

Determinants of Nursing Clinical Skills and Clinical Competence: A Systematic Review

Salmah Ahmed Alshomrani^{1*}, Regidor III Dioso²

¹School of Nursing & Applied Science, Lincoln University College, Malaysia,
salmahalshomrani@gmail.com

²School of Nursing & Applied Science, Lincoln University College, Malaysia,
duke@lincoln.edu.my

*Corresponding Author's E-mail: salmahalshomrani@gmail.com

Abstract: *This systematic review synthesises evidence on the determinants of nursing clinical skills and broad clinical competence among pre-licensure nursing students, new graduate nurses, and licensed nurses. Using a PRISMA-informed process, the review searched the predefined eleven-year eligibility window and identified 531 records. After duplicate removal, title-and-abstract screening, and full-text assessment, 54 primary empirical studies met the inclusion criteria. Fourteen determinants were inductively coded and organised into four interrelated domains: contextual-relational, experiential-pedagogical, personal-cognitive, and professional-development. The determinants most frequently examined were self-efficacy, learning environment, practice exposure, education and training, and experience or tenure. Across the evidence base, stronger competence was generally associated with supportive clinical learning environments, effective supervision, constructive staff interaction, repeated authentic practice, structured simulation, actionable feedback and debriefing, reflective learning, and appropriately calibrated self-efficacy. Stress and anxiety were generally associated with poorer performance or less favourable competence ratings, although the direction and magnitude of these relationships varied by context and measurement approach. Workforce studies additionally emphasised educational preparation, clinical tenure, professional identity, and organisational conditions. Considerable heterogeneity in populations, study designs, settings, instruments, and outcome definitions precluded defensible quantitative pooling; narrative synthesis was therefore used. The review distinguishes the frequency with which determinants were studied from the strength of their evidential influence, preserves analytical separation between student and workforce findings, and identifies priorities for longitudinal, multi-site, objectively assessed, and theory-driven research.*

Keywords: nursing clinical skills; clinical competence; nursing students; new graduate nurses; registered nurses; clinical learning environment; simulation; self-efficacy; systematic review.

1. Introduction

Nursing clinical skills extend beyond the technically accurate performance of isolated psychomotor procedures. Competent practice requires the integrated use of knowledge, clinical reasoning, communication, ethical judgement, prioritisation, situational awareness, and safe action in changing care environments. Accordingly, this review treats clinical competence as a context-sensitive capacity demonstrated through direct observation, objective structured clinical examination, simulation

performance, supervisor or preceptor assessment, or a validated multidimensional competence instrument. Knowledge, confidence, satisfaction, readiness, and self-efficacy may facilitate performance, but none constitutes clinical competence when measured in isolation. This distinction is essential because an individual may feel prepared or knowledgeable without demonstrating safe, adaptable performance. Competence is also relational and situated: clinical placements expose learners to patients, supervisors, staff, equipment, documentation systems, and organisational routines that shape what can be practised and how performance is judged (Ford et al., 2016).

Evidence on the determinants of clinical competence comes from two related but non-equivalent populations. Pre-licensure nursing students develop foundational competence through classroom instruction, skills laboratories, simulation, supervised clinical placement, reflection, and progressively demanding patient-care experiences. New graduate and licensed nurses develop, consolidate, and maintain competence through transition support, workplace experience, continuing education, professional identity, clinical supervision, and the organisational conditions of practice. Clinical employment undertaken during study may accelerate the conversion of theoretical knowledge into situated performance, although its value depends on the structure, supervision, and reflective use of that experience (Manoochehri et al., 2015). Occupational tenure is also associated with differentiated competence profiles in specialised nursing; however, years in practice cannot be assumed to represent the quality, breadth, or current adequacy of performance (Tsutsumi & Sekido, 2015). These population differences require analytical separation before any cross-career interpretation is attempted.

The evidence base is fragmented across educational, psychological, organisational, and workforce research traditions. Simulation studies examine scenario fidelity, prebriefing, facilitation, feedback, and debriefing; placement studies focus on the clinical learning environment, supervision, staff interaction, and opportunities for participation; individual-difference studies investigate self-efficacy, reflection, critical thinking, stress, and professional identity; and workforce studies emphasise education, training, experience, and workplace conditions. A systematic review of practising nurses identified education, experience, workplace environment, job stress, and critical thinking as recurrent influences, but it did not integrate evidence across the student-to-workforce continuum or apply the present requirement for a direct competence outcome (Almarwani & Alzahrani, 2023). A separate review of nursing students highlighted the clinical learning environment, self-efficacy, training, and learning experience while also reporting substantial variation in instruments and settings (Yoeum et al., 2024). The unresolved need is therefore not another undifferentiated list of correlates, but an integrated synthesis that preserves population, context, measurement, and evidential strength.

This review addresses four questions. First, which determinants of broad nursing clinical skills or clinical competence were directly examined in primary empirical studies published within the predefined eligibility window? Second, how can those determinants be organised into a coherent evidence-derived framework while preserving differences among students, new graduate nurses, and licensed nurses? Third, which determinants received the greatest research attention, and what directions, conditions, or mechanisms were reported? Fourth, which theoretical, methodological, measurement, population, and contextual gaps should guide future research? Social cognitive theory explains the reciprocal relationships among self-efficacy, behaviour, and environment (Bandura, 1997). Experiential learning explains how action, reflection, conceptualisation, and renewed experimentation can transform experience into improved performance (Kolb, 1984). Situated learning locates competence within participation in authentic communities of practice (Lave & Wenger, 1991). Novice-to-expert development frames competence as progressive, contextual, and dependent on experience without assuming that progression is automatic (Benner, 1984). The objective is not to

estimate a single pooled effect, but to develop an integrated and auditable account of how nursing competence is developed, demonstrated, and sustained.

2. Methodology

A PRISMA-informed systematic literature review was conducted to identify, appraise, and synthesise primary empirical evidence on determinants of nursing clinical skills and broad clinical competence. Reporting of identification, screening, eligibility assessment, and study inclusion followed the PRISMA guideline (Page et al., 2021). The designation PRISMA-informed is used because the search relied on transparent, web-accessible bibliographic, repository, and publisher interfaces rather than reproducible exports from every proprietary database. The eligibility window covered the eleven complete calendar years immediately preceding the search year. Eligible reports were English-language, peer-reviewed journal articles using quantitative, qualitative, mixed-methods, observational, or intervention designs. Participants could be pre-licensure nursing students, new graduate nurses, or licensed nurses, provided that results for these groups were identifiable. The outcome had to represent broad or multidimensional clinical skills or clinical competence assessed through direct observation, objective structured clinical examination, simulation performance, supervisor or preceptor assessment, or a validated competence instrument. Studies measuring only knowledge, attitudes, satisfaction, readiness, confidence, or self-efficacy were excluded unless they also reported a direct competence outcome. Studies limited to one isolated technical procedure were excluded unless they analysed transferable determinants of broader competence.

Searches were completed on 19 July of the year following the eligibility window using PubMed, including MEDLINE-indexed records, PubMed Central/Europe PMC, and discipline-relevant publisher journal interfaces. Backward reference searching, forward citation tracing, and DOI or publisher verification supplemented the electronic search. The principal concept string combined nursing-population terms, direct-competence terms, and determinant terms: (nurs* OR nursing student* OR registered nurse* OR novice nurse*) AND ("clinical competence" OR "clinical competency" OR "clinical skills" OR "professional competence") AND (determinant* OR factor* OR predict* OR associat* OR environment OR supervis* OR simulation OR training OR self-efficacy OR stress OR experience). Date and English-language limits were applied where the search interface supported them. Search sensitivity was checked against known reports concerning clinical learning environments, simulation, self-efficacy, clinical practice, and workforce competence. Crossref records and DOI landing pages were used only to verify bibliographic details and were not counted as primary search sources. Because the interfaces differed in export and indexing functions, the review prioritised transparent reporting of the consolidated search ledger and selection arithmetic.

The consolidated identification ledger contained 531 records: 468 from database or index searches and 63 from citation-based and supplementary searching. Removal of 171 duplicates left 360 unique records for title-and-abstract screening. At this stage, 228 records were excluded because the population, determinant orientation, outcome, design, or publication type did not meet the operational criteria. The remaining 132 reports underwent full-text assessment. Seventy-eight reports were excluded: 23 measured knowledge, confidence, or attitudes without a direct competence outcome; 17 did not analyse a determinant; 12 did not provide separable nursing evidence; nine concerned a single isolated procedure without a broader competence construct; seven were reviews, editorials, or abstract-only records; six lacked sufficient full text or essential metadata; three duplicated or overlapped another empirical report; and one fell outside the date or language criteria. The final evidence base comprised 54 primary empirical studies. Figure 1 presents the frozen study-selection ledger and reconciles every stage of the review.

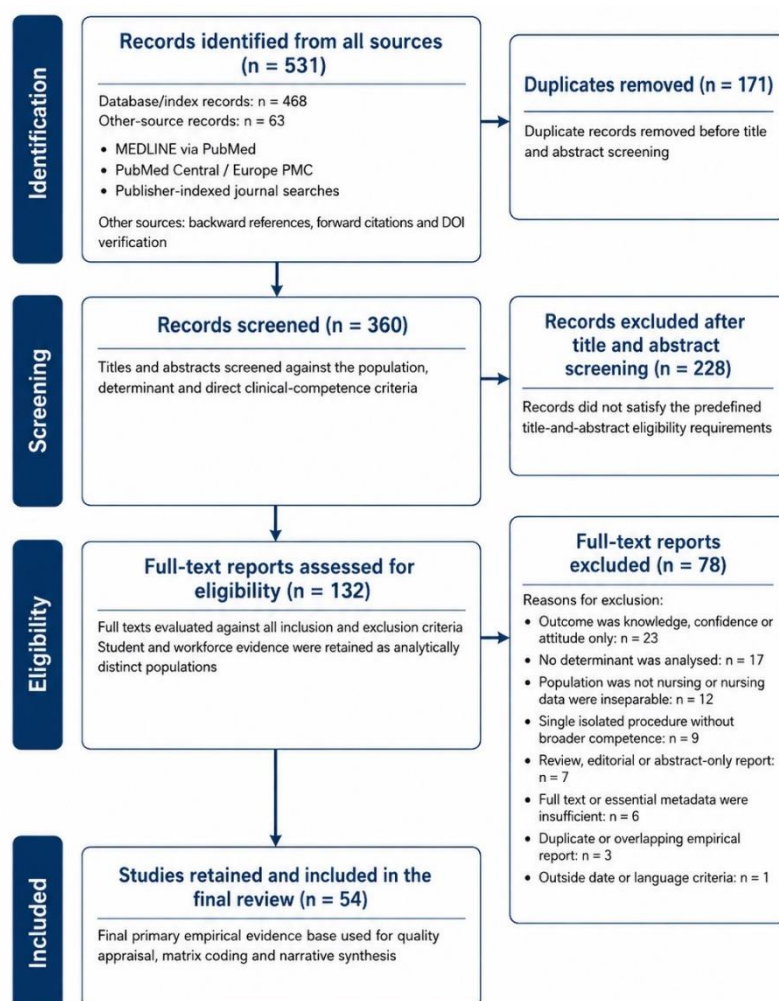


Figure 1. PRISMA-informed study-selection process

Figure 1 summarises the complete study-selection pathway and confirms the internal consistency of the review ledger. The search identified 531 records, comprising 468 database or index records and 63 records obtained through supplementary methods. Removing 171 duplicates produced 360 unique records for title-and-abstract screening. Of these, 228 were excluded because they did not meet the predefined population, determinant, outcome, design, or publication-type criteria. The remaining 132 reports underwent full-text assessment, after which 78 were excluded, most commonly because they measured indirect proxies rather than clinical competence, did not analyse a determinant, or did not provide separable nursing evidence. The final synthesis therefore included 54 primary empirical studies. Analytically, the figure demonstrates that the direct-outcome rule was most consequential at full-text review, where apparently relevant studies were removed after closer examination of their outcome constructs. It also makes the arithmetic auditable and clarifies why the final evidence base is narrower than the initial search yield.

Data extraction recorded authorship, year, setting, population, design, sample characteristics, competence measure, determinant variables, direction of association, and methodological limitations. The Mixed Methods Appraisal Tool 2018 provided a common framework across qualitative, quantitative, and mixed-methods designs, with design-specific Joanna Briggs Institute criteria consulted when a more focused judgement was required (Hong et al., 2018). Appraisal informed interpretive weight rather than functioning as an automatic exclusion threshold. Study terminology was consolidated only when definitions and operational measures were substantively equivalent.

Fourteen determinants were retained because they recurred across the evidence base or represented a theoretically important emerging domain. A matrix checkmark was assigned only when a determinant was measured, tested, modelled, evaluated, or centrally analysed. Frequencies therefore indicate research coverage, not effect size or causal importance. Student and workforce evidence was synthesised separately before cross-population interpretation, and no meta-analysis was undertaken because designs, measures, and estimates were not sufficiently comparable.

3. Results: Conceptual and Analytical Synthesis

The synthesis applied a direct-outcome rule that separates nursing clinical skills and competence from commonly used proxies. Knowledge, readiness, confidence, satisfaction, and self-efficacy were treated as potential determinants rather than evidence of competence when reported alone. Self-reported competence studies were retained only when the instrument was presented as a validated multidimensional competence measure rather than a confidence-only scale. This restriction reduces conceptual inflation and preserves the distinction between perceived and observed performance. For example, self-efficacy-based prebriefing is relevant only when competency performance is also assessed (Brennan, 2022). Longitudinal evidence further indicates that self-reported professional competence can change across simulation and clinical placement, with some domains improving and others weakening during transfer between settings (Høegh-Larsen et al., 2022). Outcome type, assessment source, context, and timing were therefore retained as essential interpretive features.

Fourteen determinants were organised into four connected domains. The contextual-relational domain comprises learning environment, supervision, and staff interaction. The experiential-pedagogical domain comprises practice exposure, simulation, teaching model, and feedback or debriefing. The personal-cognitive domain comprises self-efficacy, reflective learning, critical thinking, stress or anxiety, and professional identity. The professional-development domain comprises education or training and experience or tenure. These domains are distinct but interdependent: supportive environments expand access to authentic practice; supervision and staff interaction shape feedback; simulation can strengthen judgement and calibrated self-efficacy; reflection can convert experience into transferable learning; and professional identity can influence responsibility and help-seeking. Competence is therefore conceptualised as an emergent product of person, pedagogy, practice, and setting rather than as a fixed trait or the automatic consequence of time in training.

Table 1 separates research frequency from evidential influence. A checkmark records whether a study substantively examined a determinant; it does not represent effect magnitude or causal weight. Frequently studied factors are therefore not necessarily the most influential, while less frequently studied factors may remain theoretically or practically important. Interpretation also considers design quality, temporal ordering, outcome validity, independent assessment, consistency across settings, and the plausibility of the proposed mechanism.

Table 1. Literature review matrix of included studies and coded determinants

No.	Author(s) and Year	Learning Environment	Supervision	Staff Interaction	Practice Exposure	Simulation	Teaching Model	Feedback / Debriefing	Self-Efficacy	Reflective Learning	Critical Thinking	Stress / Anxiety	Professional Identity	Education / Training	Experience / Tenure	Clinical Skills
1	Hsu et al. (2015)					✓	✓	✓	✓					✓		✓
2	Manoochehri et al. (2015)				✓					✓			✓		✓	✓
3	Mohamadirizi et al. (2015)				✓				✓			✓				✓
4	Tsutsumi and Sekido (2015)				✓									✓	✓	✓
5	Ford et al. (2016)	✓	✓	✓	✓			✓								✓
6	Lejonqvist et al. (2016)				✓	✓				✓			✓			✓
7	Mirlashari et al. (2016)	✓										✓		✓	✓	✓
8	Kavanagh and Szveda (2017)				✓						✓			✓	✓	✓
9	Page-Cuttrara and Turk (2017)					✓	✓	✓			✓					✓
10	Pai (2017)				✓				✓	✓	✓					✓
11	Usher et al. (2017)	✓			✓				✓					✓		✓
12	Arkan et al. (2018)	✓	✓	✓								✓				✓
13	Y.-J. Kim et al. (2017)					✓	✓	✓	✓							✓
14	Park (2018)				✓		✓		✓					✓		✓
15	Tohidi et al. (2019)						✓		✓	✓				✓		✓
16	Albagawi et al. (2019)				✓				✓						✓	✓
17	Alquwez et al. (2019)	✓			✓				✓					✓		✓
18	J. Kim (2019)	✓		✓	✓		✓									✓
19	Kirkpatrick et al. (2019)				✓	✓			✓	✓						✓
20	Labrague et al. (2019)								✓		✓			✓	✓	✓
21	Cha et al. (2020)				✓		✓				✓			✓		✓
22	Huang et al. (2020)	✓			✓				✓					✓		✓
23	Taylor et al. (2020)									✓			✓	✓	✓	✓
24	Vand Tamadoni et al. (2020)	✓										✓		✓	✓	✓
25	Arrogante et al. (2021)					✓	✓	✓	✓							✓
26	Chen et al. (2021)	✓										✓		✓	✓	✓
27	Getie et al. (2021)	✓	✓	✓	✓			✓	✓							✓
28	Hung et al. (2021)					✓	✓		✓		✓					✓
29	Yamamoto et al. (2021)	✓											✓	✓	✓	✓
30	Yu et al. (2021)	✓	✓	✓					✓							✓
31	Zakeri et al. (2021)											✓	✓		✓	✓
32	Arshadi Bostanabad et al. (2022)	✓										✓	✓		✓	✓
33	Brennan (2022)					✓	✓	✓	✓							✓
34	Høegh-Larsen et al. (2022)	✓			✓	✓									✓	✓
35	Lu et al. (2022)				✓		✓			✓	✓					✓
36	Albloushi et al. (2023)	✓			✓									✓	✓	✓
37	Ayik and Akyol (2023)				✓				✓				✓		✓	✓
38	Bai et al. (2023)				✓	✓		✓			✓					✓

No.	Author(s) and Year	Learning Environment	Supervision	Staff Interaction	Practice Exposure	Simulation	Teaching Model	Feedback / Debriefing	Self-Efficacy	Reflective Learning	Critical Thinking	Stress / Anxiety	Professional Identity	Education / Training	Experience / Tenure	Clinical Skills
39	Chung et al. (2023)				✓				✓			✓	✓			✓
40	Hui et al. (2023)	✓										✓		✓	✓	✓
41	Shibiru et al. (2023)	✓		✓								✓		✓	✓	✓
42	Terefe et al. (2023)	✓	✓	✓					✓				✓			✓
43	Ahmedin et al. (2024)	✓	✓	✓	✓			✓	✓							✓
44	Cui et al. (2024)				✓		✓			✓	✓					✓
45	Fung et al. (2024)					✓	✓	✓			✓					✓
46	Mohamed et al. (2024)	✓											✓	✓	✓	✓
47	Munangatire et al. (2024)	✓	✓	✓			✓							✓		✓
48	Tura et al. (2024)	✓										✓		✓	✓	✓
49	Wu (2024)	✓							✓			✓	✓			✓
50	Mousavi et al. (2024)						✓		✓	✓						✓
51	Ma et al. (2025)				✓								✓	✓		✓
52	Pu et al. (2025)	✓		✓					✓							✓
53	Badakhshan et al. (2025)								✓	✓	✓			✓		✓
54	Yang et al. (2025)	✓							✓		✓		✓			✓

Table 1 maps the 54 included primary studies against fourteen coded determinants and confirms that every study reported a clinical-skills or clinical-competence outcome. Self-efficacy was examined most often, appearing in 26 studies (48.1%), followed by learning environment and practice exposure in 25 studies each (46.3%). Education or training appeared in 23 studies (42.6%), experience or tenure in 19 (35.2%), teaching model in 15 (27.8%), and professional identity in 13 (24.1%). Critical thinking and stress or anxiety each appeared in 12 studies (22.2%); simulation appeared in 11 (20.4%); staff interaction, feedback or debriefing, and reflective learning each appeared in 10 (18.5%); and supervision appeared in 7 (13.0%). The distribution indicates that the literature has concentrated on individual capability beliefs, access to practice, educational preparation, and clinical context. Relational and learning-process mechanisms are less consistently isolated, suggesting that important pathways may be embedded within broader interventions rather than directly tested. These frequencies represent research coverage, not comparative effect magnitude or causal importance.

4. Discussion

Contextual and relational conditions form the environment in which competence becomes possible and observable. Clinical placements provide access to patients, documentation systems, equipment, interprofessional communication, and the tacit standards that govern safe practice. Their educational value depends on psychological safety, legitimate participation, consistency between classroom and clinical expectations, and access to meaningful tasks. Students repeatedly identify staff acceptance, communication, workload, and opportunities to participate as factors that enable or restrict clinical learning (Arkan et al., 2018). Multi-site evidence also associates educator competence and modes of learning with students' perceived competence, indicating that teaching capacity should be understood

as a feature of the clinical system rather than merely an individual tutor attribute (Munangatire et al., 2024). Supervision is most educationally productive when expectations are explicit, autonomy is calibrated to capability, performance is observed, and feedback identifies a feasible next step. Ethiopian student studies associate competence with the learning environment and staff-student interaction, although their cross-sectional designs cannot establish causal direction (Getie et al., 2021). Similar findings among graduating students suggest that supervision, practice opportunity, and self-efficacy operate as a connected pathway rather than as isolated inputs (Ahmedin et al., 2024). The limited frequency with which supervision was coded indicates that many studies measure exposure to clinical practice more readily than the quality of guidance within that exposure.

Practice exposure was among the most frequently examined determinants, but exposure quantity alone did not explain competence. Clinical work during study may strengthen procedural familiarity, communication, prioritisation, and transition readiness when learners can connect experience with reflection and supervised responsibility (Manoochehri et al., 2015). Internship stage and duration are associated with perceived competence, although these relationships may be confounded by curriculum sequence, maturation, and selection into more demanding tasks (Albloushi et al., 2023). Workforce studies likewise associate tenure with competence profiles, but years of service can conceal limited case diversity, routine repetition, or inadequate feedback (Yamamoto et al., 2021). Educational programmes and employers should therefore document the complexity, quality, and supervision of performance opportunities rather than rely only on hours completed or years employed. Simulation offers a controllable form of exposure through repetition, standardisation, observation, and error without patient harm. Scenario-based training has improved communication competence and self-efficacy relative to traditional instruction when scenarios were aligned with observable performance outcomes (Hsu et al., 2015). Structured prebriefing can clarify objectives, roles, equipment, and psychological expectations before performance (Page-Cuttrara & Turk, 2017). Multi-patient simulation further tests prioritisation across competing needs and has produced stronger competency outcomes than a single-patient high-fidelity condition (Fung et al., 2024). These findings indicate that simulation effectiveness arises from the entire pedagogical design, not from technology or fidelity alone.

Teaching models were most persuasive when they required active application, structured reasoning, reflection, and alignment between learning activity and competence assessment. A self-learning module improved clinical competency when the activities were explicitly linked to expected performance rather than limited to passive content exposure (Tohidi et al., 2019). Problem-based and inquiry-oriented approaches can strengthen clinical reasoning by requiring learners to identify information needs, justify decisions, and evaluate alternatives, although transfer to practice depends on the authenticity of assessment (Lu et al., 2022). The 7E instructional model similarly organises engagement, exploration, explanation, elaboration, evaluation, and extension within clinical-skills education (Cui et al., 2024). Across models, novelty is not the operative mechanism; disciplined alignment among objectives, practice, feedback, and direct assessment is. Feedback and debriefing connect observed performance to subsequent improvement, yet their influence may be underestimated because intervention studies often treat them as inseparable components of simulation. Formative assessment provides information while improvement remains possible, whereas summative assessment primarily certifies attainment; comparative evidence indicates that purpose and timing influence how students use feedback (Arrogante et al., 2021). Effective debriefing should reconstruct the clinical situation, make reasoning visible, distinguish technical from non-technical performance, and identify an actionable next step. More complete reporting of facilitator preparation, debriefing quality, and feedback uptake is needed to determine which designs produce durable transfer.

Self-efficacy was the most frequently studied personal determinant. It can influence whether learners initiate difficult tasks, persist, seek assistance, and recover after error, but it is not interchangeable with competence. Cross-sectional student studies generally report positive associations between self-efficacy and competence, although reciprocal causation is plausible because successful performance can also strengthen self-efficacy (Albagawi et al., 2019). Evidence from graduating students similarly identifies self-efficacy as an important correlate of perceived competence after accounting for educational and personal factors (Ayik & Akyol, 2023). A recent mediation model suggests that self-efficacy may transmit part of the relationship between the clinical learning environment and core competence, a pathway consistent with social cognitive theory but not yet confirmed longitudinally (Pu et al., 2025). Educational practice should therefore calibrate confidence through progressively demanding tasks and credible feedback rather than attempt to increase confidence independently of performance. Reflective learning and critical thinking help explain how experience becomes adaptable practice. Reflection enables learners to compare intended and actual action, identify assumptions, integrate emotional and ethical responses, and formulate a revised plan. Self-reflection has been associated with learning effectiveness and clinical performance in nursing practicum settings (Pai, 2017). Critical thinking is especially important when patient information is incomplete, unstable, or ambiguous, although overlap among reasoning, competence, and self-directed-learning measures can inflate observed associations (Labrague et al., 2019). Stronger evidence would test whether structured reflection and reasoning instruction improve independently assessed performance in later, unfamiliar clinical situations.

Stress and anxiety showed a generally adverse but context-dependent relationship with competence. Moderate activation may focus attention, whereas excessive or persistent stress can narrow working memory, impair prioritisation, discourage participation, and increase avoidance. Clinical-practice stress has been associated with lower professional competence, with self-efficacy and professional identity proposed as intervening mechanisms (Wu, 2024). Among novice nurses during the COVID-19 pandemic, care competence, workplace stress, and intention to stay were interrelated, demonstrating that competence cannot be separated from the conditions under which performance is demanded (Chen et al., 2021). These findings require caution because competence and distress are often measured simultaneously through self-report, making temporal direction uncertain. Repeated objective assessment is needed to determine whether stress precedes poorer performance, follows perceived difficulty, or operates reciprocally. Professional identity may support competence by organising ethical commitment, responsibility, help-seeking, and persistence, but it should not be used as a substitute explanation for unmeasured organisational conditions. Psychological empowerment and organisational role meaning have been associated with clinical competency among intensive-care nurses (Arshadi Bostanabad et al., 2022). Compassion satisfaction has also been positively associated with clinical competence, while burnout and secondary traumatic stress complicate the relationship between professional fulfilment and performance (Zakeri et al., 2021). In student populations, professional training and direct clinical encounters appear to strengthen competence in culturally sensitive care, suggesting that identity develops through accountable participation rather than value statements alone (Ma et al., 2025).

Education or training and experience or tenure dominated the workforce evidence. Formal education can extend theoretical knowledge, evidence appraisal, leadership, and speciality capability, while continuing professional development can update practice after initial qualification. Experience can support pattern recognition and contextual judgement, but its benefits depend on case diversity, feedback, reflection, and opportunities to assume progressively greater responsibility. New emergency nurses show uneven competence profiles despite recent qualification, indicating a continuing need for transition support and speciality orientation (Vand Tamadoni et al., 2020). Studies of outpatient and hospital nurses likewise associate perceived competence with educational

preparation, years of experience, and features of the work environment, although cross-sectional self-assessment limits causal interpretation (Mohamed et al., 2024). Across all four domains, interaction is more defensible than a single dominant determinant. A strong curriculum cannot fully compensate for exclusionary placements; additional placement hours cannot ensure learning without supervision and feedback; simulation cannot guarantee transfer without authentic practice; and self-efficacy cannot replace competence assessment. The evidence also does not support automatic transfer of findings from students to licensed nurses. Students follow designed learning trajectories and are assessed as learners, whereas practising nurses perform under staffing, workload, accountability, and service constraints. Determinants may therefore operate differently by career stage, and evidential influence should be judged through design quality, temporal ordering, objective measurement, consistency, and context rather than frequency alone.

5. Limitations, Research Gaps, and Future Directions

The principal theoretical gap is the limited testing of multilevel mechanisms. Many studies examine one or two variables even though the synthesis indicates linked pathways from learning environment and supervision through practice opportunity, self-efficacy, reflection, and competence. Future studies should pre-specify models that distinguish exposures, mediators, moderators, and outcomes; locate organisational and individual variables at appropriate analytical levels; and test whether comparable pathways operate among students, new graduate nurses, and experienced practitioners. Situated learning and social cognitive theory offer complementary explanations for the interaction between environmental participation and capability beliefs, while experiential learning explains how action can be transformed through reflection into revised performance. These theories should generate falsifiable temporal models rather than be added retrospectively to cross-sectional findings. The strongest methodological priority is longitudinal, multi-site research using independent competence assessment. Cross-sectional self-report cannot determine whether supportive environments improve competence, competent participants perceive environments more favourably, or both. Future studies should combine objective structured clinical examinations, direct observation, validated competence instruments, supervisor ratings, and, where defensible, patient-safety indicators. Measurement invariance should be established before comparing programmes, countries, professions, or career stages. Intervention studies should report scenario design, facilitator preparation, supervision dose, feedback fidelity, and transfer assessment in sufficient detail for replication, with follow-up extending beyond immediate post-tests to unfamiliar cases and real clinical settings.

Empirical gaps are particularly evident for reflective learning, professional identity, feedback or debriefing, staff interaction, and supervision, all of which were examined less consistently than self-efficacy, learning environment, practice exposure, education, or tenure. Future research should test how learners interpret and use feedback, how professional identity changes after error or conflict, and how staff inclusion, incivility, or workload affects access to meaningful practice. Comparative studies should examine resource-constrained settings without assuming that high-technology simulation is the only viable route to competence. Low-cost simulation, structured bedside teaching, peer learning, and deliberate practice warrant direct comparison where resources are limited. Research should also include underrepresented specialties, community and outpatient care, rural services, culturally sensitive practice, and the transition from education to employment. Broad clinical competence should be distinguished from procedure-specific proficiency, and confidence should not be treated as proof of skill. Mixed-methods designs can clarify why an intervention succeeds in one placement but fails in another, while economic evaluation can identify feasible combinations of simulation, supervision, staffing support, and continuing education.

The review itself has limitations that qualify interpretation. The search was restricted to English-language reports and relied on web-accessible bibliographic, repository, and publisher interfaces; relevant studies indexed elsewhere may therefore have been missed. The manuscript does not document prospective protocol registration or independent duplicate screening and extraction, so reproducibility and the risk of selection or coding bias cannot be fully evaluated. Considerable heterogeneity in populations, settings, designs, competence instruments, and analytical models prevented quantitative pooling and limited direct comparison of effect magnitude. Several retained studies used self-reported or perceived competence, which may be influenced by response style, confidence, or local expectations even when the instrument is validated. Binary matrix coding increased transparency but necessarily reduced complex, conditional, and null findings to whether a determinant was substantively examined. The frequency map should consequently be interpreted as a description of research attention rather than a hierarchy of causal importance. These limitations do not negate the synthesis, but they underscore the need for reproducible searches, independently verified study selection, clearer construct validation, and performance-based outcome assessment in future reviews and primary studies.

6. Conclusion

This PRISMA-informed systematic review integrated 54 primary empirical studies and identified fourteen determinants of nursing clinical skills and broad clinical competence across four interrelated domains. The literature most frequently examined self-efficacy, learning environment, practice exposure, education or training, and experience or tenure, while supervision, staff interaction, feedback or debriefing, reflective learning, and professional identity received less consistent direct attention. The synthesis supports a multilevel interpretation in which competence develops through the interaction of supportive settings, guided authentic practice, coherent pedagogical design, personal cognitive resources, and continuing professional development. No single determinant can substitute for the others, and research frequency should not be mistaken for causal strength. Nursing programmes should align curricula, simulation, clinical placements, supervision, feedback, and direct assessment around progressively complex performance in authentic clinical problems. Healthcare organisations should sustain competence through structured transition, continuing education, psychologically safe practice, appropriate staffing support, and opportunities for reflective improvement. Current conclusions remain constrained by cross-sectional designs, self-report, heterogeneous measures, and limited follow-up. More reliable evidence will require longitudinal and experimental studies that assess performance independently, preserve population and contextual distinctions, and test explicit mechanisms across individual, educational, and organisational levels. Such work can move the field from cataloguing correlates towards designing dependable systems for the development and maintenance of safe nursing practice.

References

- Ahmedin, L., Birhanu, A., Mekuria, M., Ahmed, N., Yassin, A. M., Keneni, M., Wondimneh, F., Tesi, S., & Legesse, H. (2024). Clinical practice competence and its associated factors among generic nursing students learning at public universities: A cross-sectional study. *SAGE Open Nursing*, 10, 23779608241290002. <https://doi.org/10.1177/23779608241290002>
- Albagawi, B., Hussein, F. M., Alotaibi, J. S., Albabtain, M. A., Alwadei, A. M., Al-Shehri, S. S., & Al-Samghan, A. S. (2019). Self-efficacy and clinical competence of fourth-year nursing

- students: A self-reported study. *International Journal of Advanced and Applied Sciences*, 6(8), 65–70. <https://doi.org/10.21833/ijaas.2019.08.009>
- Albloushi, M., Innab, A., Almarwani, A. M., Alqahtani, N., Anazi, M., Roco, I., & Alzahrani, N. S. (2023). The influence of internship year on nursing students' perceived clinical competence: A multi-site study. *SAGE Open*, 13(3). <https://doi.org/10.1177/21582440231193198>
- Almarwani, A. M., & Alzahrani, N. S. (2023). Factors affecting the development of clinical nurses' competency: A systematic review. *Nurse Education in Practice*, 73, 103826. <https://doi.org/10.1016/j.nepr.2023.103826>
- Alquwez, N., Cruz, J. P., Alshammari, F., Felemban, E. M., Almazan, J. U., Tumala, R. B., Alabdulaziz, H. M., Alsolami, F., Silang, J. P. B. T., & Tork, H. M. M. (2019). A multi-university assessment of patient safety competence during clinical training among baccalaureate nursing students: A cross-sectional study. *Journal of Clinical Nursing*, 28(9–10), 1771–1781. <https://doi.org/10.1111/jocn.14790>
- Arkan, B., Ordin, Y. S., & Yilmaz, D. K. (2018). Undergraduate nursing students' experience related to their clinical learning environment and factors affecting to their clinical learning process. *Nurse Education in Practice*, 29, 127–132. <https://doi.org/10.1016/j.nepr.2017.12.005>
- Arrogante, O., González-Romero, G. M., López-Torre, E. M., Carrión-García, L., & Polo, A. (2021). Comparing formative and summative simulation-based assessment in undergraduate nursing students: Nursing competency acquisition and clinical simulation satisfaction. *BMC Nursing*, 20, 92. <https://doi.org/10.1186/s12912-021-00614-2>
- Arshadi Bostanabad, M., Areshtanab, H. N., Shabanloei, R., Hosseinzadeh, M., Hogan, U., Brittain, A. C., & Pourmahmood, A. (2022). Clinical competency and psychological empowerment among ICU nurses caring for COVID-19 patients: A cross-sectional survey study. *Journal of Nursing Management*, 30(7), 2488–2494. <https://doi.org/10.1111/jonm.13700>
- Ayik, C., & Akyol, M. A. (2023). Self-perceived competence and its related factors in nursing students at graduation: The role of self-efficacy. *International Journal of Nursing Education Scholarship*, 20(1), 1–8. <https://doi.org/10.1515/ijnes-2023-0017>
- Badakhshan, R., Badakhshan, S., Bagheriyeh, F., & Hosseinzadegan, F. (2025). The relationship between self-directed learning ability and clinical competence among nursing students: A cross-sectional descriptive study. *BMC Medical Education*, 25, 1508. <https://doi.org/10.1186/s12909-025-08108-4>
- Bai, P., Zang, X., Liu, R., Wang, L., Dai, C., & Yang, G. (2023). In-situ simulation for nursing students' professional competence development in postanesthesia care: A quasi-experimental study. *Nurse Education in Practice*, 70, 103660. <https://doi.org/10.1016/j.nepr.2023.103660>
- Bandura, A. (1997). Self-efficacy: The exercise of control. W. H. Freeman.
- Benner, P. (1984). From novice to expert: Excellence and power in clinical nursing practice. Addison-Wesley.
- Brennan, B. A. (2022). The impact of self-efficacy based prebriefing on nursing student clinical competency and self-efficacy in simulation: An experimental study. *Nurse Education Today*, 109, 105260. <https://doi.org/10.1016/j.nedt.2021.105260>
- Cha, C., Hwang, H., An, B., Jeong, S., & Yang, S. J. (2020). Nursing student and faculty competency improvement through a nurse-bridging program in Cambodia. *Nurse Education Today*, 93, 104523. <https://doi.org/10.1016/j.nedt.2020.104523>

- Chen, H.-M., Liu, C.-C., Yang, S.-Y., Wang, Y.-R., & Hsieh, P.-L. (2021). Factors related to care competence, workplace stress, and intention to stay among novice nurses during the coronavirus disease (COVID-19) pandemic. *International Journal of Environmental Research and Public Health*, 18(4), 2122. <https://doi.org/10.3390/ijerph18042122>
- Chung, S. K., Kim, J., & Bhandari, P. (2023). Factors related to clinical competence among graduating nursing students during the COVID-19 pandemic: A cross-sectional study. *Journal of Korean Academy of Nursing*, 53(2), 145–154. <https://doi.org/10.4040/jkan.22087>
- Cui, L., Dong, Y., Zhang, S., & Shi, X. (2024). The value of the “7E” instructional model in the teaching of nursing students in nursing clinical probation. *BMC Medical Education*, 24, 1222. <https://doi.org/10.1186/s12909-024-06157-9>
- Ford, K., Courtney-Pratt, H., Marlow, A., Cooper, J., Williams, D., & Mason, R. (2016). Quality clinical placements: The perspectives of undergraduate nursing students and their supervising nurses. *Nurse Education Today*, 37, 97–102. <https://doi.org/10.1016/j.nedt.2015.11.013>
- Fung, J. T. C., Chan, S. L., Chan, C. K., Lam, C. F., Chau, Y. S., Lam, W. H., Cheng, C. C. W., & Lai, M. H. (2024). Enhancing nursing students’ clinical competency using a multi-patient simulation learning model: A randomized controlled study. *Nurse Education Today*, 140, 106292. <https://doi.org/10.1016/j.nedt.2024.106292>
- Getie, A., Tsige, Y., Birhanie, E., Tlaye, K. G., & Demis, A. (2021). Clinical practice competencies and associated factors among graduating nursing students attending at universities in northern Ethiopia: Institution-based cross-sectional study. *BMJ Open*, 11, e044119. <https://doi.org/10.1136/bmjopen-2020-044119>
- Høegh-Larsen, A. M., Gonzalez, M. T., Reiersen, I. Å., Husebø, S. I. E., & Ravik, M. (2022). Changes in nursing students’ self-reported professional competence in simulation-based education and clinical placement: A longitudinal study. *Nurse Education Today*, 119, 105592. <https://doi.org/10.1016/j.nedt.2022.105592>
- Hong, Q. N., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M.-P., Griffiths, F., Nicolau, B., O’Cathain, A., Rousseau, M.-C., Vedel, I., & Pluye, P. (2018). The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. *Education for Information*, 34(4), 285–291. <https://doi.org/10.3233/EFI-180221>
- Hsu, L.-L., Chang, W.-H., & Hsieh, S.-I. (2015). The effects of scenario-based simulation course training on nurses’ communication competence and self-efficacy: A randomized controlled trial. *Journal of Professional Nursing*, 31(1), 37–49. <https://doi.org/10.1016/j.profnurs.2014.05.007>
- Huang, F. F., Shen, X. Y., Chen, X. L., He, L. P., Huang, S. F., & Li, J. X. (2020). Self-reported confidence in patient safety competencies among Chinese nursing students: A multi-site cross-sectional survey. *BMC Medical Education*, 20, 32. <https://doi.org/10.1186/s12909-020-1945-8>
- Hui, T., Zakeri, M. A., Soltanmoradi, Y., Rahimi, N., Hossini Rafsanjanipoor, S. M., Nouroozi, M., & Dehghan, M. (2023). Nurses’ clinical competency and its correlates: Before and during the COVID-19 outbreak. *BMC Nursing*, 22, 156. <https://doi.org/10.1186/s12912-023-01330-9>
- Hung, C.-C., Kao, H.-F. S., Liu, H.-C., Liang, H.-F., Chu, T.-P., & Lee, B.-O. (2021). Effects of simulation-based learning on nursing students’ perceived competence, self-efficacy, and

- learning satisfaction: A repeat measurement method. *Nurse Education Today*, 97, 104725. <https://doi.org/10.1016/j.nedt.2020.104725>
- Kavanagh, J. M., & Szveda, C. (2017). A crisis in competency: The strategic and ethical imperative to assessing new graduate nurses' clinical reasoning. *Nursing Education Perspectives*, 38(2), 57–62. <https://doi.org/10.1097/01.NEP.0000000000000112>
- Kim, J. (2019). Effects of learning experience on core competencies of nursing students. *International Journal of Innovative Technology and Exploring Engineering*, 8(3), 154–159.
- Kim, Y.-J., Noh, G.-O., & Im, Y.-S. (2017). Effect of step-based prebriefing activities on flow and clinical competency of nursing students in simulation-based education. *Clinical Simulation in Nursing*, 13(11), 544–551. <https://doi.org/10.1016/j.ecns.2017.06.005>
- Kirkpatrick, A. J., Cantrell, M. A., & Smeltzer, S. C. (2019). Relationships among nursing student palliative care knowledge, experience, self-awareness, and performance: An end-of-life simulation study. *Nurse Education Today*, 73, 23–30. <https://doi.org/10.1016/j.nedt.2018.11.003>
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.
- Labrague, L. J., McEnroe-Petitte, D. M., D'Souza, M. S., Cecily, H. S. J., & Fronda, D. C. (2019). Predictors of evidence-based practice knowledge, skills, and attitudes among nursing students. *Nursing Forum*, 54(2), 238–245. <https://doi.org/10.1111/nuf.12323>
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.
- Lejonqvist, G.-B., Eriksson, K., & Meretoja, R. (2016). Evidence of clinical competence by simulation: A hermeneutical observational study. *Nurse Education Today*, 38, 88–92. <https://doi.org/10.1016/j.nedt.2015.12.011>
- Lu, Y.-C. A., Lee, S.-H., Hsu, M.-Y., Shih, F.-F., Yen, W.-J., Huang, C.-Y., Li, P.-C., Hung, C.-Y., Chuang, H.-L., & Kuo, C.-P. (2022). Effects of problem-based learning strategies on undergraduate nursing students' self-evaluation of their core competencies: A longitudinal cohort study. *International Journal of Environmental Research and Public Health*, 19(23), 15825. <https://doi.org/10.3390/ijerph192315825>
- Ma, H., Cham, C. Y. C., Zhang, W., Tang, S. K., Ng, A. Y. M., Ho, S., & Wong, J. Y.-H. (2025). Assessing nursing students' clinical competence in caring for LGBT+ clients: A cross-sectional study in Hong Kong. *Journal of Research in Nursing*. Advance online publication. <https://doi.org/10.1177/17449871251389564>
- Manoochehri, H., Imani, E., Atashzadeh-Shoorideh, F., & Alavi-Majd, A. (2015). Competence of novice nurses: Role of clinical work during studying. *Journal of Medicine and Life*, 8(Special Issue 4), 32–38.
- Mirlashari, J., Qommi, R., Nariman, S., Bahrani, N., & Begjani, J. (2016). Clinical competence and its related factors of nurses in neonatal intensive care units. *Journal of Caring Sciences*, 5(4), 317–324. <https://doi.org/10.15171/jcs.2016.033>
- Mohamadirizi, S., Kohan, S., Shafei, F., & Mohamadirizi, S. (2015). The relationship between clinical competence and clinical self-efficacy among nursing and midwifery students. *International Journal of Pediatrics*, 3(6), 1117–1123. <https://doi.org/10.22038/ijp.2015.5222>
- Mohamed, R. A., Alharbi, M. F. J., Aloufi, R., Abraham, N., Taref, N. N., Bauomy, E. S., Alkalash, S. H., Marzouk, M. M., & Almowafy, A. A. (2024). Perceived clinical competence and its

- related factors among registered nurses employed at selected outpatient clinics in Egypt. *PLOS ONE*, 19(12), e0314206. <https://doi.org/10.1371/journal.pone.0314206>
- Mousavi, S. K., Javadzadeh, A., Hasankhani, H., & Alijani Parizad, Z. (2024). Relationship between learning styles and clinical competency in nursing students. *BMC Medical Education*, 24, 469. <https://doi.org/10.1186/s12909-024-05432-z>
- Munangatire, T., Jacob, V., & Tomas, N. (2024). Perceived competence and related factors affecting the development of the clinical competence of nursing students at two university sites in Namibia: A cross-sectional study. *BMC Medical Education*, 24, 743. <https://doi.org/10.1186/s12909-024-05729-z>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Page-Cuttrara, K., & Turk, M. (2017). Impact of prebriefing on competency performance, clinical judgment and experience in simulation: An experimental study. *Nurse Education Today*, 48, 78–83. <https://doi.org/10.1016/j.nedt.2016.09.012>
- Pai, H.-C. (2017). An investigation of the relationship between self-reflection and learning effectiveness in a nursing practicum. *Journal of Professional Nursing*, 33(4), 287–292. <https://doi.org/10.1016/j.profnurs.2017.01.003>
- Park, S. (2018). Effects of an intensive clinical skills course on senior nursing students' self-confidence and clinical competence: A quasi-experimental post-test study. *Nurse Education Today*, 61, 182–186. <https://doi.org/10.1016/j.nedt.2017.11.028>
- Pu, Y., Xie, H., Fu, L., Zhang, X., Long, T., Su, X., Feng, X., & Feng, X. (2025). Self-efficacy as a mediator in the relationship between clinical learning environment and core nursing competence of intern nursing students: A multicentre cross-sectional study. *BMJ Open*, 15, e094858. <https://doi.org/10.1136/bmjopen-2024-094858>
- Shibiru, S., Aschalew, Z., Kassa, M., Bante, A., & Mersha, A. (2023). Clinical competence of nurses and the associated factors in public hospitals of Gamo Zone, Southern Ethiopia: A cross-sectional study. *Nursing Research and Practice*, 2023, 9656636. <https://doi.org/10.1155/2023/9656636>
- Taylor, I., Bing-Jonsson, P. C., Wangensteen, S., Finnbakk, E., Sandvik, L., McCormack, B., & Fagerström, L. (2020). The self-assessment of clinical competence and the need for further training: A cross-sectional survey of advanced practice nursing students. *Journal of Clinical Nursing*, 29(3–4), 545–555. <https://doi.org/10.1111/jocn.15095>
- Terefe, T. F., Geletie, H. A., GebreEyesus, F. A., Tarekegn, T. T., Amlak, B. T., Kindie, K., Geleta, O. T., Mewahegn, A. A., Temere, B. C., Mengist, S. T., Beshir, M. T., Wondie, A., & Mengist, B. (2023). Clinical competency and associated factors among undergraduate nursing students studying in universities of Southern regional state of Ethiopia, 2021. *Heliyon*, 9(8), e18677. <https://doi.org/10.1016/j.heliyon.2023.e18677>
- Tohidi, S., KarimiMoonaghi, H., Shayan, A., & Ahmadiania, H. (2019). The effect of self-learning module on nursing students' clinical competency: A pilot study. *Iranian Journal of Nursing and Midwifery Research*, 24(2), 91–95. https://doi.org/10.4103/ijnmr.IJNMR_46_17
- Tsutsumi, K., & Sekido, K. (2015). Relationship of clinical nursing competence to nursing occupational experience in hospice/palliative care nurses in Japan. *Health*, 7(2), 279–288. <https://doi.org/10.4236/health.2015.72032>

- Tura, M. R., Mulu, D., Kadir, A., Getahun, A., & Megersa, Y. (2024). Nurse's clinical competence and its associated factors among working in Ethiopia: A cross-sectional study. *SAGE Open Nursing*, 10, 23779608241275213. <https://doi.org/10.1177/23779608241275213>
- Usher, K., Woods, C., Parmenter, G., Hutchinson, M., Mannix, J., Power, T., Chaboyer, W., Latimer, S., Mills, J., Siegloff, L., & Jackson, D. (2017). Self-reported confidence in patient safety knowledge among Australian undergraduate nursing students: A multi-site cross-sectional survey study. *International Journal of Nursing Studies*, 71, 89–96. <https://doi.org/10.1016/j.ijnurstu.2017.03.006>
- Vand Tamadoni, B., Shahbazi, S., Seyedrasooli, A., Gilani, N., & Gholizadeh, L. (2020). A survey of clinical competence of new nurses working in emergency department in Iran: A descriptive, cross-sectional study. *Nursing Open*, 7(6), 1896–1901. <https://doi.org/10.1002/nop2.579>
- Wu, P.-L. (2024). The impact of clinical practice stress on nursing professional competence among undergraduate nursing students: A cross-sectional study. *Florence Nightingale Journal of Nursing*, 32(3), 206–214. <https://doi.org/10.5152/FNJJN.2024.24102>
- Yamamoto, Y., Okuda, R., & Fukada, M. (2021). Factors affecting clinical nursing competency: A cross-sectional study. *Yonago Acta Medica*, 64(1), 46–56. <https://doi.org/10.33160/yam.2021.02.008>
- Yang, L., Li, S. N., Wang, Q., Pan, S., & Zhao, W. (2025). Unveiling the relationships of professional identity, values and communication competence in nursing students' clinical practice behaviours: A cross-sectional study and mediation model analysis. *Nursing Open*, 12(7), e70270. <https://doi.org/10.1002/nop2.70270>
- Yoeum, B., Koy, V., & Sam, R. (2024). Factors associated with clinical competency of nursing students. *International Journal of Research in Medical Sciences*, 12(4), 1232–1241. <https://doi.org/10.18203/2320-6012.ijrms20240847>
- Yu, M., Tong, H., Li, S., Wu, X. V., Hong, J., & Wang, W. (2021). Clinical competence and its association with self-efficacy and clinical learning environments among Chinese undergraduate nursing students. *Nurse Education in Practice*, 53, 103055. <https://doi.org/10.1016/j.nepr.2021.103055>
- Zakeri, M. A., Bazmandegan, G., Ganjeh, H., Zakeri, M., Mollaahmadi, S., Anbariyan, A., & Kamiab, Z. (2021). Is nurses' clinical competence associated with their compassion satisfaction, burnout and secondary traumatic stress? A cross-sectional study. *Nursing Open*, 8(1), 354–363. <https://doi.org/10.1002/nop2.636>