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The effect of peer tutoring on pediatric nursing education: a systematic review

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Purpose: This study aimed to systematically review studies on the effect of peer tutoring on pediatric nursing education for nursing students and identify its contents and characteristics. **Methods:** A comprehensive search was conducted from November to December 2023 across databases including PubMed, Embase, CENTRAL, CINAHL, ProQuest, and others. We included both published and unpublished literature in English or Korean. Three reviewers independently screened and selected eligible studies that involved undergraduate nursing students participating in peer tutoring programs focused on pediatric nursing education. We analyzed quantitative outcomes related to learning effects and learner responses. The quality of the studies was assessed using the revised Cochrane risk-of-bias tool for randomized trials and the risk of bias assessment tool for non-randomized studies. **Results:** Five studies were reviewed, encompassing randomized controlled trials, a non-randomized controlled trial, a cohort study, and a before-after study. These interventions were conducted in school settings or pediatric clinical environments and featured different forms of peer teaching: horizontal, near-peer, and reciprocal. The tutor-to-tutee ratios ranged from 1:3 to 1:36.5. The educational content covered nursing care for major neonatal diseases, communication skills, medication administration, and resuscitation techniques. Significant improvements in cognitive knowledge and communication skills were observed among nursing students. However, there was noticeable variability in the design and reporting of the studies. **Conclusion:** Peer tutoring programs can effectively enhance pediatric nursing education by improving nursing students' knowledge and skills. For future meta-analyses, more studies in this field reported according to reporting guidelines are needed.

Keywords: Child health; Pediatric nursing; Peer group; Students, nursing

INTRODUCTION

Nursing students must apply their theoretical knowledge of pediatric nursing in clinical settings to develop into competent nurses capable of independently caring for child patients [1]. Children have underdeveloped physical functions compared to adults, which significantly increases their risk of complications from infections and injuries. Therefore, children receiving care require precise and meticulous nursing [2].

Nursing students acquire clinical decision-making skills and integrate knowledge and skills through instruction from nursing faculties or clinical instructors. They also gain first-hand experience with job capabilities and interpersonal interactions. Consequently, the development of nursing students' practice competency is significantly shaped by nursing educators [3]. However, clinical instructors often face an overwhelming workload and feel limited in their ability to provide effective practicum instruction [4]. Nursing students

may be reluctant to engage with nursing educators due to fears of receiving negative evaluations [5]. To improve students' capacity to apply theoretical nursing knowledge in practical settings, nurse educators have employed a variety of teaching strategies [6].

Peer tutoring has been effectively implemented for nursing students, where tutors assist tutees in adapting to efficient learning strategies [7,8]. It is characterized by individuals from similar social groups, who are not professional educators, helping each other learn while also enhancing their own understanding through the act of teaching [9]. This approach is distinct from peer mentoring, which involves a one-on-one relationship that provides encouragement and support from someone more experienced. Peer tutoring specifically requires participants to assume designated roles, focuses heavily on curriculum-based content, and follows clearly established procedures for interactions between tutors and tutees [10].

It has been suggested that simply preparing to be a peer tutor can enhance cognitive processing in the tutor by increasing their focus and motivation to complete tasks, as well as requiring them to revisit their previous knowledge and skills [9]. Nursing student tutors found that engaging in peer tutoring not only boosted their learning capacity but also motivated them to pursue further learning [11]. Tutors created a supportive and non-threatening learning environment where tutees were able to effectively absorb knowledge [8]. Therefore, peer tutoring has been shown to help tutees overcome their academic challenges [12].

Despite the reported benefits of peer tutoring, several shortcomings have been identified, including tutor inefficiency and tutee dependency [5,12]. Additionally, peer tutoring has not been effective in reducing anxiety or enhancing self-efficacy among students [13]. Furthermore, the majority of peer tutoring studies have focused on qualitative research [7,8,12,14]. Therefore, the effects of peer tutoring in nursing education need to be comprehensively evaluated.

This study systematically reviewed research on the impact of peer tutoring in pediatric nursing education and explored the topics and content delivered through this method.

METHODS

Ethical statements: This study is a literature review of previously published studies and was therefore exempt from Institutional Review Board approval.

This study was conducted to answer the research question, "What is the impact of using peer tutoring in pediatric nursing education for nursing students?" The research was carried out in accordance with the research protocol registered in PROSPERO (No. CRD42023399026) and reported following the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 [15].

1. Eligibility Criteria

To clearly establish the eligibility criteria, five key articles related to the research question were analyzed. The specific eligibility criteria are presented in Table 1 and are as follows: 1) The tutees were undergraduate nursing students, and the tutors were peers or near-peers, including undergraduate or graduate nursing students; 2) the intervention involved peer mentoring with clearly defined roles for both tutor and tutee, and included education on the knowledge and skills required for pediatric nursing; 3) outcome measures included quantitative results regarding the learner's learning effects in cognitive, psychomotor, and affective domains, or individual responses to the education; 4) the study designs encompassed quantitative methodologies that presented quantitative outcomes of the intervention, regardless of the presence of a control group; 5) additionally, studies must be published in English or Korean.

2. Search Strategy

For an extensive search, the COre, Standard, Ideal search (COSI) model [16] was followed in selecting the sources. The Core search accessed databases such as PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Embase, KMbase, and the Korean Studies Information Service System (KISS). The Standard search included the Cumulative Index to Nursing Allied Health Literature (CINAHL) and Research Information Sharing Service (RISS) databases. For the Ideal search, unpublished literature was sourced from the ProQuest and RISS databases, and reference lists from the selected studies were thoroughly reviewed. The studies retrieved were managed using EndNote 21 (Clarivate), where duplicate records were identified and removed. This phase of the project spanned from November 26, 2023, to December 30, 2023. The search strategy incorporated MeSH terms, Emtree terms, and relevant natural language expressions. The main keywords were selected according to the population, inter-

Table 1. Eligibility Criteria

Categories	Inclusion criteria	Exclusion criteria
Population	•Tutees: undergraduate nursing students •Tutors: nursing undergraduates or graduate students	•Tutees: not undergraduate nursing students •Tutors: undergraduate or graduate students in non-nursing healthcare fields, healthcare professionals
Intervention	Interventions that satisfy the following two criteria: •An intervention utilizing peer or near-peer education where the roles of tutor and tutee are clearly distinguished •Includes theoretical or practical training that covers the knowledge and skills necessary for child nursing	•Interventions where the roles of tutor and tutee are not distinguished and learning occurs (e.g., interprofessional education, team-based learning) •Interventions that do not include child nursing in the educational content
Comparator	•Education provided by faculty and professionals (healthcare providers), e-learning, self-directed learning, or no treatment •Includes single-group studies without a comparison group	-
Outcomes	Includes any of the following quantitative outcomes: •Three levels of learning effects, including the cognitive, affective, and psychomotor domains •Individual responses to education, such as comfort, anxiety, and satisfaction	•Qualitative data such as learners' perceptions and meanings related to their educational experiences
Study design	•Randomized controlled trials •Quasi-experimental study •Cohort study •Before-after study •Mixed methods study	•Methodological study •Descriptive study •Qualitative study •Reviews •Conference abstracts •Editorials
Others	•Studies published in Korean or English •No restrictions on the year of publication	•Studies written in languages other than English or Korean

vention, comparison, and outcome (PICO) elements and were as follows: "students, nursing," "peer group," and a range of terms related to pediatric nursing such as "pediatric nursing," "pediatrics," "neonatal nursing," "newborn nursing," "maternal-child nursing," "maternal child health care," "child health," "family nursing," and "family centered care."

3. Study Selection and Data Extraction

All authors participated in the literature selection process, which involved an initial review of titles and abstracts to identify potential studies. This was followed by a full-text review to determine their final eligibility based on the established criteria. Data extraction was conducted using a predefined data coding form. One author (BRL), performed the extraction, while another (HA), reviewed the extracted data. The data coding form captured general information about the study, characteristics of tutors and tutees, sample size, education topic, learning contents, tutoring method, preparatory tutor training, outcome measures, and key conclusions. Any disagreements that arose during the literature selection and data extraction processes were resolved through discussion until a consensus was reached among the researchers.

4. Quality Evaluation

The quality assessment tools used were the revised Cochrane risk-of-bias tool for randomized trials (RoB-2) [17] and the risk of bias assessment tool for non-randomized studies (RoBANS) [18]. Two researchers (HA, BRL) independently conducted the quality assessment. The inter-rater reliability for the quality assessment, measured by Cohen's kappa, was 1, indicating "almost perfect" reliability [19].

5. Measures of Intervention Effect and Reporting Biases

Due to the diversity of outcomes reported in the analyzed studies, no single outcome was consistently reported by three or more studies; consequently, the effect size was not pooled [20]. Therefore, the mean difference (MD) and 95% confidence interval (CI) for the experimental and control groups were calculated and presented for each individual study.

Because the number of selected studies (N=5) was small, a funnel plot could not be used to assess reporting bias [21].

RESULTS

1. Study Selection

The process of selecting studies was presented using a PRISMA flow chart (Figure 1). Initially, a systematic literature search was conducted across various databases, resulting in the identification of 1,605 studies after duplicates were removed. Following a review of the titles and abstracts, nine articles were chosen for a full-text review. During this phase, four articles were excluded, leaving five studies for further analysis. Additionally, the gray literature was explored, yielding 1,591 entries. Duplicates from previously searched literature, totaling 77, were also removed. Including references cited in the selected studies (n=149), a total of 1,663 titles and abstracts underwent review. At the title and abstract screening stage, 1,653 were excluded, leaving 10 for full-text review. However, none of these 10 met the selection criteria. Consequently, a final total of five studies were selected for analysis [22-26].

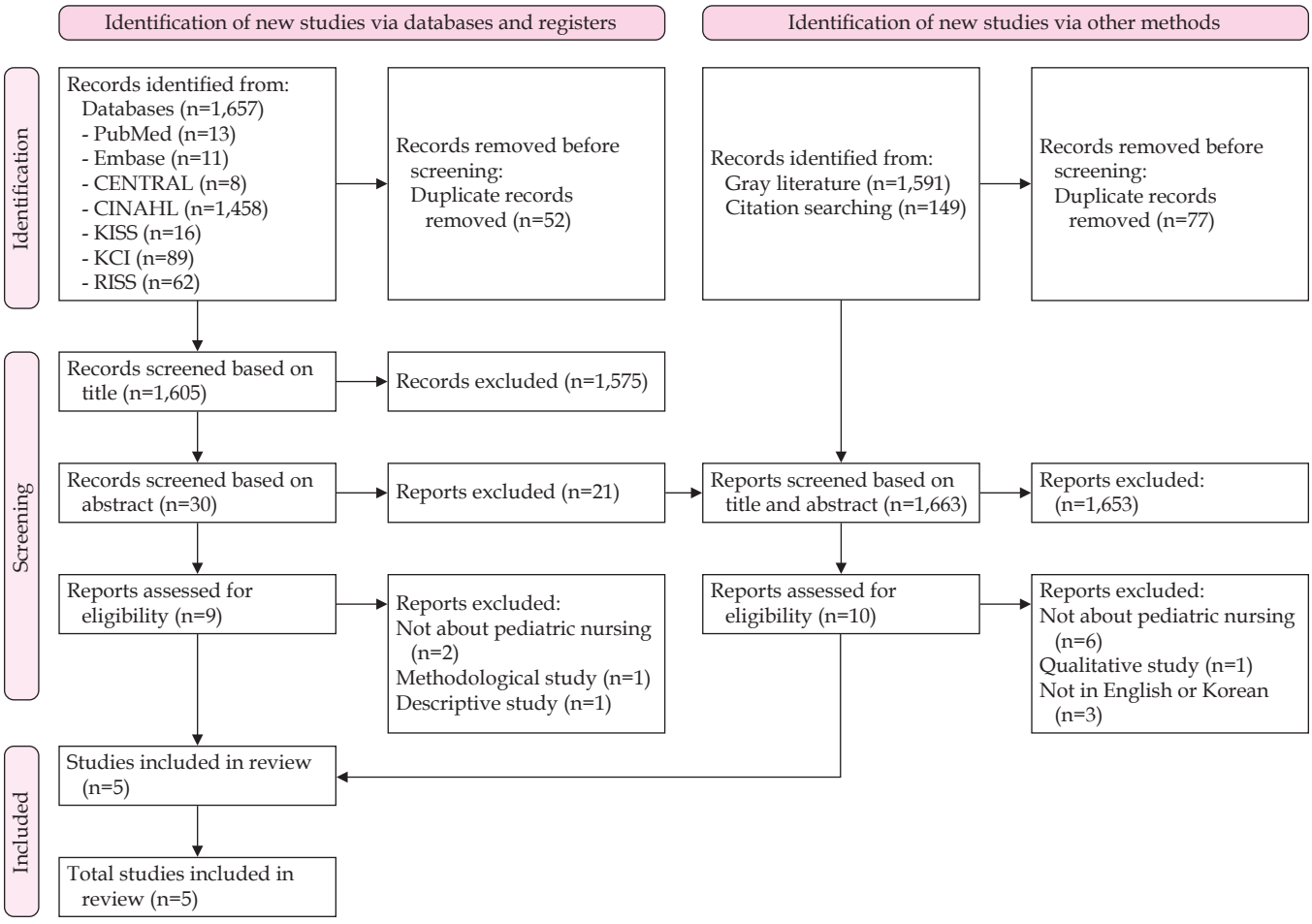

Figure 1. Flow diagram of the screening process. CENTRAL, Cochrane Central Register of Controlled Trials; CINAHL, Cumulative Index to Nursing Allied Health Literature; KISS, Korean Studies Information Service System; KCI, Korea Citation Index; RISS, Research Information Sharing Service.

2. Characteristics of the Included Studies

The characteristics of the selected studies are presented in Table 2. The studies were published from 2010 to 2023 and were conducted in the United States, United Kingdom, Iran, India, and Turkey, with one study from each country. Three studies were conducted in school settings [22,25,26], while two studies were carried out in pediatric clinical settings [23,24]. The two studies conducted in clinical settings were randomized controlled trials (RCTs) [23,24], while the remaining studies included a non-randomized controlled trial (NRCT) [22], a cohort study [25], and a one-group before-after study [26].

The number of participants (tutees) ranged from 24 to 143. Two studies targeted third-year students [22,24], one study focused on fourth-year students [23], and another study included second-year students [26]. One study targeted nursing students at risk of failing major courses, regardless of

Table 2. Characteristics of the Included Studies and Summary of Findings

Authors (year), Country	Study design/ Setting	Tutees		Tutors		Comparison	Outcomes (tool)-MD (95% CI)
		Level	Number	Level	Number		
Bhele et al. (2015) [22]; India	NRCT/College of nursing	Third-year students	Exp. 37 Cont. 48	Undergraduate students	NR	FT, Conventional lecture	Knowledge (tool developed by researchers) ↑*-MD 20.02 (95% CI 17.54 to 22.50)
Cheraghi et al. (2021) [23]; Iran	RCT/Pediatric clinical setting	Fourth-year students	Exp. 51 Cont. 52	Post-graduate students in pediatric nursing	2	FT, Usual pediatric practicum education with a nursing educator	Communication skills with children (nurse-hospitalized child communication skills) ↑*-MD 10.72 (95% CI 8.87 to 12.57) Communication skills with parents (nurse-parent communication skills) ↑*-MD 8.99 (95% CI 7.51 to 10.47)
Öztürk Şahin et al. (2023) [24]; Turkiye	RCT/Pediatric clinical setting	Third-year students	Exp. 73 Cont. 70	Graduate students in the department of pediatric nursing	2	ET, Mentoring provided by the nurse	Self-efficacy in pediatric medication administration (MASSCNS)-MD 1.72 (95% CI -2.05 to 5.49) Clinical comfort and worry (PNSCCWT) -Comfort: MD 0.16 (95% CI -0.95 to 1.27) -Worry: MD 0.19 (95% CI -1.18 to 1.56)
Robinson and Niemer (2010) [25]; USA	Cohort study (using posttest scores only)/ School of nursing	Undergraduate students (risk for nonsuccess in major)	Exp. 97 Cont. NR	Undergraduate students	NR	Did not apply PMTP	Exam performance ↑*-Unable to calculate[a]
Valler-Jones (2014) [26]; UK	One-group before-after study/School of nursing	Second-year students	Exp. 24 Cont. none	Second-year students	24	None	Confidence and competence in caring for a critically ill child (tool developed by researchers) ↑*-Unable to calculate [a),b)] Satisfaction (NR)-Unable to calculate [a),b)]

[a)]Due to insufficient reporting; [b)]One group study; CI, confidence interval; Cont., control group, ET, expert teaching; Exp., experimental or exposure group; FT, faculty teaching; MASSCNS, Medication Administration Self-efficacy Scale in Children for Nursing Students; MD, mean difference; NR, not reported; NRCT, non-randomized controlled trial; PMTP, peer mentor tutor program; PNSCCWT, Pediatric Nursing Students Clinical Comfort and Worry Tool; RCT, randomized controlled trial; UK, United Kingdom; USA, United States of America. Reporting statistical significance: ↑* Increase and a statistically significant result.

year [25].

Two studies utilized control groups that received lectures or instructions from faculty [22,23], one study compared the effects with a mentoring group led by nurses (healthcare professionals) [24], and one study used a control group that received no treatment [25]. There was also one study with a single group and no control group [26].

3. Characteristics of Peer Tutoring

The characteristics of the interventions are presented in Table 3. Two studies structured their interventions around theoretical models. One implemented a cooperative group approach, drawing on cooperative learning theory [25], while the other employed peer tutoring within simulation education, guided by situational learning theory [26].

Regarding educational topics, two studies focused on the cognitive domain, addressing subjects such as pediatric nursing theoretical courses [25] and nursing care for major neonatal diseases [22]. Three studies examined the educational effects in the psychomotor and affective domains, concentrating on communication skills with hospitalized children and their parents [23], medication administration skills for pediatric patients [24], and neonatal and pediatric resuscitation [26].

Two studies provided horizontal peer teaching (HPT), where both tutees and tutors were undergraduates [22,25]. Two studies employed near-peer teaching (NPT) with graduate students as tutors [23,24]. The remaining study used reciprocal peer teaching (RPT), allowing participants to alternate between tutor and tutee roles [26]. Except for one study (insufficient reporting) [22], all were group programs, with tutor-to-tutee ratios ranging from 1:3 to 1:36.5. In the study by Valler-Jones [26], the tutor group supported tutees' learning, resulting in a ratio of 4:8. The duration of tutoring varied from one day to one semester, employing methods such as feedback and comments (n=3), role-modeling (n=2), explanation (n=1), support and assistance (n=1), and debriefing (n=1).

In four studies, tutors were recruited through voluntary applications, while in one study, tutors were assigned by the faculty [22]. Three of these studies established specific criteria for selecting tutors, all of whom were chosen based on their high academic or test performance [22,23,25]. Each study also provided comprehensive training for the tutors. This training included role-play activities [23], education on the concepts, purposes, and roles of mentoring [24,25], and development of simulation scenarios and skill training [26]. The duration of tutor training was approximately 120 minutes [23,24].

Three studies reported that faculty monitored the peer tutoring process. Faculty observed the tutoring in two studies [23,26], and the study by Valler-Jones [26] provided a final debriefing after the observation. Robinson and Niemer [25] maintained continuous communication with tutors throughout the semester, reviewed documents summarizing the tutoring activities, and supplied the most current learning materials through an online learning platform.

4. Outcomes of the Peer Tutoring

We identified learning effects and individual responses as the primary outcomes of peer tutoring. These outcomes, together with the tools and statistical measures employed for assessment, are presented in Table 2.

Learning effects were measured in all studies. Among the three domains of learning effects, the cognitive domain included measurements of knowledge, school exam scores, and grade point average (GPA) [22,25]. In the study by Bhele et al. [22], knowledge was measured on the 12th day after the intervention, and the MD improved to 20.02 (95% CI 17.54 to 22.50). Robinson and Niemer [25] reported significantly higher exam scores in the tutoring group; however, due to insufficient reporting of statistics, the MD could not be calculated. The effects in the affective and psychomotor domains included improvements in communication skills, self-efficacy in pediatric medication administration, and confidence and competence in caring for critically ill children [23,24,26]. Peer tutoring positively affected communication skills with hospitalized children (MD=10.72, 95% CI 8.87 to 12.57) and their parents (MD=8.99, 95% CI 7.51 to 10.47) [23]. Although positive effects on confidence and competence in caring for critically ill children were reported, the MD could not be calculated due to insufficient statistical reporting, and these results were measured in a single group [26]. In the study by Öztürk Şahin et al. [24], no significant difference in MD was found in self-efficacy in pediatric medication administration when compared to the nurse-mentoring group.

Learners' responses were measured in two studies [24,26]. In the study by Öztürk Şahin et al. [24], clinical comfort and worry showed no significant differences in MD between the groups when compared to the nurse-mentoring group. In the study by Valler-Jones [26], educational satisfaction was mea-

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Table 3. Characteristics of Peer Tutoring

Authors (year)	Model or theory	Educational topics	Tutoring		Frequency (duration)	Tutor		Faculty monitoring
			Type (GP ratio)	Method		Recruitment/ Criteria	Training (frequency)	
Bhele et al. (2015) [22]	-	Management of neonatal disorders (neonatal hypothermia, neonatal seizure, neonatal sepsis, neonatal jaundice)	HPT (NR)	NR	Every day for 4 days	Assignment/A score of over 80%	Yes (NR)	NR
Cheraghi et al. (2021) [23]	-	Communication skills with hospitalized children and their parents	NPT (1:6–7)	Role-modeling, explanation, comments	NR	Voluntary/Top scores in the written quiz	Yes Role-play training using five scenarios covering major childhood health problems (three sessions, 45 min/session)	Yes Supervised performances and peer coaching
Öztürk Şahin et al. (2023) [24]	-	Medication administration in pediatric age groups	NPT (1:36.5)	Role-modeling, support, assistance, feedback	8 hours for a day	Voluntary/ None	Yes Training sessions: concept of mentoring, roles of mentors, stages of mentoring, effective mentoring skills, interpersonal relationships, communication skills and conflict resolution (1 session, 2 hours)	NR
Robinson and Niemer (2010) [25]	Cooperative learning	Seven subjects including pediatric nursing Study strategies and test-taking skills Anxiety, stress reduction, and time management	HPT (1:3–5)	NR	2 hours/week for one semester (attendance of 75% or more required)	Voluntary/ Grades of A or B, faculty's recommendation, and selection through an interview	Yes Confidentiality agreement signature Training sessions: PMTP objectives and components, mentoring relationship, available campus resources, and materials for mentoring (handouts, case studies, practice questions, etc.) (NR)	Yes Review of the summary document on group meetings, tracking mentee's academic performance, and providing mentoring to tutors (active communication using an online learning platform)
Valler-Jones (2014) [26]	Situated learning	Resuscitation of a neonate or child, including airway management and drug administration	RPT (4:8)	Debriefing, feedback	NR	Voluntary/ None	Yes Participants form teams of four and take turns performing the role of the tutor group Team-based work: develop a simulation scenario for resuscitation, conduct practice for skill training, and create a flow chart for the simulation process (NR)	Yes Provide a briefing after observing the simulations and debriefings

GP, group program; HPT, horizontal peer teaching; NPT, near-peer teaching; NR, not reported; PAL, peer-assisted learning; PMTP, peer mentor tutor program; RPT, reciprocal peer teaching.

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sured using a single-group design with only a post-test, making it impossible to determine the effect.

5. Risk of Bias Assessment

In the two RCTs [23,24], concerns about bias arose due to the omission of details regarding the allocation sequence and the concealment of the group assignment order. Additionally, the study by Cheraghi et al. [23] failed to mention evaluator blinding and lacked a detailed description of the specific methods and fidelity of the interventions provided, leading to a high risk of bias (Figure 2).

In the remaining three studies, a high risk of bias was present due to challenges in excluding the natural progression of learning effects without a control group and the omission of adjustments for differences in confounding variables [22,25,26]. Additionally, the risk of bias was compounded by several study-specific issues: imprecise statistical reporting [25,26], the absence of blinding [26], the use of self-reported outcomes [26], and the high dropout rates of participants [25] (Figure 2).

DISCUSSION

This study carried out a systematic review to assess the impact of peer tutoring on pediatric nursing education among nursing students. Despite extensive searches across various databases, only five studies met the inclusion criteria. The five studies analyzed were conducted in the United States, the United Kingdom, Iran, India, and Turkey, underscoring a significant global research gap in the application of peer tutoring in pediatric nursing education. According to previous systematic reviews, peer tutoring for nursing students has predominantly been utilized in the United States, and most studies have reported qualitative outcomes and focused on fundamental nursing skills or resuscitation training for adults [27-29]. In South Korea, nursing students primarily engage in learning focused on adult patients and face difficulties in studying pediatric nursing due to the limited opportunities for pediatric clinical practice resulting from the declining birth rate and the reduced number of hospitalized children [30,31]. This has resulted in challenges ranging from understanding the characteristics of pediatric patients to appropriately applying nursing skills learned for adults to pediatric patients [31]. Therefore, it is necessary to develop instructional strategies that specifically address the educational content in pediatric nursing that nursing students find challenging to learn or practice directly, and intensive peer education can be particularly useful in this context. However, this review revealed a scarcity of quantitative studies measuring the effects of peer tutoring in pediatric nursing education. Consequently, it is vital to actively pursue research on the implementation and effectiveness of peer tutoring within nursing education in pediatric nursing.

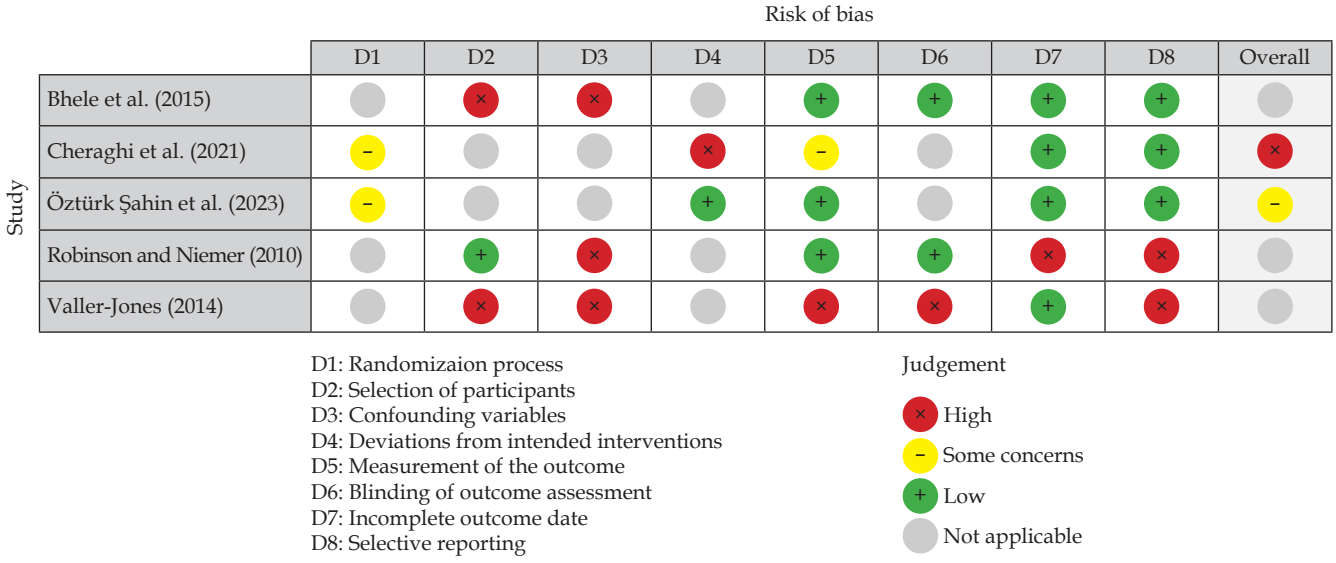

Figure 2. Risk of bias assessment using the revised Cochrane risk-of-bias tool for randomized trials and the risk of bias assessment tool for non-randomized studies.

The analyzed papers included two studies that aimed to improve theoretical learning abilities in pediatric nursing [22,25]. These studies reported that the participants exhibited significant improvements in exam scores [25] and knowledge [22] compared to the control group. Both studies employed HPT, where the mentors and mentees were undergraduates. HPT can reduce the burden of theoretical learning and improve learning outcomes by sharing information more easily and favorably based on the reliability shared among peers experiencing similar difficulties [22]. Given the challenging and rigorous nature of nursing education, which often causes students to struggle academically [25], employing HPT to improve cognitive learning in pediatric nursing education could be considered.

In the two studies utilizing HPT [22,25], the tutors were selected for their high academic performance and received training in tutoring during the pre-implementation phase of peer tutoring programs. Of particular note, in the study by Robinson and Niemer [25], the tutors were not only trained in advance but also regularly supervised during the mentoring process. This included the faculty providing the tutors with the latest learning materials and offering mentorship to the tutors themselves. Therefore, when employing HPT where both tutees and tutors are students, it is essential that educational benefits accrue to both parties. This approach can help prepare tutors for future roles as clinical nursing instructors [32]. However, the analyzed studies focused solely on the effects from the perspective of the tutees and did not assess the potential benefits for the tutors. A previous study on peer tutoring in high-risk neonatal nursing education demonstrated that peer tutoring enhanced the academic capabilities of both tutees and tutors through qualitative content analysis [5]. Although tutees and tutors are horizontal peers, their roles in the program differ, which suggests that the educational effects they experience might also vary. Future studies should consistently explore the specific educational benefits that each role can achieve.

In addition to its cognitive learning effects, peer tutoring has shown beneficial impacts on practical skills such as neonatal and pediatric resuscitation [26], communication skills with hospitalized children and their parents [23], and clinical pediatric medication administration [24]. As a result, the tutoring group showed improved communication skills compared to the control group [23], and there was no significant difference in self-efficacy in pediatric medication administration compared to the group that was instructed by clinical nurses [24]. Recent systematic reviews have reported that peer tutoring does not show a significant difference in educational effectiveness compared to expert and faculty-led education, with NPT being reported as the most effective type of peer tutoring [27]. Reflecting on these findings, the two studies [23,24] utilized NPT with graduate students as tutors, and it can be inferred that practical skill training in pediatric clinical settings for senior students led to positive outcomes. Therefore, employing NPT in clinical settings can be an effective instructional strategy to supplement the limited availability of faculty, especially when teaching pediatric nursing skills that require careful education.

The affective impacts identified in pediatric nursing education through the application of peer tutoring include satisfaction [26], clinical comfort, and anxiety [24]. Previous systematic reviews have reported that peer tutoring reduces mentees' stress [29], but the study by Öztürk Şahin et al. [24] found no significant difference compared to the clinical nurse-instructed group. This is presumed to be due to the use of NPT instead of HPT. Students reported feeling less anxious and more comfortable and confident when they learned through peer tutoring, free from the constant evaluation by faculty and concerns about potential biases from faculty members [5]. Therefore, to create a learner-centered, psychologically safe learning environment, HPT should be considered as a method that would be especially useful for junior students who experience high anxiety due to a lack of coping skills [29]. However, NPT can be considered as a way to focus on learning outcomes, and it would be beneficial for senior students who need to improve their practical skills. To clarify this, future research should explore whether the type of peer tutoring is closely related to its impact on cognitive, affective, and psychomotor learning outcomes.

Among the five analyzed studies, two utilized cooperative learning theory and situational learning theory to design peer tutoring programs [25,26]. Robinson and Niemer [25] faithfully applied the cooperative group approach by forming groups of 3–5 students, where the tutor continuously supported both academic and non-academic issues throughout the semester. The faculty checked attendance as a routine task and monitored changes in the exam scores of group members as an assessment task, thereby improving the exam scores of students with lower GPA. Additionally, Valler-Jones [26] combined situational learning theory with peer tutoring to use peer tutoring in simulations for the care of critically ill children, using the RPT method, which alternates the

tutor and tutee roles, to enhance nursing confidence and competence. Additionally, various models such as social cognitive theory, the goal-reality-options-will model, Kolb's cycle of experiential learning, Pintrich's model of self-regulated learning, an adapted version of the five senses of student success model, and the multidimensional model of nurse self-concept are being used in peer tutoring [29]. Therefore, utilizing these theories can help enhance the educational effectiveness of peer tutoring in pediatric nursing education.

This study is significant in systematically reviewing the effectiveness of peer education in pediatric nursing education for nursing students. However, the review included only five studies, which limits its scope. In the two RCTs [23,24], concerns about bias arose due to insufficient details on allocation sequence, group assignment concealment, and evaluator blinding, as well as inadequate descriptions of the intervention methods. The other three studies encountered high risks of bias because they lacked control groups, did not address confounding variables, and had issues such as imprecise statistical reporting, absence of blinding, reliance on self-reported outcomes, and high participant dropout rates [22,25,26]. Therefore, future research should implement peer tutoring across various educational topics in pediatric nursing, assess the educational effects, and adhere strictly to standardized intervention protocols.

CONCLUSION

This systematic review aimed to evaluate the effects of peer tutoring in pediatric nursing education for nursing students. Although only a few studies were available, they showed significant improvements in cognitive knowledge, communication skills, and clinical competencies. However, these studies demonstrated high risks of bias due to inadequate control groups, unaddressed confounding variables, and inconsistent reporting. Future research should employ more rigorous study designs, standardized intervention protocols, and comprehensive outcome assessments to more effectively validate the effectiveness of peer tutoring. Such improvements will enhance the educational strategies used in pediatric nursing education, ultimately improving the competency of nursing students.

ARTICLE INFORMATION

Authors' contribution

Conceptualization: all authors; Data collection, Formal analysis: all authors; Writing-original draft, Writing-review and editing: all authors; Final approval of published version: all authors.

Conflict of interest

Hyun Young Koo has been an editor of *Child Health Nursing Research* since 2016. She was not involved in the review process of this article.
Bo Ryeong Lee has been an editor of *Child Health Nursing Research* since 2024. She was not involved in the review process of this article.
No existing or potential conflict of interest relevant to this article was reported.

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Data availability

Please contact the corresponding author for data availability.

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REFERENCES

1. Korean Accreditation Board of Nursing Education (KABONE). The manual of nursing education accreditation for university. KAB-

ONE; 2021. p. 58-59, 143-145.
2. Kim MY, Kang JS, Kwon YJ, Kwon IS, Kim SH, Kim JS, et al. Child health promotion care. Soomoonsa; 2018. p. 2, 384-397.
3. Collier AD. Characteristics of an effective nursing clinical instructor: the state of the science. Journal of Clinical Nursing. 2018;27(1-2):363-374. https://doi.org/10.1111/jocn.13931
4. Park YA, Kong EH, Park YJ. Head nurses' experiences in clinical practice education of nursing students: a qualitative research. Journal of Korean Academic Society of Nursing Education. 2018;24(4):337-346. https://doi.org/10.5977/jkasne.2018.24.4.337
5. An H, Koo HY. Peer tutoring experiences of neonatal nursing simulations among Korean nursing students: a qualitative study. Child Health Nursing Research. 2022;28(4):280-290. https://doi.org/10.4094/chnr.2022.28.4.280
6. Berga KA, Vadnais E, Nelson J, Johnston S, Buro K, Hu R, et al. Blended learning versus face-to-face learning in an undergraduate nursing health assessment course: a quasi-experimental study. Nurse Education Today. 2021;96:104622. https://doi.org/10.1016/j.nedt.2020.104622
7. Carey MC, Chick A, Kent B, Latour JM. An exploration of peer-assisted learning in undergraduate nursing students in paediatric clinical settings: an ethnographic study. Nurse Education Today. 2018;65:212-217. https://doi.org/10.1016/j.nedt.2018.03.014
8. Li T, Petrini MA, Stone TE. Baccalaureate nursing students' perspectives of peer tutoring in simulation laboratory, a Q methodology study. Nurse Education Today. 2018;61:235-241. https://doi.org/10.1016/j.nedt.2017.12.001
9. Topping KJ. The effectiveness of peer tutoring in further and higher education: a typology and review of the literature. Higher Education. 1996;32(3):321-345. https://doi.org/10.1007/BF00138870
10. Topping KJ. Trends in peer learning. Educational Psychology. 2005;25(6):631-645. https://doi.org/10.1080/01443410500345172
11. Irvine S, Williams B, Özmen M, McKenna L. Exploration of self-regulatory behaviours of undergraduate nursing students learning to teach: a social cognitive perspective. Nurse Education in Practice. 2019;41:102633. https://doi.org/10.1016/j.nepr.2019.102633
12. Jeong H. A qualitative study on the purpose, difficulties, achievements, and improvements of peer tutoring at university: from the perspective of tutors. Korean Journal of Educational Methodology Studies. 2019;31(4):737-766. https://doi.org/10.17927/tkjems.2019.31.4.737
13. Brannagan KB, Dellinger A, Thomas J, Mitchell D, Lewis-Trabeaux S, Dupre S. Impact of peer teaching on nursing students: perceptions of learning environment, self-efficacy, and knowledge. Nurse Education Today. 2013;33(11):1440-1447. https://doi.org/10.1016/j.nedt.2012.11.018
14. Svellingen A, Røssland A, Røykenes K. Students as facilitators: experiences of reciprocal peer tutoring in simulation-based learning. Clinical Simulation in Nursing. 2021;54:10-16. https://doi.org/10.1016/j.ecns.2021.01.008
15. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021;372:n71. https://doi.org/10.1136/bmj.n71
16. Bidwell S, Jensen MF. Etext on Health Technology Assessment (HTA) Information Resources [Internet] Bethesda: U.S. National Library of Medicine, National Institutes of Health, Health & Human Services; 2003. Jun 14, [cited 2016 Jul 5]. Chapter 3: Using a Search Protocol to Identify Sources of Information: the COSI Model. Available from http://www.nlm.nih.gov/archive/20060905/nichsr/ehta/chapter3.html#COSI
17. Sterne JAC, Savović J, Page MJ, Elbers RG, Blencowe NS, Boutron I, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. BMJ. 2019;366:l4898. https://doi.org/10.1136/bmj.l4898
18. Kim SY, Park JE, Lee YJ, Seo HJ, Sheen SS, Hahn S, et al. Testing a tool for assessing the risk of bias for nonrandomized studies showed moderate reliability and promising validity. Journal of Clinical Epidemiology. 2013;66(4):408-414. https://doi.org/10.1016/j.jclinepi.2012.09.016
19. McHugh ML. Interrater reliability: the kappa statistic. Biochemia Medica. 2012;22(3):276-282.
20. Shenhav L, Heller R, Benjamini Y. Quantifying replicability in systematic reviews: the r-value. arXiv. https://doi.org/10.48550/arXiv.1502.00088
21. Egger M, Davey Smith G, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. BMJ. 1997;315(7109):629-634. https://doi.org/10.1136/bmj.315.7109.629
22. Bhele R, Arora S, Bhardwaj U. Effectiveness of peer led intervention programme (PLIP) on knowledge of student nurses regarding management of neonatal disorders. International Journal of Nursing Education. 2015;7(1):26-31. https://doi.org/10.5958/0974-9357.2015.00006.9
23. Cheraghi F, Hooshangian M, Doosti-Irani A, Khalili A. The effect of peer support approach on communication skills of nursing students in pediatric clinical setting. Nurse Education in Practice. 2021;52:102984. https://doi.org/10.1016/j.nepr.2021.102984
24. Öztürk Şahin Ö, Aközlü Z, Taşdelen Y. Pediatric nursing students' self-efficacy regarding medication administration and clinical comfort and worry: a pre-posttest comparative study of nurse mentoring versus peer mentoring. Nurse Education in Practice. 2023;71:103712. https://doi.org/10.1016/j.nepr.2023.103712
25. Robinson E, Niemer L. A peer mentor tutor program for academic

success in nursing. Nursing Education Perspectives. 2010;31(5):286-289.
26. Valler-Jones T. The impact of peer-led simulations on student nurses. British Journal of Nursing. 2014;23(6):321-326. https://doi.org/10.12968/bjon.2014.23.6.321
27. Zhang H, Liao AWX, Goh SH, Wu XV, Yoong SQ. Effectiveness of peer teaching in health professions education: a systematic review and meta-analysis. Nurse Education Today. 2022;118:105499. https://doi.org/10.1016/j.nedt.2022.105499
28. Stone R, Cooper S, Cant R. The value of peer learning in undergraduate nursing education: a systematic review. ISRN Nursing. 2013;2013:930901. https://doi.org/10.1155/2013/930901
29. Lim S, Xin Min L, Chan CJW, Dong Y, Mikkonen K, Zhou W. Peer mentoring programs for nursing students: a mixed methods systematic review. Nurse Education Today. 2022;119:105577. https://doi.org/10.1016/j.nedt.2022.105577
30. Sim M, Kim S, Kim K. Effects of simulation-based neonatal nursing care education on communication competence, self-efficacy and clinical competency in nursing students. Journal of Digital Convergence. 2022;20(2):563-571. https://doi.org/10.14400/JDC.2022.20.2.563
31. Koo HY, Lee BR. Educational needs for practicing neonatal intensive care among Korean nursing students. Child Health Nursing Research. 2021;27(4):339-353. https://doi.org/10.4094/chnr.2021.27.4.339
32. Mikkonen K, Tomietto M, Cicolini G, Kaucic BM, Filej B, Riklikiene O, et al. Development and testing of an evidence-based model of mentoring nursing students in clinical practice. Nurse Education Today. 2020;85:104272. https://doi.org/10.1016/j.nedt.2019.104272