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# How Demographic and Academic Factors Relate to Critical Thinking Skills among Indonesian Nursing Students

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## ABSTRACT

**Background:** Critical thinking is a core competency for nursing students because it supports clinical judgment, evidence-based practice, and patient safety. However, evidence on critical thinking among nursing students in Indonesia remains limited, and findings on the influence of demographic and academic factors are inconsistent.

**Purpose:** This study aimed to examine the relationship between demographic and academic characteristics and critical thinking levels among Indonesian nursing students.

**Methods:** This cross-sectional study was conducted at the largest private health education institution in Riau Province, Indonesia. Of the 400 eligible students, 365 completed the survey, resulting in an analyzable response rate of 91.3%. Data were collected using the Nursing Critical Thinking in Students Questionnaire (N-CT-4 Students), which consists of 109 items across four dimensions of the 4-Circle Critical Thinking Model. Data were analyzed using descriptive statistics, the Kruskal–Wallis test, and the chi-square test of independence.

**Results:** Nearly half of the respondents had a moderate level of critical thinking (48.2%). Inferential analysis showed that gender ($\chi^2 = 7.997$; $p = 0.018$), educational program ($\chi^2 = 10.886$; $p = 0.004$), academic year ($\chi^2 = 12.352$; $p = 0.015$), and semester level ($\chi^2 = 12.352$; $p = 0.015$) were significantly associated with critical thinking level. Age was not significantly associated with critical thinking level ($H = 4.398$; $p = 0.111$).

**Conclusion:** Most nursing students demonstrated a moderate level of critical thinking. Critical thinking was associated with gender and academic characteristics, whereas age was not. Nursing educators may strengthen critical thinking through case-based, reflective, and structured clinical learning strategies across the curriculum.

**Keywords:** Academic Characteristics, Critical Thinking, Demographic Factors, Nursing Education, Nursing Student

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## BACKGROUND

The increasing complexity of healthcare services requires nurses to provide patient-centered care through the implementation of evidence-based practice, making critical thinking an essential competency in nursing education. Critical thinking enables nursing students to make sound clinical judgments, solve problems effectively, and deliver safe, high-quality nursing care (Zuriguel-Pérez et al., 2017)(Ge et al., 2025; Karaca, 2023; Zainal et al., 2025). Its importance has become even more pronounced in the context of changing disease patterns, evolving healthcare systems, population aging, and the growing prevalence of chronic illnesses, all of which demand accurate and timely clinical decision-making (Ali-Abadi et al., 2020; Yusuf, 2025).

Previous studies have also demonstrated that critical thinking contributes to improved clinical judgment, more effective implementation of evidence-based interventions, and better patient safety outcomes (Santos et al., 2025) (Oh et al., 2025)(Sari et al., 2025) Critical thinking develops through the integration of logical analysis, creativity, innovative strategies, theoretical knowledge, and practical experience. For undergraduate nursing students, this competency is particularly important because they are in a transitional stage from acquiring foundational knowledge to developing clinical reasoning skills (Geok et al., 2019).

Critical thinking develops through the integration of logical analysis, creativity, innovative strategies, theoretical knowledge, and practical experience. In nursing education, this competency is not only required for academic success but also for preparing students to respond appropriately to increasingly complex clinical situations. Studies conducted in various countries have reported substantial variation in the critical thinking levels of nursing students. Research from Türkiye, Iran, and Egypt found that most students demonstrated low levels of critical thinking (Ali et al., 2023; Kaya et al., 2017; Nemati-Vakilabad et al., 2023). whereas a study in Portugal reported predominantly high critical thinking scores (Santos et al., 2025). Meanwhile, studies from Saudi Arabia, Iran, China, Malaysia, Brazil, Vietnam, and Spain found that a large proportion of nursing students were in the moderate category (Barry et al., 2020; Basco-Prado et al., 2024; Esa et al., 2023; Hashish et al., 2018; Jin & Ji, 2021; Nes et al., 2023; Nguyen et al., 2023). These findings suggest that critical thinking levels among nursing students may vary across educational and cultural contexts.

In Indonesia, research on critical thinking among nursing students has also begun to develop. Several studies have described the critical thinking levels of nursing students in private nursing education institutions (Adelia et al., 2024) and have indicated that critical thinking may develop across academic progression and semester levels (Adelia et al., 2026). Previous research has also identified several demographic and academic factors associated with critical thinking, including gender, academic year, case-based learning experiences, interest in the nursing major, self-efficacy, supportive learning environments, and research involvement (Ciftci et al., 2021), case-based learning experiences (Kassabry et al., 2024), age, semester level, interest in the nursing major (Mousazadeh et al., 2021), study hours, self-efficacy, supportive learning environments, involvement in research activities (Nguyen et al., 2023), study hours, self-efficacy, supportive learning environments, involvement in research activities (Nuampa et al., 2025). In addition, sociodemographic variables such as gender and academic year have also been reported to correlate with critical thinking levels (Ruslan & Ruslan, 2024).

However, evidence in the Indonesian context remains limited and inconsistent regarding how demographic and academic factors are associated with critical thinking among nursing students. In particular, it is still unclear which demographic and academic characteristics are significantly related to critical thinking in Indonesian nursing education settings.

This study addresses that gap by examining the relationship between demographic and academic factors and critical thinking skills among Indonesian nursing students. By identifying which characteristics are associated with critical thinking, this study provides context-specific evidence that may support nursing educators in developing more targeted learning strategies to strengthen students' critical thinking and better prepare them for the complexities of contemporary clinical practice.

## OBJECTIVE

This study aimed to examine the relationship between demographic and academic factors and critical thinking skills among Indonesian nursing students.

## METHODS

This study employed a cross-sectional design to examine the relationship between demographic and academic factors and the level of critical thinking among Indonesian nursing students. The study was conducted at the largest private health education institution in Riau Province, Indonesia and formed part of a broader research project aimed at generating evidence on critical thinking in nursing education and clinical nursing practice. The target population consisted of undergraduate nursing students enrolled at the institution during the study period.

A total sampling technique was applied, in which all students who met the eligibility criteria were invited to participate. The inclusion criteria were active undergraduate nursing students, willingness to participate in the study, and completion of the online informed consent form. Students were excluded if they were on academic leave, were not actively enrolled during the data collection period, or submitted incomplete questionnaires. Of the 400 students invited, 365 completed the survey, yielding a response rate of 92.3%.

Data were collected through an online survey administered using Google Forms. Before completing the questionnaire, participants received an information sheet explaining the study objectives, procedures, benefits, and ethical considerations. Written informed consent was obtained electronically from all participants as an indication of voluntary participation. Participants were informed that completion of the questionnaire would require approximately 15–20 minutes. Confidentiality and anonymity were maintained throughout the study.

The research instrument consisted of two sections. The first section collected demographic and academic characteristics, including age, gender, educational program, academic year, and semester level. The second section used the Nursing Critical Thinking in Students Questionnaire (N-CT-4 Students) developed by (Zuriguel-Pérez et al., 2022) and used with permission from the author. This instrument was designed to assess students' critical thinking skills across multiple dimensions.

The N-CT-4 Students consists of 109 items distributed across four dimensions of the 4-Circle Critical Thinking Model proposed by (Alfaro-lefevre, 2017). These dimensions include Personal with 39 items, Intellectual and Cognitive with 44 items, Interpersonal and Self-Management with 20 items, and Technical with 6 items. Each item is rated on a 4-point Likert scale ranging from 1 (never or almost never) to 4 (always or almost always). All items are positively worded, and both total scores and dimension scores can be calculated.

The possible total score ranged from 109 to 436. Based on the original study (mean = 355; SD = 33.5; n = 331), critical thinking was classified into three levels: low for scores below 321.5, moderate for scores between 321.6 and 388.4, and high for scores above 388.5. The instrument demonstrated strong psychometric properties, with an overall Cronbach's alpha of 0.96. The subscale reliability coefficients ranged from 0.81 to 0.94

Data were analyzed using SPSS version 23. Descriptive statistics, including frequency, percentage, mean, standard deviation, minimum, and maximum values, were used to

summarize participants' demographic and academic characteristics as well as critical thinking scores. The normality of the age variable was assessed using the Kolmogorov–Smirnov. Because age was not normally distributed ($p < 0.001$), the Kruskal–Wallis test was used to compare age across the three critical thinking categories (low, moderate, and high).

The chi-square test of independence was used to examine the association between categorical demographic and academic variables, including gender, educational program, academic year, and semester level, and critical thinking level. This test was selected because both the independent variables and the outcome variable were analyzed in categorical form. Prior to analysis, the assumptions of independence of observations and adequacy of expected cell frequencies were checked and found to be acceptable. A p-value of less than 0.05 was considered statistically significant.

Ethical approval for the study was granted by the Health Research Ethics Committee of IKes Payung Negeri with approval number 1055/IKes PN/F.Kep/03/XI/2024. Participation was entirely voluntary and free from coercion. All collected data were kept confidential and used solely for research purposes without disclosure to any third party.

## RESULTS

A total of 365 nursing students were included in the final analysis. Although 400 students were invited to participate, only complete responses were analyzed; therefore, the response rate based on analyzed data was 91.3%. Table 1 summarizes the demographic and academic characteristics of the respondents. The mean age of the participants was 20.0 ± 0.93 years, with an age range of 18 to 25 years. Most respondents were female (88.5%), enrolled in the four-year bachelor program (73.2%), and in their third academic year (81.9%), which corresponded to the sixth semester (81.9%). In terms of critical thinking level, nearly half of the students were classified as having moderate critical thinking (48.2%).

**Table 1.** Demographic and Academic Characteristics of Respondents) (n=365)

| Variable | Category | n | % | Mean ± SD | Min-Max |
|---|---|---|---|---|---|
| Age (years) | | | | 20 ± 0.93 | 18-25 |
| Gender | Male | 42 | 11.5 | - | - |
| | Female | 323 | 88.5 | - | - |
| Education program | 3-year diploma | 98 | 26.8 | - | - |
| | 4-year bachelor | 267 | 73.2 | - | - |
| Academic year | Year 1 | 32 | 8.8 | - | - |
| | Year 2 | 34 | 9.3 | - | - |
| | Year 3 | 299 | 81.9 | - | - |
| Academic semester | Semester 2 | 32 | 8.8 | - | - |
| | Semester 4 | 34 | 9.3 | - | - |
| | Semester 6 | 299 | 81.9 | - | - |
| Critical Thinking Level | Low | 47 | 12.9 | - | - |
| | Moderate | 176 | 48.2 | - | - |
| | High | 142 | 38.9 | - | - |

Source: Primary Data, 2025

Diferential analyses were conducted to examine the association between demographic and academic variables and nursing students' critical thinking levels, as shown in Table 2. Because the age variable was not normally distributed, the Kruskal–Wallis test was performed to compare age across critical thinking levels. The analysis showed no significant difference in

age among the low, moderate, and high critical thinking groups (H = 4.398, df = 2, p = 0.111). The mean ranks were 193.00 for the low group, 191.08 for the moderate group, and 169.68 for the high group.

Categorical variables, including gender, educational program, academic year, and semester level, were analyzed using the chi-square test of independence. The results showed that gender was significantly associated with critical thinking level ($\chi^2$ = 7.997, p = 0.018). Significant associations were also found between critical thinking level and educational program ($\chi^2$ = 10.886, p = 0.004), academic year ($\chi^2$ = 12.352, p = 0.015), and semester level ($\chi^2$ = 12.352, p = 0.015). These findings indicate that age was not significantly associated with critical thinking level, whereas gender and academic variables showed significant associations.

**Table 2.** Association Between Demographic and Academic Variables and Critical Thinking Levels Among Nursing Students (n = 365)

| Variable | Statistical Test | Test Statistic | p-value |
|---|---|---|---|
| Age | Kruskal–Wallis | H = 4.398 | 0.138 |
| Gender | Pearson Chi-Square | $\chi^2(2) = 7.997$ | 0. 018 |
| Education program | Pearson Chi-Square | $\chi^2(2) = 10.886$ | 0.004 |
| Academic year | Pearson Chi-Square | $\chi^2(2) = 12.352$ | 0.015 |
| Semester level | Pearson Chi-Square | $\chi^2(2) = 12.352$ | 0.015 |

* Significant at p value < 0.05

## DISCUSSION

The present study found that gender was significantly associated with nursing students' critical thinking level, whereas age was not. This finding should be interpreted cautiously. Within the 4-Circle Critical Thinking Model, critical thinking is not reduced to a single demographic trait, but emerges from the interaction of personal characteristics, intellectual and cognitive abilities, interpersonal and self-management skills, and technical abilities. From this perspective, the observed gender difference may reflect variations in confidence, communication, classroom participation, or socialization patterns rather than a direct effect of biological sex itself. This interpretation is consistent with (Liu et al., 2019), who found that gender-role orientation, particularly masculine traits such as assertiveness and analytical confidence, was more relevant to critical thinking than sex alone. At the same time, our finding differs from studies that reported no significant relationship between gender and critical thinking, including work by (Azizi-Fini et al., 2015) and (Santos et al., 2025). Taken together, these studies suggest that gender-related differences in critical thinking are likely context-dependent and may be shaped by institutional culture, role expectations, and educational experiences rather than by sex as an isolated variable (Zuriguel-Pérez et al., 2017).

The absence of a significant association between age and critical thinking is also understandable in light of cognitive development concepts. In this study, age did not differ significantly across the low, moderate, and high critical thinking groups. This may be explained by the relatively narrow age range of the participants, which may have limited meaningful variation in higher-order thinking based on chronological age alone. In higher education, especially in professional programs such as nursing, critical thinking is more plausibly shaped by metacognitive development, opportunities for reflection, and repeated engagement with complex learning tasks than by age itself. Recent work has highlighted the importance of metacognitive processes in the development of nursing students' clinical decision-making, reinforcing the view that critical thinking grows through guided cognitive engagement rather than simple maturation. This interpretation is supported by previous studies showing that age

was not a significant factor in critical thinking among nursing students (Wang et al., 2024).

A more robust pattern in this study was the significant association of educational program, academic year, and semester level with critical thinking. These variables all reflect students' progression through the curriculum, and they may therefore be understood as indicators of cumulative learning exposure rather than as independent influences. From a learning theory perspective, this pattern is consistent with constructivist and experiential views of learning, in which students develop stronger reasoning when they repeatedly confront authentic problems, connect theory with practice, and refine their judgments through feedback and reflection. In nursing education, critical thinking is strengthened when students move beyond memorization and are required to interpret data, prioritize problems, and justify decisions in progressively complex academic and clinical contexts. This explanation is supported by (Santos et al., 2025), who found differences in critical thinking across academic years, and by (Nemati-Vakilabad et al., 2023), who identified semester as a predictor of critical thinking among nursing students. These findings indicate that academic exposure may play an important role in shaping critical thinking development (Santos et al., 2025).

Even so, academic progression should not be interpreted as a purely linear pathway in which critical thinking automatically increases with every semester. The literature suggests a more complex relationship. Some studies show better performance in more advanced students, but others indicate that progression depends heavily on the quality of instruction, the learning climate, and the types of pedagogical experiences offered to students. (Nguyen et al., 2023) found that self-study habits, self-efficacy, supportive learning environments, and involvement in research activities were associated with better critical thinking, suggesting that curricular exposure alone is insufficient unless it is paired with active engagement. This helps explain why students at similar academic levels may still differ substantially in critical thinking performance. In other words, academic year and semester may provide opportunities for development, but the actual growth of critical thinking depends on whether the curriculum deliberately cultivates analysis, reflection, and judgment.

The significant association between educational program and critical thinking also deserves careful interpretation. Differences between diploma and bachelor pathways may reflect variation in curriculum depth, academic expectations, opportunities for independent inquiry, and exposure to evidence-based learning tasks. This interpretation is compatible with prior work showing that program structure matters. For example, (Aldiabat et al., 2021). reported differences in critical thinking between students in a fast-track program and those in a traditional four-year program, while (Sun et al., 2023) found differences in critical thinking dispositions among newly graduated nurses with different educational backgrounds. These studies, together with the present findings, suggest that critical thinking is influenced not only by how long students study, but also by how learning is organized and what kinds of reasoning demands are embedded in the program (Aldiabat et al., 2021)

The present findings also have important implications for how critical thinking is taught. Within the 4-Circle Critical Thinking framework, development requires more than technical competence; it also involves personal dispositions, interpersonal awareness, and self-management. This means that students' critical thinking is unlikely to improve through lectures alone. Educational approaches that explicitly foster reflection, metacognition, and situated decision-making are more likely to support development across semesters. Recent evidence supports this interpretation. Reflective practice has been shown to help nursing students bridge theory and clinical competency, while simulation-based and technology-supported learning have been reported to improve critical thinking by exposing students to realistic problems that require prioritization, analysis, and decision-making. Thus, the relationship observed in this study between academic progression and critical thinking should be understood as a function

of developmental learning experiences, not merely time spent in the program (Bowers et al., 2025).

This study has several limitations. First, the cross-sectional design does not allow causal conclusions to be drawn, so the significant associations identified should not be interpreted as evidence that gender or academic progression directly causes changes in critical thinking. Second, the study was conducted in a single private health education institution, which limits the generalizability of the findings to other nursing schools in Indonesia with different curricular models, institutional cultures, and student characteristics. Third, critical thinking was measured using a self-report instrument, which may be influenced by response tendencies and may not fully capture students' actual performance in authentic clinical situations. Fourth, the strong concentration of respondents in the third academic year and sixth semester may have reduced variability in some comparisons. These limitations suggest that future studies should use multicenter designs, include more balanced academic cohorts, and consider combining questionnaire-based measures with performance-based assessments of clinical reasoning and judgment

The findings of this study suggest that nursing programs should approach critical thinking as a developmental outcome that must be intentionally cultivated throughout the curriculum. Because educational program, academic year, and semester level were associated with critical thinking, curriculum planners should ensure that learning experiences are scaffolded from basic analysis in earlier semesters toward more complex clinical reasoning, reflection, and decision-making in later stages. Teaching strategies should go beyond content delivery and include structured case discussions, problem-based learning, reflective writing, guided debriefing, simulation, and research-related learning activities. Particular attention should also be paid to creating supportive learning environments that strengthen students' self-efficacy and metacognitive awareness, since these factors may help translate curricular exposure into actual growth in critical thinking. In practice, this means that advancing students to higher semesters is not enough; nurse educators must also design learning environments that consistently challenge students to analyze, justify, reflect, and revise their judgments.

## CONCLUSION

This study found that most Indonesian nursing students demonstrated a moderate level of critical thinking. Critical thinking level was significantly associated with gender, educational program, academic year, and semester level, whereas age was not significantly associated. These findings indicate that differences in critical thinking among nursing students may be related more to academic progression and educational pathway than to age alone. In nursing education practice, this suggests the need to provide structured learning experiences that consistently support the development of critical thinking, such as case-based learning, reflective activities, and supervised clinical learning across different stages of the curriculum. Future studies are recommended to use longitudinal, multicenter, and intervention-based designs to further examine how critical thinking develops over time and how educational strategies may enhance it in different nursing education settings

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## CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper. The research was conducted independently, and no financial, personal, or institutional relationships were identified that could have influenced the study design, data collection, analysis, interpretation, or manuscript preparation.

## REFERENCES

Adelia, G., Alwi, F., Asyikin, N., Pérez, E. Z., Putri, V. D., Arfina, A., Locsin, R. C., & Yoder, L. H. (2026). Critical Thinking Skills Development Across Semesters in Nursing Students : A Cross-Sectional Study. *Jurnal Berita Ilmu Keperawatan*, *19*(1), 83–94.

Adelia, G., Asyikin, N., Malfasari, E., Putri, V. D., & Arfina, A. (2024). Tingkat Berpikir Kritis Mahasiswa Keperawatan di Institusi Pendidikan Keperawatan Swasta. *Jurnal Penelitian Perawat Profesional*, *6*(6), 3195–3200. https://jurnal.globalhealthsciencegroup.com/index.php/JPPP/article/view/7461/5022.

Aldiabat, K., Alsrayheen, E., Aquino-Russell, C., Al-Qadire, M., Al Rawajfah, O., & Al Sabei, S. D. (2021). Differences in critical thinking skills between nursing students on a fast-track versus traditional 4-year programme. *British Journal of Nursing*, *30*(7), 434–439. https://doi.org/10.12968/bjon.2021.30.7.434.

Alfaro-lefevre, R. (2017). *Critical Thinking, Clinical Reasoning, and Clinical Judgment: A Practical Approach* (6th editio). Elsevier Inc.

Ali-Abadi, T., Babamohamadi, H., & Nobahar, M. (2020). Critical thinking skills in intensive care and medical-surgical nurses and their explaining factors. *Nurse Education in Practice*, *45*(April 2019), 102783. https://doi.org/10.1016/j.nepr.2020.102783.

Ali, S., Alil, M., El-sayed, S. H., & Hosany, W. A. El. (2023). Effect of Critical Thinking Training Program on Improving knowledge and skills of Nursing Students at Technical Institute of Nursing. *Trends in Nursing and Health Care Journal*, *6*(1), 1–9. https://doi.org/10.21608/tnhcj.2023.305024.

Azizi-Fini, I., Hajibagheri, A., & Adib-Hajbaghery, M. (2015). Critical Thinking Skills in Nursing Students: a Comparison Between Freshmen and Senior Students. *Nursing and Midwifery Studies*, *4*(1), 1–5. https://doi.org/10.17795/nmsjournal25721.

Barry, A., Parvan, K., Jabbarzadeh Tabrizi, faranak, Sarbakhsh, P., Safa, B., & Allahbakhshian, A. (2020). Critical thinking in nursing students and its relationship with professional self-concept and relevant factors. *Research and Development in Medical Education*, *9*(1), 7–7. https://doi.org/10.34172/rdme.2020.007.

Basco-Prado, L., Biurrun-Garrido, A., Zuriguel-Pérez, E., Roldán-Merino, J., & Mestres-Soler, O. (2024). Critical thinking level in nursing degree students according to sociodemographic and academic variables: A correlational study. *Nurse Education in Practice*, *78*, 103955. https://doi.org/10.1016/j.nepr.2024.103955.

Bowers, M., Terry, D., & Irwin, P. (2025). The impact of reflective practice on nursing students : a scoping review. *Nurse Education in Practice*, *87*, 104468. https://doi.org/10.1016/j.nepr.2025.104468.

Ciftci, B., Oktay, A. A., Erden, Y., & Kasikci, M. (2021). Comparison of Critical Thinking Levels of Nursing Students at Two Universities and the Influencing Factors. *International Journal of Caring Sciences*, *14*(1), 1–664.

Esa, M., Karim, & Yaman. (2023). Critical Thinking Level among Nursing Students of Faculty of Medicine UKM. *Medicine & Health*, *19*(1), 150–160. https://doi.org/10.17576/mh.2024.1901.10.

Ge, W. L., Zhu, X. Y., Lin, J. B., Jiang, J. J., Li, T., Lu, Y. F., Mi, Y. F., & Tung, T. H. (2025).

Critical thinking and clinical skills by problem-based learning educational methods: an umbrella systematic review. *BMC Medical Education*, *25*(1), 455. https://doi.org/10.1186/s12909-025-06951-z.

Geok, L. S., Yee, L. M., & Lian, H. A. (2019). Level of Critical Thinking Ability Among Nursing Students. *Malaysian Journal of Nursing*, *11*(2), 31–39. https://doi.org/10.31674/mjn.2019.v11i02.004.

Hashish, A. A., Ebtsam, & Bajbeir, E. F. (2018). Emotional Intelligence among Saudi Nursing Students and Its Relationship to Their Critical Thinking Disposition at College of Nursing- Jeddah, Saudi Arabia. *American Journal of Nursing Research*, *6*(6), 350–358. https://doi.org/10.12691/ajnr-6-6-2.

Jin, M., & Ji, C. (2021). The correlation of metacognitive ability, self-directed learning ability and critical thinking in nursing students: A cross-sectional study. *Nursing Open*, *8*(2), 936–945. https://doi.org/10.1002/nop2.702.

Karaca, A. (2023). The Relationship between Critical Thinking Skills and Caregiving Roles of Nurses. *Journal of Education and Research in Nursing*, *20*(4), 360–366. https://doi.org/10.14744/jern.2023.22354.

Kassabry, M., Al-Kalaldeh, M., Ayed, A., & Abu-Shosha, G. (2024). The impact of applying unfolding case-study learning on critical care nursing students' knowledge, critical thinking, and self-efficacy; a quasi-experimental study. *Nurse Education in Practice*, *78*(February 2024), 104015. https://doi.org/10.1016/j.nepr.2024.104015.

Kaya, H., Şenyuva, E., & Bodur, G. (2017). Developing critical thinking disposition and emotional intelligence of nursing students: a longitudinal research. *Nurse Education Today*, *48*, 72–77. https://doi.org/10.1016/j.nedt.2016.09.011.

Liu, N. Y., Hsu, W. Y., Hung, C. A., Wu, P. L., & Pai, H. C. (2019). The effect of gender role orientation on student nurses' caring behaviour and critical thinking. *International Journal of Nursing Studies*, *89*, 18–23. https://doi.org/10.1016/j.ijnurstu.2018.09.005.

Mousazadeh, N., Momennasab, M., Nia, H. S., Nazari, R., & Hajihosseini, F. (2021). Effective Factors in Critical Thinking Disposition in Nursing Students. *Education Research International*. https://doi.org/https://doi.org/10.1155/2021/5580010.

Nemati-Vakilabad, R., Mojebi, M. R., Mostafazadeh, P., Jafari, M. J., Kamblash, A. J., Shafaghat, A., Abbasi, A. S., & Mirzaei, A. (2023). Factors associated with the critical thinking ability among nursing students: An exploratory study in Iran. *Nurse Education in Practice*, *73*(June), 103814. https://doi.org/10.1016/j.nepr.2023.103814.

Nes, A. A. G., Riegel, F., Martini, J. G., Zlamal, J., Bresolin, P., Mohallem, A. G. da C., & Steindal, S. A. (2023). Brazilian undergraduate nursing students' critical thinking need to be increased: a cross-sectional study. *Revista Brasileira de Enfermagem*, *76*(1), 1–8. https://doi.org/10.1590/0034-7167-2022-0315.

Nguyen, T. V., Tang, M. F., Kuo, S. Y., Hu, S. H., Ngoc, T. D. T., & Chuang, Y. H. (2023). Nursing students' critical thinking and associated factors in Vietnam: A multicenter cross-sectional study. *Nurse Education in Practice*, *73*(October). https://doi.org/10.1016/j.nepr.2023.103823.

Nuampa, S., Ratinthorn, A., Tangsuksan, P., Chalermpichai, T., Kuesakul, K., Ruchob, R., Chanphong, J., Buranasak, J., Khadking, N., Subsomboon, K., Pangzup, S., Sirithepmontree, S., & Hungsawanus, P. (2025). Factors influencing critical thinking in simulation-based maternal-child nursing education among undergraduate nursing students: a mixed methods study. *BMC Nursing*, *24*(1). https://doi.org/10.1186/s12912-025-03016-w.

Oh, J. A., Kim, E. A., & Kim, H. R. (2025). Influence of Critical Thinking Disposition, Clinical Reasoning Competence, and Nursing Practice Environment on Medication Safety

Competence of Hospital Nurses. *Healthcare (Switzerland)*, *13*(5), 1–12. https://doi.org/10.3390/healthcare13050542.

Ruslan, A., & Ruslan, R. (2024). The Level of Critical Thinking Skills of Nursing Students at International Islamic University Malaysia (IIUM), Kuantan, Pahang. *International Journal of Care Scholars*, *7*(3), 92–96. https://doi.org/10.31436/ijcs.v7i3.382.

Santos, M. J. de O., Lopes, J. P., Imaginário, C. I., Silva, H. S., & Morais, E. E. V. A. (2025). Influence of Demographic and Academic Variables on Portuguese Nursing Undergraduate Students' Critical Thinking. *Enfermeria Global*, *24*(1), 1–14. https://doi.org/10.6018/eglobal.624341.

Sari, D. W. P., Abdurrouf, M., Ardian, I., & Azizah, I. R. (2025). Investigating the factors influencing nursing students' competency in patient safety. *Healthcare in Low-Resource Settings*, *13*(s1), 143–147. https://doi.org/10.4081/hls.2025.13515.

Sun, Y., Yin, Y., Wang, J., Ding, Z., Wang, D., Zhang, Y., Zhang, J., & Wang, Y. (2023). Critical thinking abilities among newly graduated nurses: A cross-sectional survey study in China. *Nursing Open*, *10*(3), 1383–1392. https://doi.org/10.1002/nop2.1388.

Wang, F., Liu, D., & Zhang, M. (2024). Metacognitive processes , situational factors , and clinical decision - making in nursing education : a quantitative longitudinal study. *BMC Medical Education*, *24*(1530). https://doi.org/10.1186/s12909-024-06467-y.

Yusuf, S. (2025). Contemporary Nursing As A Dynamic Response to Evolving Health Challenges. *Indonesian Contemporary Nursing Journal*, *10*(1), 1–2. https://doi.org/https://doi.org/10.20956/icon.v10i1.46314.

Zainal, N. H., Islam, M. A., Rasudin, N. S., Mamat, Z., Hanis, T. M., Rodzlan Hasani, W. S., & Musa, K. I. (2025). Critical Thinking and Clinical Decision Making Among Registered Nurses in Clinical Practice: A Systematic Review and Meta-Analysis. *Nursing Reports*, *15*(5), 1–19. https://doi.org/10.3390/nursrep15050175.

Zuriguel-Pérez, E., Falcó-Pegueroles, A., Roldán-Merino, J., Agustino-Rodriguez, S., Gómez-Martín, M. del C., & Lluch-Canut, M. T. (2017). Development and Psychometric Properties of the Nursing Critical Thinking in Clinical Practice Questionnaire. *Worldviews on Evidence-Based Nursing*, *14*(4), 257–264. https://doi.org/10.1111/wvn.12220.

Zuriguel-Pérez, E., Lluch-Canut, M. T., Puig-Llobet, M., Basco-Prado, L., Almazor-Sirvent, A., Biurrun-Garrido, A., Aguayo-González, M. P., Mestres-Soler, O., & Roldán-Merino, J. (2022). The nursing critical thinking in clinical practice questionnaire for nursing students: A psychometric evaluation study. *Nurse Education in Practice*, *65*(June), 1–7. https://doi.org/10.1016/j.nepr.2022.103498.