



Competence–Confidence Calibration and Risk Profiling Among Preclinical Nursing Students: A Cross-Sectional Study

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Article Information	ABSTRACT
Received : 12 April 2026 Revised : 17 June 2026 Accepted : 27 June 2026	The transition from preclinical learning to clinical practice requires nursing students to possess adequate competence and self-confidence in performing clinical skills. Mismatch between competence and confidence may affect clinical readiness and patient safety. Objective: This study aimed to analyze the relationship between objective clinical competence and self-confidence among preclinical nursing students and evaluate competence-confidence calibration. Methods: A cross-sectional analytic study was conducted among 41 preclinical nursing students using total population sampling. Objective competence was measured using standardized preclinical assessment scores, while self-confidence was assessed using a validated competency-based questionnaire (Cronbach's alpha = 0.80). Data were analyzed using descriptive statistics, Pearson correlation, simple linear regression, and z-score-based calibration analysis. Results: A significant moderate positive correlation was found between objective competence and self-confidence ($r = 0.58$; $p < 0.001$). Objective competence significantly predicted self-confidence ($R^2 = 0.34$; $p < 0.001$). Calibration analysis showed that 36.6% of students were well-calibrated, 34.1% were overconfident, and 29.3% were underconfident. Conclusion: Objective competence was significantly associated with self-confidence among preclinical nursing students, although competence-confidence mismatch remained common. Formative feedback and reflective learning are needed to improve clinical readiness.
Keywords: Clinical Competence, Self-Confidence, Nursing Education, Clinical Readiness.	
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Introduction

The transition from preclinical training to clinical practice represents a critical phase in nursing education, during which students are expected to integrate theoretical knowledge with practical skills while ensuring patient safety (Abd Elfatah et al., 2021; Zheng et al., 2025). Competence in this context is typically assessed through objective measures such as knowledge-based examinations or skill evaluations. However, beyond objective competence, students' self-perceived confidence plays a pivotal role in determining how they perform in real clinical environments (Ramezanzade Tabriz et al., 2024). Confidence influences decision-making, initiative, and the willingness to engage in patient care activities (Tang et al., 2025).

Despite its importance, confidence does not always align with actual competence (Tzamaras et al., 2024). A growing body of literature highlights the phenomenon of competence–confidence mismatch, where individuals may either overestimate or underestimate their abilities. Overconfidence, in particular, poses a significant concern in healthcare settings, as it may lead to unsafe clinical practices, procedural errors, and reduced supervision-seeking behavior (Seidel-Fischer et al., 2024; Trifunovic-Koenig et al., 2022). Conversely, underconfidence may result in hesitation, delayed interventions, and reduced learning opportunities (Douglas et al., 2023).

This mismatch is frequently discussed within cognitive bias frameworks such as the Dunning–Kruger effect, which explains how individuals with lower competence may overestimate their abilities due to limited metacognitive awareness (Knof et al., 2024). In nursing education, accurate self-assessment is particularly important because students are expected to recognize both their strengths and limitations before entering direct patient care environments (Bam et al., 2020).

Most previous nursing education studies have examined competence and confidence as independent variables, with relatively limited emphasis on calibration, defined as the degree of alignment between perceived confidence and objectively measured competence (Al Gharibi & Arulappan, 2020). Understanding calibration is essential during the preclinical phase because students are preparing for real clinical exposure but still rely heavily on simulated learning environments. Poor calibration at this stage may continue into clinical placement and potentially compromise patient safety and quality of care.

Furthermore, identifying patterns of mismatch enables the development of risk profiling among nursing students. Students with high confidence but low competence may represent a

high-risk group requiring closer supervision, structured feedback, and targeted remediation. In contrast, students with adequate competence but low confidence may benefit from confidence-enhancing strategies such as simulation-based education, reflective learning, mentorship, and supportive clinical supervision (Alrashidi et al., 2023; Ramezanzade Tabriz et al., 2024).

Simulation-based learning, formative feedback, and reflective practice have been consistently associated with improvements in clinical readiness and self-awareness among nursing students (Alharbi et al., 2024; Alrashidi et al., 2023; Arrogante et al., 2021). Repeated simulation exposure may improve both psychomotor competence and confidence through experiential learning and guided reflection (Guerrero et al., 2021). Therefore, examining competence–confidence calibration may provide valuable insights for curriculum development and educational intervention planning.

The novelty of this study lies in its integration of objective competence measurement, self-reported confidence assessment, and calibration-based risk profiling among preclinical nursing students. Unlike previous studies that primarily focus on the relationship between competence and confidence, this study specifically evaluates the alignment and mismatch between these constructs to identify overconfident and underconfident student profiles with implications for patient safety and clinical readiness. Therefore, this study aims to examine the relationship between objective clinical competence and self-confidence among preclinical nursing students while evaluating calibration patterns as a basis for educational intervention development.

Method

This study employed a cross-sectional analytic design to examine the relationship and calibration between objective competence and self-confidence among preclinical nursing students prior to clinical placement in a medical–surgical nursing course. The study involved 41 preclinical nursing students representing the entire cohort enrolled during the study period using a total population sampling technique. Although the sample size was relatively small, it represented the total accessible population and reflected the complete profile of students in the targeted academic phase. Self-confidence was measured using a self-developed competency-based questionnaire consisting of three domains: fundamental nursing care, technical and procedural skills, and clinical reasoning/professional skills. Each item was assessed using a 5-point Likert scale, with higher scores indicating greater self-confidence. Content validity was evaluated through expert review involving nursing educators and clinical instructors, while

construct validity was supported by corrected item–total correlation values exceeding 0.30. The instrument demonstrated good internal consistency reliability (Cronbach’s alpha = 0.80). Objective competence was measured using standardized preclinical assessment scores obtained from institutional preclinical examinations conducted prior to clinical placement. The assessment evaluated students’ cognitive understanding and procedural nursing skills, including fundamental nursing care and clinical skill performance. Scores were treated as continuous variables, with higher scores indicating greater objective clinical competence and readiness for clinical practice. To assess calibration, both competence and self-confidence scores were standardized using z-scores and categorized into calibration groups (overconfident when confidence z-scores exceeded competence z-scores by >0.5 SD, underconfident when competence z-scores exceeded confidence z-scores by >0.5 SD, and well-calibrated when the difference was within ± 0.5 SD). Z-score classification was selected to facilitate standardized comparison between variables measured using different scales and to identify relative mismatch patterns within the cohort. All participants provided informed consent prior to participation, and all data were anonymized before analysis. Data were analyzed using IBM SPSS Statistics through descriptive statistics, Shapiro–Wilk normality test, Pearson correlation analysis, and simple linear regression. Statistical significance was determined at $p < 0.05$.

Research Results

A total of 41 nursing students participated in the study. Descriptive analysis indicated objective competence and self-confidence scores were generally above the midpoint of their respective scales among participants.

Objective competence scores had a mean of 39.80 (SD = 5.21), with scores ranging from 28 to 50. Self-confidence scores had a mean of 4.21 (SD = 0.46), with observed values ranging from 3.10 to 5.00. Normality assumptions were assessed using the Shapiro–Wilk test. Both objective competence ($W = 0.97$, $p = 0.41$) and self-confidence ($W = 0.96$, $p = 0.28$) were normally distributed. These results supported the use of parametric statistical analyses in subsequent tests.

Table. 1 Descriptive Statistics and Normality test (n = 41)

Variable	Mean (SD)	Min–Max	Statistic (W)	df	p-value	Distribution
Objective Competence	39.80 (5.21)	28–50	0.97	41	0.41	Normal
Self-Confidence	4.21 (0.46)	3.10–5.00	0.96	41	0.28	Normal

Pearson correlation analysis revealed a statistically significant moderate positive relationship between objective competence and self-confidence ($r = 0.58$, $p < 0.001$). This indicates that higher levels of objective clinical competence are associated with higher self-confidence among nursing students in clinical skill performance.

Table 2. Relationship Between Objective Competence And Self-Confidence

Variables	n	r	p-value
Objective competence vs self-confidence	41	0.58	<0.001

A simple linear regression analysis was conducted to examine the predictive effect of objective competence on self-confidence. The overall model was statistically significant ($F = 20.45$, $p < 0.001$) and explained 34% of the variance in self-confidence ($R^2 = 0.34$; adjusted $R^2 = 0.32$). Objective competence significantly predicted self-confidence ($B = 0.051$, $\beta = 0.58$, $t = 4.52$, $p < 0.001$), indicating that each one-point increase in objective competence was associated with an average increase of 0.051 points in self-confidence.

Table 3. Regression Analysis of Objective Competence on Self-Confidence

Component	Variable	B	SE	β	t	p-value	95% CI
Model Fit	R	0.58	–	–	–	<0.001	–
	R^2	0.34	–	–	–	–	–
	Adjusted R^2	0.32	–	–	–	–	–
	F-statistic	20.45	–	–	–	<0.001	–
Predictor	Constant	2.18	0.45	–	4.84	<0.001	1.27–3.09
	Objective Competence	0.051	0.011	0.58	4.52	<0.001	0.028–0.074

A calibration analysis further demonstrated variability in the alignment between competence and confidence. Approximately 36.6% of students were well-calibrated, while 34.1% demonstrated overconfidence and 29.3% showed underconfidence, indicating variability in competence–confidence calibration among students.

Table 4. Calibration analysis (n = 41)

Calibration Category	Definition	n (%)
Well-calibrated	Difference within ± 0.5 SD	15 (36.6%)
Overconfident	Confidence exceeded competence by >0.5 SD	14 (34.1%)
Underconfident	Competence exceeded confidence by >0.5 SD	12 (29.3%)

The distribution of calibration categories indicates that more than half of the students experienced some degree of mismatch between competence and confidence, emphasizing the need for educational interventions targeting self-awareness and reflective clinical judgment. Based on competence-confidence calibration, students may be educationally stratified into risk profiles. Well-calibrated students represented a low-risk group, underconfident students a moderate-risk group, and overconfident students a high-risk group requiring closer supervision and feedback.

Discussion

This study examined the relationship between objective clinical competence and self-confidence among preclinical nursing students preparing for clinical placement. The findings demonstrated a statistically significant moderate positive relationship between competence and self-confidence, indicating that students with higher objectively measured competence tend to report higher levels of self-confidence in clinical skills performance.

The positive association observed in this study is consistent with the theoretical premise that experiential learning and repeated clinical exposure enhance both skill acquisition and affective readiness (Guerrero et al., 2021). As students gain more hands-on experience in clinical settings, their procedural fluency and decision-making capacity improve, which in turn strengthens their perceived ability to perform clinical tasks (Arun Chandekar et al., 2025; Oermann et al., 2016). This alignment supports the notion that competence development and confidence formation progress in parallel during clinical education. Nevertheless, previous studies have reported that competence and confidence do not always develop simultaneously (Almansour, 2023; Roszipal et al., 2025). Some students may demonstrate high confidence despite limited competence, whereas others may underestimate their abilities despite adequate performance. These inconsistencies suggest that confidence is influenced by multiple psychological and contextual factors beyond technical competence alone. Therefore, caution should be exercised when using confidence as a sole indicator of clinical readiness.

The regression analysis further confirmed that objective competence significantly predicted self-confidence, explaining 34% of the variance. This finding suggests that although competence contributes substantially to students' confidence, approximately 66% of self-confidence variance may be influenced by other factors not captured in this model, including feedback quality, prior exposure, supervision style, anxiety, learning environment, personality characteristics, and self-efficacy. These factors are consistent with self-efficacy theory and previous nursing education literature suggesting that confidence is shaped by mastery experiences, social support, feedback processes, and emotional regulation (Shorey & Lopez, 2021). Consequently, objective competence represents only one component influencing students' perceived readiness for clinical practice. These findings indicate that self-confidence in clinical settings is a multidimensional construct rather than a direct reflection of technical competence alone. Similar findings in nursing students have demonstrated that psychosocial factors and social support systems contribute to students' psychological outcomes and educational experiences, suggesting that confidence may also be influenced by factors beyond objective competence. (Majidah et al., 2026; Sholehah et al., 2025). These findings may also be interpreted through Bandura's Social Cognitive Theory, which emphasizes self-efficacy as a central determinant of behavioral performance. According to this framework, confidence is influenced not only by actual competence but also by mastery experiences, verbal persuasion, vicarious learning, and emotional states (H. J. Lee & Bong, 2023). Consequently, students with comparable competence levels may demonstrate different confidence levels depending on their learning experiences, feedback received, and psychological readiness. This theoretical perspective may help explain why objective competence accounted for only 34% of the variance in self-confidence in the present study.

One of the most important findings of this study was the variability in competence-confidence calibration. Only approximately one-third of students demonstrated accurate calibration, while the remainder showed either overconfidence or underconfidence. These findings are educationally significant and may have implications for future patient safety and learning outcomes. Unlike previous nursing education studies that primarily examined competence and self-confidence as separate or correlational constructs, the present study incorporated competence-confidence calibration analysis to identify specific risk profiles among preclinical nursing students. This approach provides a more nuanced understanding of

clinical readiness by distinguishing students who accurately evaluate their abilities from those who may overestimate or underestimate their competence. The identification of overconfident and underconfident groups extends current knowledge beyond simple competence-confidence associations and offers a practical framework for targeted educational interventions and patient safety initiatives.

Students categorized as overconfident may overestimate their ability and perform procedures beyond their actual competence level, potentially increasing the risk of clinical errors and reducing their tendency to seek supervision or clarification. Previous studies have similarly highlighted the relationship between overconfidence and unsafe clinical practice behaviors (Seidel-Fischer et al., 2024; Trifunovic-Koenig et al., 2022). Conversely, underconfident students may hesitate to perform procedures despite adequate competence, limiting learning opportunities and delaying patient care interventions.

From a metacognitive perspective, accurate calibration reflects students' ability to monitor and evaluate their own learning and performance effectively (Alfaraj et al., 2026; C. Lee et al., 2026). Students with poor calibration may have difficulty recognizing knowledge gaps and skill limitations, which can hinder self-regulated learning processes. Therefore, competence-confidence calibration may serve as an important indicator of metacognitive development in nursing education. Educational strategies that encourage reflection, self-monitoring, and guided self-assessment may improve students' ability to regulate learning and make appropriate clinical decisions.

The findings of this study support the importance of strengthening formative feedback and reflective learning processes within nursing education. Structured feedback allows students to compare perceived performance with objective outcomes, thereby improving self-awareness and calibration accuracy. Reflective learning activities, debriefing sessions, and guided self-assessment may help students recognize discrepancies between confidence and competence. Simulation-based education may also serve as an effective strategy to improve calibration accuracy and patient safety. Repeated simulation exposure enables students to practice psychomotor skills, receive immediate feedback, and develop metacognitive awareness in a safe learning environment. Additionally, Objective Structured Clinical Examination (OSCE)-based assessments combined with reflective discussion may help students develop more realistic self-appraisal.

Beyond educational implications, the present findings contribute to the theoretical understanding of competence-confidence relationships in nursing education. The results support the view that self-confidence is a multidimensional construct influenced by both objective competence and metacognitive processes. Competence-confidence calibration may represent a potentially important mechanism linking self-awareness and perceived clinical readiness. From an institutional perspective, nursing education programs should integrate calibration-oriented educational strategies into preclinical curricula. Educational interventions may include simulation-based assessments, reflective journaling, structured mentorship, peer-assisted feedback, and competency-based formative evaluation. Clinical instructors should also monitor students who demonstrate persistent overconfidence or underconfidence because these profiles may require different educational approaches and supervision intensity.

This study has several limitations. First, the sample size was relatively small and limited to a single cohort, reducing generalizability to broader nursing student populations. Second, the cross-sectional design does not allow evaluation of changes in competence–confidence calibration over time. Third, self-confidence was measured using self-reported responses that may be influenced by response bias. Future studies should employ multicenter designs involving larger and more diverse nursing student populations to improve generalizability. Longitudinal investigations are also needed to examine how competence-confidence calibration evolves throughout clinical training. Furthermore, incorporating psychological variables such as self-efficacy, resilience, clinical anxiety, reflective capacity, and metacognitive awareness may facilitate the development of more comprehensive explanatory models of clinical readiness.

Conclusion

This study demonstrated a significant positive relationship between objective clinical competence and self-confidence among preclinical nursing students. Although students with higher competence generally reported greater confidence, substantial competence-confidence mismatch was observed, with many students classified as either overconfident or underconfident. These findings indicate that self-confidence cannot be considered a direct proxy for competence and highlight the importance of competence-confidence calibration in evaluating clinical readiness. Educational strategies including formative feedback, reflective learning, simulation-based training, mentorship, and calibration-focused assessments may help improve students' self-awareness, clinical preparedness, and patient safety. Future longitudinal

and multicenter studies incorporating additional psychological variables are warranted to further explore the mechanisms underlying competence-confidence calibration in nursing education.

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