - | - | - | - |
| ROE | 0.223** | 0.272** | 0.369** | 0.345** | 0.283** | -0.232** | 0.644** | 1 | - | - | - |
| UOE | 0.243** | 0.209** | 0.343** | 0.312** | 0.368** | -0.251** | 0.651** | 0.570** | 1 | - | - |
| OEA | 0.140* | 0.233** | 0.281** | 0.252** | 0.302** | -0.191** | 0.642** | 0.598** | 0.565** | 1 | - |
| EI | 0.249** | 0.298** | 0.407** | 0.378** | 0.382** | -0.279** | 0.879** | 0.817** | 0.834** | 0.819** | 1 |

Table 3 Correlation analysis of challenge-hindrance stress, emotional intelligence, and reflective ability among junior nurses (n = 308,

Note: RNP = Refer Nursing Practice; RONP = Recall on Nursing Practice; ENP = Expand Nursing Practice; RA = Reflective Ability; CS = Challenge Stress; HS = Hindrance Stress; SEA = Self-Emotional Appraisal; ROE = Regulation of Emotion; UOE = Use of Emotion; OEA = Others' Emotional Appraisal; EI = Emotional Intelligence

*P<0.05 (two-tailed tests)

r

**P<0.01 (two-tailed tests)



Fig. 1 Path analysis diagram for prediction of Reflective ability (mediation effect). Note: all P<0.01

fitting and modification to test the hypotheses, with the final model meeting the fit criteria. The fit results of the modified model were as follows: $\chi^2/df = 1.169$, GFI=0.982, AGFI=0.963, NFI=0.975, TLI=0.994, CFI=0.996, RFI=0.959, RMSEA=0.023. The structural equation model is shown in Fig. 1.

Mediating effect of emotional intelligence between challenge-hindrance work stress and reflective ability

The mediating effect of the model was tested using the Bootstrap method with 5,000 samples and a 95% confidence interval (CI). The results revealed that the total effects of challenge stress and hindrance stress on the reflective ability of junior nurses were 0.296 and -0.288,

respectively. The corresponding direct effects were 0.274 and -0.240, and the indirect effects were 0.095 and -0.048. Emotional intelligence played a partial mediating role in the relationships between both types of stress and reflective ability, with 95% CIs for the indirect effects ranging from (0.163 to 0.467) and (-0.451 to -0.140), both excluding zero. The mediating effects accounted for 32.0% and 16.7% of the total effects, respectively. Further details are provided in Table 4.

 Table 4
 Break down table of the total effect, direct effect, and the mediating effect

| Dependent | Independent | Direct Effect | Indirect | Gross |
|-----------|-------------|---------------|----------|--------|
| Variable | Variable | | Effect | effect |
| RA | CS | 0.274 | 0.095 | 0.296 |
| EI | CS | 0.346 | | 0.346 |
| RA | HS | -0.240 | -0.048 | -0.288 |
| EI | HS | -0.178 | | -0.178 |
| RA | EI | 0.275 | | 0.275 |

Note: RA=Reflective Ability; CS=Challenge Stress; HS=Hindrance Stress; EI=Emotional Intelligence

Discussion

Analysis of the current situation of reflective ability, dual work stress, and emotional intelligence among junior nurses

This study revealed that junior nurses exhibited a moderate level of reflective ability. Their scores were notably lower than those reported by Zhao et al. in a study of ostomy and incontinence specialist nurses [19], but were similar to those observed by Zhou et al. in a study of junior nurses [20]. This discrepancy may be attributed to substantial differences between the two groups in terms of clinical experience, professional competence, and role responsibilities [20]. Reflection is inherently an exploratory cognitive process that requires individuals to engage in continuous critical review and analysis of their professional practice. Specialist nurses, such as those focusing on ostomy and incontinence care, often possess deep, domain-specific clinical experience and typically receive advanced training. These factors contribute to the development of a well-established reflective feedback system.In contrast, junior nurses, due to their shorter duration of practice and lack of targeted training, tend to have limited clinical insight and a relatively weaker knowledge base in specialized areas. This may restrict the depth and breadth of their reflective thinking, which in turn could explain their lower reflective ability scores [19].

In terms of work stress, junior nurses reported moderate levels of both challenge and hindrance stress. This pattern aligns with the findings of Ma et al. [21], who also observed that hindrance stress tended to exceed challenge stress. Specifically, the average hindrance stress score was slightly higher than the challenge stress score, suggesting that junior nurses may be exposed to more obstructive than growth-promoting stressors in the early stages of their careers. This discrepancy may stem from a mismatch between the personal capabilities of junior nurses and the demands of their roles [22]. As expectations within the nursing profession continue to rise, junior nurses are increasingly required to meet higher standards of efficiency and quality, often resulting in a misalignment between job demands and individual competencies. Such a mismatch frequently necessitated extended working hours to complete assigned tasks,

further intensifying their work-related stress. Notably, 97% of participants in this study reported working overtime. The additional workload not only heightened their psychological tension but also exacerbated their experience of hindrance stress. Moreover, elevated expectations for career advancement, combined with limited developmental opportunities, may contribute to feelings of uncertainty regarding their career trajectories. This uncertainty can diminish their motivation to pursue more challenging professional goals, thereby influencing their perception of and response to challenge stress.

In terms of emotional intelligence, junior nurses demonstrated a moderately low level, which was significantly lower than that reported by Gao Yilan et al. [23] in a study of intensive care unit (ICU) nurses. This discrepancy may be attributed to differences in work environments. In the highly specialized ICU setting, nurses often formed close-knit teams that provided both emotional and professional support, which was crucial for fostering emotional intelligence [24]. Additionally, ICU nurses typically received specialized training that equipped them to manage the unique demands of their environment, including strategies for regulating both their own and others' emotions, thereby supporting the development of emotional intelligence [25]. In contrast, junior nurses may not have been fully integrated into similar support systems or exposed to targeted emotional skills training. As a result, they may have lacked the ability to effectively interpret, manage, and evaluate emotions in clinical contexts, and their awareness and application of emotional self-regulation strategies in the workplace may have been limited [26]. These factors likely contributed to the lower emotional intelligence observed among junior nurses.

The interrelationship between reflective ability, emotional intelligence, and dual role work stress among junior nurses This study found that challenge stress had a significant positive effect on the reflective ability of junior nurses, whereas hindrance stress had a significant negative effect. These findings were consistent with those reported by Wu et al. [27] in their study on mid- to senior-level nurses. Challenge stress may have enhanced reflective ability by stimulating learning motivation and reinforcing professional identity, encouraging junior nurses to actively engage in reflection during clinical practice in order to acquire new skills and effectively respond to workplace challenges [7, 16]. In contrast, hindrance stress may have impaired reflective ability by increasing psychological burden, weakening cognitive processing, and fostering frustration, ultimately reducing problem-solving capacity [7, 16]. For junior nurses, this may have hindered their capacity for deeper reflection and self-assessment, making it more difficult to engage in complex reflective activities. Based on these findings, nursing managers should recognize the potential of challenge stress to support the development of reflective ability among junior nurses. To facilitate their professional growth, managers are encouraged to create appropriately challenging work environments and provide structured training opportunities. At the same time, it is crucial to mitigate the negative impact of hindrance stress by implementing stress reduction strategies and offering tailored support and resources to help junior nurses cope more effectively with workplace demands.

This study further confirmed the significant positive predictive effect of emotional intelligence on reflective ability, indicating that individuals with higher emotional intelligence tended to exhibit stronger reflective ability. This finding was consistent with the results reported by Kim SH et al. [28]. A higher level of emotional intelligence enabled junior nurses to more effectively recognize and understand their emotional states when confronted with nursing challenges. Through enhanced self-awareness, they were better equipped to identify both their strengths and areas for improvement during the reflective process. Moreover, emotional intelligence facilitated timely self-feedback and enhanced the ability to process that feedback with empathy and insight [29]. This, in turn, allowed junior nurses to gain deeper insights into their clinical experiences, thereby fostering more meaningful self-reflection. These findings suggested that nursing managers should prioritize the cultivation of emotional intelligence among junior nurses. Offering targeted training programs focused on emotional regulation, selfawareness, and empathy could improve emotional intelligence, support emotional and behavioral recognition, and ultimately strengthen reflective practices.

Further analysis revealed that challenge stress had a positive impact on emotional intelligence, whereas hindrance stress exerted a negative effect. This finding aligned with the conclusions drawn by Alsufyani et al. [30]. According to Dugué M, emotional intelligence referred to a set of non-cognitive skills and abilities that influenced an individual's success in managing daily demands and stress. It involved the capacity to perceive, understand, and regulate one's own emotions, as well as those of others, and to respond appropriately based on this understanding [31]. Specifically, when junior nurses were exposed to hindrance stress, they often experienced emotional strain and psychological burden, which could compromise their ability to identify and manage emotions effectively. Such stress increased their psychological load, impaired emotional regulation, and ultimately hindered the development of emotional intelligence [7, 16]. In contrast, challenge stress tended to serve as a motivational force, fostering personal growth and development. It enhanced nurses' sense of self-efficacy and confidence in addressing workplace difficulties. As junior nurses became more confident, they were better able to navigate emotional fluctuations and strengthen their emotional intelligence. These findings suggested that cultivating a supportive yet challenging work environment was conducive to the emotional development of junior nurses, while interventions aimed at reducing hindrance stress could further facilitate the enhancement of emotional intelligence.

The mediating role of emotional intelligence between dual work stress and reflective ability in junior nurses

The SEM analysis revealed that emotional intelligence partially mediated the relationship between dual work stress and reflective ability. This finding indicated that emotional intelligence not only exerted a direct influence on reflective ability but also functioned as both a mediator and a moderator in the pathways through which challenge stress and hindrance stress impacted reflective ability. Grounded in Gibbs' Reflective Cycle theory [12], emotional intelligence served as a dynamic mediator in junior nurses' responses to dual work stress. When facing challenge stress, emotional intelligence enabled junior nurses to accurately identify the positive aspects of stress during the "feeling" stage and to actively evaluate its potential value in the "analysis" stage, thereby fostering positive emotions such as optimism and confidence [32]. This emotional state not only enhanced their cognitive adaptation to stress but also laid the motivational foundation for the subsequent "conclusion" and "action plan" stages, facilitating the effective translation of reflective ability into practice [33].

Conversely, when dealing with hindrance stress (e.g., resource scarcity or interpersonal conflict), junior nurses were more likely to experience anxiety or frustration, leading to emotional overload during the "feeling" stage and cognitive rigidity during the "analysis" stage. In such cases, emotional intelligence operated through a dual-path mechanism. First, during the "feeling" stage, it assisted in recognizing and accepting negative emotions, thereby preventing emotional suppression and psychological exhaustion. Second, in the "analysis" stage, emotional intelligence employed emotion regulation strategies to maintain cognitive flexibility, helping to overcome barriers to critical thinking in the "evaluation" stage [34]. This dynamic regulatory process enabled junior nurses to complete the full reflective cycle outlined by Gibbs, even under high psychological load, transforming stress into an opportunity for developing reflective ability.

Therefore, emotional intelligence played a critical role in junior nurses' effective stress management and the enhancement of their reflective ability. Based on this finding, the study recommended that nursing managers prioritize the development of emotional intelligence among junior nurses. Specifically, targeted training programs focused on emotional regulation, self-awareness, and empathy should be implemented, alongside the creation of a supportive, feedback-oriented work environment. Such initiatives would help junior nurses better manage emotional stress, improve adaptability, and promote deeper reflection and critical thinking.

Practical implications

This study reveals the mediating role of emotional intelligence in the relationship between work stress and reflective ability among junior nurses, offering important practical guidance for nursing management. To mitigate the negative effects of hindrance stress, it is recommended that emotional intelligence training be integrated into in service education and clinical support systems. Enhancing nurses' ability to recognize and regulate emotional responses not only supports their psychological well-being but also promotes deeper reflection in clinical practice. At the same time, encouraging junior nurses to view challenge stress as a growth opportunity can help boost their motivation and reinforce reflective behaviors.

Furthermore, strengthening junior nurses' capacity to assess patients' emotional states may contribute to improved quality of care. By understanding how their nursing behaviors influence patient emotions, nurses can more effectively prevent communication breakdowns and reduce the occurrence of nurse patient conflicts. Fostering emotional awareness and empathy can also enhance inter professional collaboration and help build a more supportive work environment. Therefore, it is recommended that emotional intelligence development be incorporated into nursing education and career development planning to support the professional growth of junior nurses and improve the overall quality of patient care.

Conclusion

This study revealed that junior nurses generally exhibited low to moderate levels of emotional intelligence and reflective ability, with moderate levels of both challenge and hindrance stress. Further analysis confirmed that emotional intelligence not only directly and positively predicts reflective ability, but also partially mediates the relationship between dual work stress and reflective ability. When facing hindrance stress, junior nurses are more likely to experience negative emotions such as anxiety and frustration, which in turn constrain their cognitive flexibility and impede the reflective process. However, emotional intelligence may facilitate reflection through the mechanism of Gibbs' Reflective Cycle. In the "feeling" stage, it enables nurses to recognize and accept negative emotions, thereby preventing emotional suppression and psychological exhaustion. In the "analysis" stage, emotional regulation supports openness and cognitive flexibility, promoting deeper and more comprehensive reflection. This dynamic regulatory process empowers nurses to complete the full reflective cycle even under high-pressure situations, transforming stress into opportunities for professional growth.

Based on these findings, targeted strategies are recommended to enhance emotional intelligence among junior nurses. On the one hand, structured training programs should be implemented to strengthen emotional awareness, emotion regulation, self-feedback, and empathy, thereby improving their ability to cope with stress and to understand both their own and others' emotions. On the other hand, a supportive work environment should be fostered to encourage reflective practice and establish an open feedback culture. Such an environment can help junior nurses engage in meaningful reflection and professional development within a safe and inclusive atmosphere. These measures are expected to enhance not only emotional regulation and adaptability, but also critical thinking and problem-solving abilities, ultimately contributing to the sustained improvement of nursing care quality.

Limitations

This study had several limitations. First, data were obtained exclusively from junior nurses at three tertiary hospitals in Jiaxing, Zhejiang Province. The definition of junior nurses may vary across regions or healthcare systems, which limits the generalizability of the findings. Consequently, the cross-cultural applicability of the study's conclusions may be constrained. Future research should consider multi-center studies to validate these conclusions more broadly.

Second, data were collected through self-reported questionnaires. Although participation was voluntary and anonymous, responses may still have been influenced by social desirability or concerns about self-image, potentially introducing response bias. Additionally, as the study was conducted within a specific time frame, it was unable to capture long-term trends or dynamic changes in reflective ability, work stress, and emotional intelligence over time.

Finally, due to the cross-sectional design of this study, it was not possible to establish causal relationships between variables. In summary, the limitations of this study include concerns regarding sample representativeness, cultural and individual variability, self-report bias, and the inability to infer causality. Future studies could address these limitations by expanding the sample size, employing diverse data collection methods, and adopting a longitudinal research design.

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Author contributions

Made substantial contributions to conception and design, or acqui-sition of data, or analysis and interpretation of data: Mingfang Zhang, Junxian Wu, Qin Shen, Yanting Yang, Jingru Song. Involved in drafting the manuscript or revising it critically for important intellectual content: Mingfang Zhang, Qin Shen. Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content: Mingfang Zhang, Junxian Wu, Qin Shen, Yanting Yang, Jingru Song. Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Mingfang Zhang, Junxian Wu, Qin Shen, Yanting Yang, Jingru Song.

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Data availability

The data sets are available with the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Review Committee of The First Hospital of Jiaxing (approval number: 2023-LY-427) and adheres to the principles of the Declaration of Helsinki. Participants were provided with standardized instructions explaining the purpose, significance, and completion requirements of the questionnaires. Informed consent was obtained from each participant, who voluntarily agreed to participate and was informed of their right to withdraw at any time without affecting their work or daily life. Personal information was anonymized, and all questionnaire data were used exclusively for the purposes of this study, ensuring confidentiality. The research team strictly adhered to both national and international ethical standards throughout the study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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