The Effect of Simulation-Based Learning on First-Year Nursing Students' Perception of Competence, Self-Efficacy, and Learning Satisfaction

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KEYWORDS

Simulation-based learning, Nursing education, Self-efficacy, Clinical competence, Learning satisfaction.

ABSTRACT

Background: Simulation-based learning (SBL) has become an integral component of nursing education, enhancing students' clinical skills, self-efficacy, and learning satisfaction in a safe, controlled environment. Despite its growing implementation, a need remains to assess its impact on first-year nursing students' competence and confidence. **Aim:** This study aimed to evaluate the effect of simulation-based learning on first-year nursing students' perception of competence, self-efficacy, and learning satisfaction. **Design:** A mixed-methods research design was utilized. **Setting:** The study was conducted within the simulation laboratory at the Faculty of Nursing, Badr University in Cairo. **Subjects:** A purposive sample of 81 first-year nursing students was selected for the study. **Tools:** Data collection was conducted using seven tools: (1) Demographic data and Student Engagement in Simulation-Based Learning data, (2) Generalized Perceived Self-Efficacy Scale (GPSS) to assess self-efficacy, (3) Nursing Student Knowledge Assessment, (4) Creighton Simulation Evaluation Instrument (C-SEI) to evaluate clinical performance, (5) Simulation Effectiveness Tool - Modified (SET-M) to assess learning effectiveness, (6) Student Satisfaction/Self-Confidence in Learning Scale (SSSCL), and (7) a semi-structured interview to capture students' experiences and insights. **Results:** Most students were between 15 and 18 years old, with an average age of 17.97±1.73 years. Most participants were female (71.6%) and from rural areas (67.9%). Nearly all students engaged in simulation activities 1-2 times using a single method. The program significantly improved self-efficacy, with 88.9% achieving high self-efficacy post-program, and knowledge level rose to 53.1% ($p<0.001$). The clinical performance showed that 91.36% of students performed satisfactorily after the program. Additionally, students' perception of competency improved, with 94% rating their competency as satisfactory. Satisfaction and self-confidence levels were also significantly higher post-program, with 98.1% expressing confidence in their learning and 96.3% reporting satisfaction. **Conclusion:** The findings indicate that simulation-based learning significantly enhances nursing students' competence, self-efficacy, and learning satisfaction. The results support the integration of SBL as a core teaching strategy in nursing education to bridge the gap between theoretical knowledge and clinical practice. **Recommendations:** Continuously implementing and expanding simulation-based education within nursing curricula is recommended, ensuring structured debriefing sessions and diverse clinical scenarios to maximize learning outcomes.

1-Introduction:

Simulation has become integral to healthcare education, revolutionizing how students learn and practice essential clinical skills in a controlled and safe environment. Over the past few decades, simulation has evolved from rudimentary models to sophisticated, high-fidelity systems capable of replicating real-life clinical scenarios. The growing recognition of simulation's potential to bridge the gap between theoretical knowledge and clinical practice has positioned it as a cornerstone of modern nursing education **(Elendu et al., 2024).**

Simulation in healthcare education involves using various teaching tools and technologies to mimic real-life healthcare situations. It allows students to practice clinical skills, decision-making, and problem-solving in a controlled environment. The key advantage of simulation is its ability to replicate complex, high-risk scenarios that would otherwise be difficult or impossible to reproduce in real clinical settings (**Nosrati & Nosrati, 2023).**

One of the core strengths of simulation is its ability to offer immediate feedback. Students receive real-time assessments of their actions, allowing them to recognize errors, reflect on their performance, and improve. This iterative learning process is essential for developing clinical competence and confidence, which are critical for nursing students as they prepare to enter the workforce. By providing hands-on practice with different clinical situations, simulation supports the development of a broad range of skills, from technical proficiency to critical thinking and communication (**Cardoso et al., 2023).**

Simulation-based nursing education is supported by several educational theories and frameworks that ensure its effectiveness in developing clinical competence. The NLN/Jeffries Simulation Framework provides a structured, evidence-based approach to designing, implementing, and evaluating simulation-based learning. This framework enhances student engagement, critical thinking, and practical application by integrating key elements such as context, design, educational practices, and outcomes. It emphasizes active learning, feedback, and structured debriefing, making simulations an effective bridge between theory and practice. Additionally, the INACSL Guidelines establish evidence-based best practices for simulation education. These guidelines cover essential standards such as simulation design, briefing, facilitation, debriefing, participant evaluation, professional integrity, and continuous quality improvement. By ensuring structured, realistic, and pedagogically sound simulations, these frameworks enhance student learning, clinical competence, and patient safety (**Barlow et al., 2024**).

Perception of competence in nursing education refers to students' confidence in their ability to perform clinical tasks safely, accurately, and effectively. Simulation-based learning significantly enhances this perception by providing a realistic, risk-free environment where students can practice clinical skills, apply theoretical knowledge, and receive immediate feedback. This process helps students refine their abilities, assess their strengths and weaknesses, and improve their self-confidence. Ultimately, simulation makes students feel more capable and confident, ensuring they are better equipped to deliver high-quality patient care in their future nursing careers (**Alshehri et al., 2023).**

Self-efficacy, or the belief in one's ability to succeed in specific tasks, is a critical factor in learning and professional development (**Gümüş & Bellibaş, 2023).** In nursing education, self-efficacy influences students' motivation to engage in learning and their ability to perform clinical tasks confidently. Simulation-based learning improves self-efficacy by allowing students to practice skills in a realistic yet low-risk environment. As students repeatedly engage in simulated scenarios, their confidence in their clinical abilities increases, enhancing their overall performance in both simulation and real-life clinical settings (**Oliveira et al., 2024).**

Learning satisfaction is another important outcome of simulation-based education. Students who are satisfied with their learning experiences are likelier to engage in the material, participate actively, and perform well in assessments. Simulation contributes to learning satisfaction by offering engaging, interactive, and realistic learning experiences directly relevant to students' future practice. By providing opportunities to practice skills, make decisions, and receive feedback, simulation enhances students' overall educational experience and prepares them for the challenges of nursing practice (**Cho & Kim, 2023).**

Significance of the study:

Simulation-based learning has become a transformative approach in nursing education worldwide, addressing the challenges of limited clinical placements, patient safety concerns, and the need for hands-on experience in a controlled environment. Globally, evidence supports the effectiveness of SBL in enhancing nursing students' competence, self-efficacy, and learning satisfaction. For instance, **Alharbi et al. (2024)** supports using SBL as a potent teaching strategy within nursing education and highlights the importance of this approach's ongoing evaluation and refinement.

In Egypt, the shortage of clinical training opportunities, high patient-to-nurse ratios, and safety concerns in real clinical settings highlight the need for simulation-based learning. This study assesses whether simulation can address these gaps, improve self-efficacy, and enhance clinical preparedness in Egyptian nursing education. **Saad Abd El-aty et al. (2022)** revealed a statistically significant improvement in Egyptian nursing students' knowledge and performance following simulation-based training. This underscores the potential of SBL to address gaps in traditional clinical teaching methods and enhance students' readiness for real-world clinical practice.

The strategic goals outlined in Egypt's Vision 2030 also emphasize fostering innovation, advancing scientific research, and improving educational quality to meet national development needs. This study aims to evaluate the effect of simulation-based learning on first-year nursing students' performance, perception of competency, self-efficacy, and satisfaction. A teaching-learning framework will also be developed and designed to create, implement, and evaluate SBL in nursing education. **Research Hypotheses:**

1. The first-year nursing students who receive simulation-based learning will report high perceived self-efficacy and competence.
2. First-year nursing students who receive simulation-based learning will be satisfied with the learning process.
3. The students who self-report positive satisfaction regarding simulation-based learning will report higher levels of clinical performance.

2-Subjects and methods:

Research design:

This study adopts a convergent mixed-methods design, integrating quantitative (survey tools, performance scores) and qualitative (semi-structured interviews) data collection. The rationale for using a mixed-methods approach is to triangulate findings, allowing qualitative insights to provide more profound interpretations of the quantitative results. Using the NLN/Jeffries simulation Framework for Simulation design characteristics, the scenarios are designed to meet simulation objectives.

Setting:

This study was conducted at Badr University in Cairo in the simulation lab, which includes nine simulation rooms on the first floor for first-level nursing students. One room was selected for skills stations and simulation runs, one for a control room, and the last for debriefing areas. The skills room contains simulation equipment and supplies. The simulation scenario in the lab was a physical examination using a standardized patient.

Sampling:

Type of the sample: A simple randomized sampling technique was employed to ensure the study's validity and generalizability. The total population of first-year nursing students (N = 320) was divided into four groups (each containing 80 to 83 students). Students were divided into six sub-groups within each group, with 13–14 students per sub-group. Using a computer-generated randomization process, one sub-group from each of the four main groups was randomly selected, ensuring an unbiased selection of 81 students for the simulation program.

Tools for data collection:

1st tool: Demographic data and Student Engagement in Simulation-Based Learning data:

Part (I): Demographic data: The researcher designed and validated the form. It consists of information about age, gender, marital and economic status, place of residence, grade point average, and previous simulation experience.

Part (II) Student Engagement in Simulation-Based Learning data: The researcher designs and validates the form. It categorizes simulation usage based on frequency and variety. It outlines how often simulations are conducted, ranging from low (1-2 times) to high frequency (6+ times), and the diversity of methods used, from a single approach to four or more methods. This classification helps assess the intensity and variation of simulations applied in a given context.

2nd tool: Generalized Perceived Self-Efficacy Scale (GPSS) :

The Generalized Perceived Self-Efficacy Scale (GPSS) is a validated and reliable tool designed to measure individuals' beliefs in their ability to manage and cope with challenges effectively. It is used to assess nursing students' self-efficacy before and after participating in the simulation experience; the scale consists of 10 items, each rated on a 4-point Likert scale ranging from 1 ("Not at all true") to 4 ("Exactly true"), with higher scores indicating greater self-efficacy. Cronbach's alphas varied from .76 to .90, mainly in the high .80s, indicating that the scale is unidimensional.

3rd tool: Nursing student knowledge assessment:

The nursing student knowledge assessment is a test designed by researchers and educators to evaluate nursing students' knowledge of physical examination techniques and principles. It consists of a structured questionnaire administered before (pre-test) and after (post-test) the educational intervention. The test consists of 15 multiple-choice questions (MCQs) and five actual/false questions for 20 items. Cronbach's alpha ranges from 0.98 to 0.99, which is considered highly acceptable.

4th tool: Creighton Simulation Evaluation Instrument (C-SEI) :

The Creighton Simulation Evaluation Instrument (C-SEI) is an assessment tool researchers adopt to evaluate student performance before and after clinical simulation scenarios. It comprises 17 items to assess students' performance during simulation-based learning activities. The instrument is structured into four sub-dimensions, each focusing on different aspects of student performance: assessment, communication, clinical judgment, and patient safety. Cronbach's alpha ranges from 0.974 to 0.979, which is considered highly acceptable.

5th tool: Simulation Effectiveness Tool - Modified (SET-M):

The Simulation Effectiveness Tool-Modified (SET-M) was developed by **Leighton et al. (2015)** and utilized by the researcher to evaluate nursing students' perceived competence before and after participating in a simulation program. The tool is structured into four domains: pre-briefing, learning, trust, and debriefing; each assesses different aspects of the simulation experience. 20 items with three subscales with acceptable internal consistency: Pre briefing ($\alpha = .833$), learning ($\alpha = .852$), Confidence ($\alpha = .913$), and Debriefing ($\alpha = .908$).

6th tool: Student Satisfaction / Self-Confidence in Learning (SSSCL):

It incorporates 13 items to measure the student's satisfaction (5 items) and self-confidence (8 items) (**Studnicka et al., 2023)** after the simulation program. It measures the students' self-confidence in managing the simulated patient's situations and their satisfaction with the simulation activities. Components of the SSSCL: **Satisfaction (5 items)**: This component assesses students' satisfaction with the simulation activities. **Self-Confidence (8 items):** The self-confidence component measures students' confidence in managing simulated patient situations. The Cronbach's Alpha coefficient for the scale was 0.90; for the subscale "Satisfaction with current learning," it was 0.87; for the subscale "Self-confidence in learning," it was 0.84.

7th tool: Semi-structured interview:

The form guides student interviews with five questions. It is designed to acquire more information about simulation-based learning and uncover participants' complex subjective experiences, insights, feelings, beliefs, perceptions, attitudes, knowledge, and perspectives quickly and effectively. In addition to the questions in the interview form, elaborative questions will be asked during the interview, and in-depth opinions of the students on the simulation will be obtained.

Ethical considerations:

Before the study was conducted, the research approval was obtained from the Scientific Research Ethical Committee in the Faculty of Nursing, Helwan University, in its session No. 32, held on 11/20/2022. In addition, approval was obtained from the dean of the Faculty of

Nursing at Badr University in Cairo. Also, informal oral consent was sought and obtained from each participating subject before data collection. They were informed about the purpose and expected outcomes of the study, and they were assured that the study was harmless, their participation was voluntary, and they had the right to withdraw from the study at any time without any reason. They were assured that anonymity and confidentiality were guaranteed and that the data collected would be used solely for research purposes. Ethics, values, culture, and beliefs were respected.

Pilot study:

The pilot study was conducted on 10% of the studied sample to examine the clarity of questions and time needed to complete the study tools. Based on the results, modifications were made (if necessary). Subjects included in the pilot study were excluded if significant modifications were required.

Fieldwork:

The **simulation-based learning program** lasted three months, aligning with the academic calendar to help nursing students integrate theoretical knowledge with hands-on practice and build clinical confidence before working with actual patients. It followed four key phases: assessment, planning, implementation, and evaluation. In the **assessment phase**, students' knowledge, skills, and confidence in performing physical examinations were evaluated using multiple-choice questions, practical exams, observations, and self-assessments. Skill gaps, such as difficulties in auscultation and palpation, were identified. PowerPoint presentations provided theoretical instruction and lab demonstrations using low-fidelity simulators or video demonstrations. The **planning phase** involved defining goals, objectives, budget, and simulation types while designing the program based on NLN Jeffries Simulation Theory and INACSL Best Practices. Educational materials were developed, including procedure manuals and instructional videos, and briefing and debriefing strategies were planned. Two simulation scenarios were designed, with three four-hour practice sessions scheduled. A simulation hospital was set up to replicate a clinical environment, focusing on chest and abdomen examinations. Actual patients were chosen instead of standardized ones to enhance students' experience, and four patients were prepared through the College of Medicine, ensuring they understood their roles and scenarios.

During the **implementation phase**, students first participated in a briefing session**,** reviewing theoretical materials and videos before simulation. A 60-minute orientation introduced them to the lab environment, roles, expectations, and safety guidelines. Briefing emphasized a safe learning environment, patient room setup, equipment usage, and documentation. Students were divided into two teams handling different physical examination simulators. A pre-test using GPSS (Generalized Perceived Self-Efficacy Scale) and a performance checklist established baseline data. In the **first-run simulation experience**, a 30-minute simulation scenario focused on systematic chest or abdominal examinations, where students practiced techniques, identified abnormalities, communicated with patients, and documented findings. Simulations ran for four weeks (twice weekly), with 10 students per session**.** The Creighton Simulation Evaluation Instrument (C-SEI) assessed student performance. Afterward, students participated in a structured debriefing session using the PEARLS framework (Promoting Excellence and Reflective Learning in Simulation)**.** The process included reaction, analysis, and application phases to enhance reflective learning and clinical competency.

In the **evaluation phase**, students assessed the program using the Simulation Effectiveness Tool-Modified (SET-M), Student Satisfaction/Self-Confidence in Learning (SSSCL), and semi-structured interviews with five questions conducted two weeks post-simulation in six

batches. Their self-efficacy was re-evaluated using the GPSS**.** The evaluation process took 15-20 minutes per student. This structured program ensured that students gained confidence, improved clinical skills, and performed systematic assessments effectively, preparing them for fundamental patient interactions.

3- Results:

Table (1): Distribution of the studied students according to their characteristics (n=81).

Items	Studied students (n=81)	
	N	%
Age /Year :		
15 ≤ 18 years	47	5%
19 ≤ 21 years	34	42%
$\bar{x}$ S.D 17.97±1.73		
Gender:		
Male	23	28.4%
Female	58	71.6%
Place of residence:		
Urban	26	32.1%
Rural	55	67.9%
Grade point average:		
2.6 – 2.99	23	28.4%
3 – 3.39	39	48.1%
3.4 – 4	19	23.5%
Any Previous simulation experience:		
Yes	7	8.6%
No	74	91.4%
Type of simulation exposure:		
Several simulation video games. Vehicle simulation games. Football Manager simulation games.	3 2 2	42.8% 28.5% 28.5%

Table (1) demonstrates that the majority (58%) of respondents are aged between 15 and 18 years, with the remaining 42% between 19 and 21 years; 71.6% were female and 28.4% male. About 67.9% of the students live in rural areas, while 32.1% are from urban settings. Almost half the respondents (48.1%) have a GPA between 3.0 and 3.39, and 91.4% reported having no prior simulation experience. Only seven students (8.6%) had some form of simulation experience.

Table (2): Student Engagement in Simulation-Based Learning: Frequency and Variety Distribution (n=81):

Simulation type	Studied students (n=81)	
	Nu	%
Simulation frequency		
1-2 Times	73	90.12 %
3-5 Times	6	7.4 %
6+ Times	2	2.4 %
Simulation Variety		
1 Method	73	90.12 %

2-3 Methods	6	7.4 %
4+ Methods	2	2.4 %

Table (2) shows that most students (90.12%) participated in simulations 1-2 times using a single method, while a smaller proportion (7.4%) engaged 3-5 times or used 2-3 methods. Only a minority (2.4%) participated 6+ times or used 4+ methods.

Table (3): Distribution of the studied students regarding the total level of self-efficacy at the pre and post-simulation program implementation (n=81).

Item	Pre-program		Post-program		Chi-Square P value
	No	%	No	%	
Low self-efficacy	3	3.7%	0	00%	172.819 **0.011***
Moderate self-efficacy	78	96.3	9	11.1%	
High self-efficacy	0	00%	72	88.9%	

* Statistically significance p>0.05 **Highly statistically significance p>0.001

Table (3) Shows that the majority (88.9%) of the studied students had high self-efficacy post-simulation program implementation compared to the majority (96.3%) with moderate self-efficacy pre-program. Moreover, there was a highly statistically significant difference between pre and post-simulation program implementation as evidenced by the significant reduction in moderate self-efficacy ratings and a substantial increase in high self-efficacy ratings with (p= .011*), respectively.

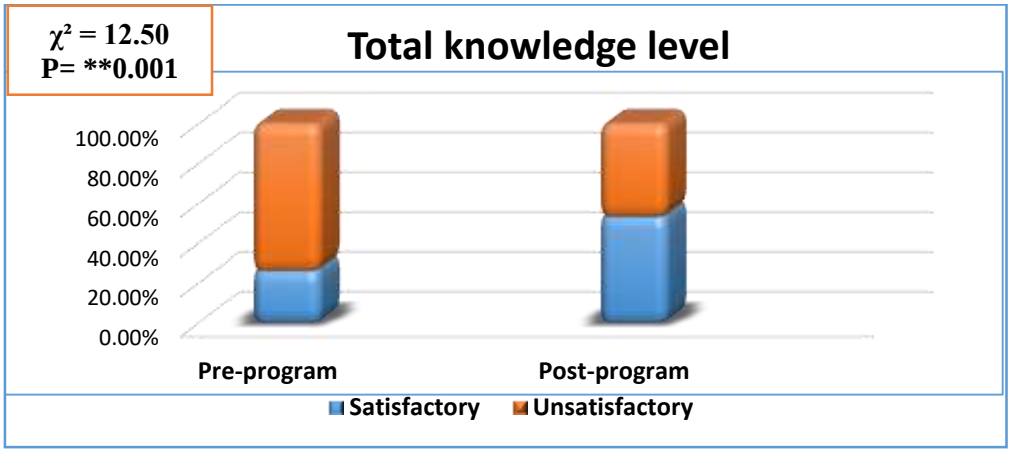

Figure (1): Total knowledge level before and after the simulation program implementation (n=81)

Figure (1) shows that 74.1% of students had unsatisfactory knowledge before the exposure to the program, which decreased significantly to 46.9% post-program. There is a highly statistically significant improvement in students' knowledge levels.

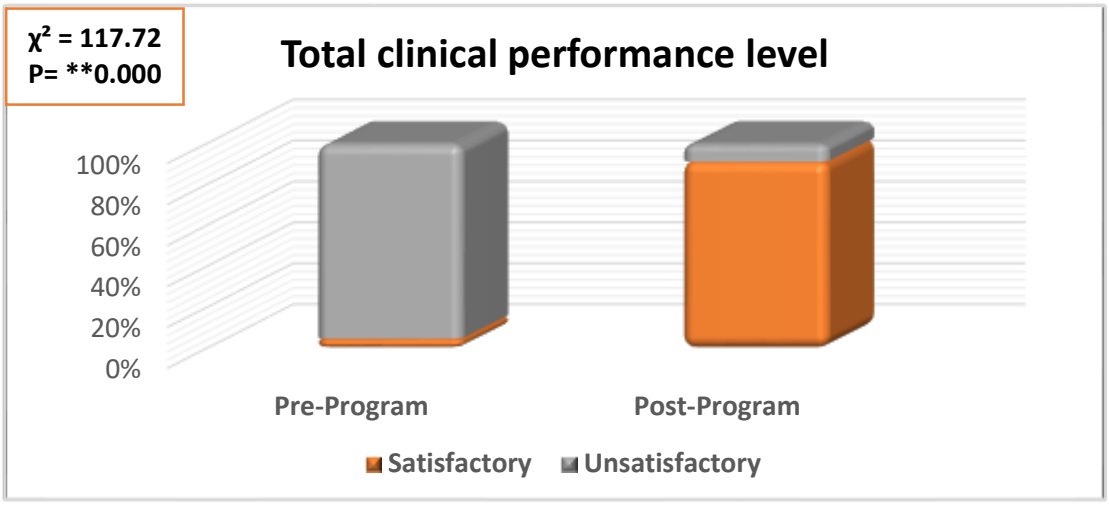

Figure (2): Total clinical performance level before and after the simulation program implementation (n=81)

Figure (2) shows that 91.36% of the studied students achieved satisfactory performance post-program implementation, compared to only 4.94% pre-program. There is a statistically significant improvement in students' clinical performance, respectively.

Table (3): Distribution of total student perception competency level regarding simulation program (n=81)

	Satisfactory level		unsatisfactory level	
	No	%	No	%
Pre-briefing	79	98.30%	2	1.70%
Learning	74	93.30%	7	6.70%
Trust	72	91.50%	9	8.50%
Debriefing	76	94.06%	5	5.94%
Total level	76	94.05 %	5	5.9 %

Table (3) shows that more than 91.00% of the students studied reported satisfactory levels of all items of perception competency regarding the simulation program.

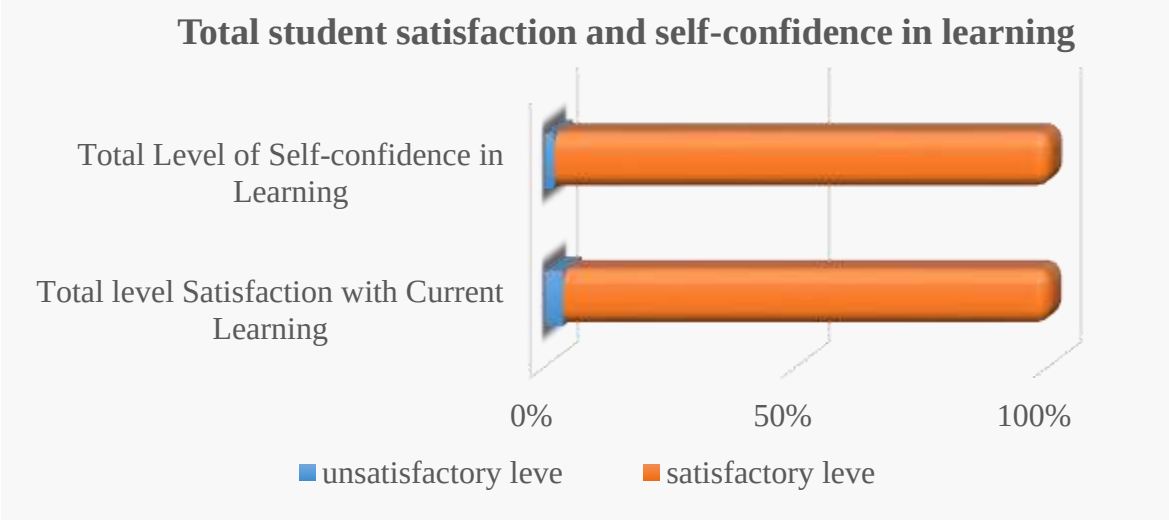

Figure (3): Total student satisfaction and self-confidence in learning level after simulation program implementation (n=81)

Figure (3) indicates that most students have high self-confidence and satisfaction, which means a successful simulation program that effectively supports student learning and development.

Table (4): Correlation between total knowledge level, total performance level, and total perception of competency level among nursing student's post-simulation program:

Relationship	Total Knowledge level		Total Performance level	
	r	P-Value	r	P-Value
Total Knowledge level	---	---	0.9992	**0.0001
Total Perception of Competency Level	0.9969	**0.0002	0.9981	**0.0001

* Statistically significance p>0.05 **Highly statistically significance p>0.001

Table (4) indicates high statistical significance between total knowledge level and total perception of competency level, evidenced by a strong positive relationship with r = **0.9969** (p=0.0002). There is high statistical significance between total performance level and total perception of competency level, with r = **0.9981** (p=0.0001). Additionally, the correlation between total knowledge and performance levels is highly statistically significant, with an r = **0.9992** (p=0.0001).

Table (5): Correlation between total self-efficacy and total performance level (pre/post-simulation program among nursing students:

Relationship	Pre simulation program		Post simulation program	
	(r)	P-Value	(r)	P-Value
Total Self-Efficacy Level & total Performance level	0.50	0.12	0.9998	**0.00001

* Statistically significance p>0.05 **Highly statistically significance p>0.001

Table (5) indicates a statistically significant relationship between total self-efficacy level and total performance level post-simulation programs among nursing students and no statistically significant pre-simulation program. The pre-simulation program observed a weak relation between total self-efficacy and performance levels, with r = **0.50** (p=0.12). The post-simulation program observed the relationship becoming stronger post-simulation, with r = **0.9998** (p=0.00001).

Table (6): Correlation between total self-efficacy level, total satisfaction level, and total performance levels among nursing student's post-simulation program:

Relationship	Total Self-Efficacy Level		Total Performance Level	
	r	P-Value	r	P-Value
Total Self-Efficacy Level	---	---	0.9997	**0.00001
Total Satisfaction Level	0.9999	**0.000001	0.9998	**0.00001

Table (7) indicates high statistical significance between total self-efficacy and satisfaction levels, evidenced by a robust positive relationship with r = **0.9999** (p=0.00000). There is also high statistical significance between the total satisfaction and performance levels, with r = **0.9998** (p=0.00001). Additionally, the correlation between total self-efficacy and performance levels is highly statistically significant, with r = **0.9997** (p=0.00001).

Table (8): Correlation between total knowledge level with total self-confidence level and total performance level among nursing students in the post-simulation program:

Relationship	Total Knowledge level		Total Performance level	
	(r)	P-Value	(r)	P-Value
Total Knowledge level	--	--	0.9992	**0.0001
Total Self Confidence level	0.9991	**0.0001	0.9996	**0.00001

* Statistically significance p>0.05 **Highly statistically significance p>0.001

Table (8) indicates high statistical significance between total knowledge and self-confidence levels, evidenced by a powerful positive relationship with an r = **0.9991** (p=0.0001). There is also high statistical significance between total self-confidence and performance levels, with an r = **0.9996** (p=0.00001). Additionally, the correlation between total knowledge and performance levels is highly statistically significant, with an r = **0.9992** (p=0.0001).

Table (9): Correlation between total self-efficacy level, total satisfaction level, total performance level, and simulation type among nursing student's post-simulation program:

Variables	Total Self-Efficacy level (n=72)		Total performance level (n=74)		Total satisfaction level (n=77)		Correlation test	
Simulation Type	Nu	%	Nu	%	Nu	%	r	p-value
1-2 Times	65	90.27%	66	89.18%	69	89.1%	0.89	0.01
3-5 Times	5	6.9 %	6	8.1 %	6	7.7%	0.95	**0.001
6+ Times	2	2.7 %	2	2.7%	2	2.5%	0.97	**0.0002
1 Method	65	90.27%	66	89.18%	69	89.1%	0.87	0.02
2-3 Methods	5	6.9 %	6	8.1 %	6	7.7%	0.93	**0.001
4+ Methods	2	2.7 %	2	2.7%	2	2.5%	0.99	**0.0006

* Statistically significance p>0.05 **Highly statistically significance p>0.001

Table (9) 6+ Times **exhibited the** highest correlation with student outcomes (**r = 0.97**, **p = 0.0002**),3-5 Times showed a strong correlation (**r = 0.95**, **p = 0.001**). While 1- Times was still significant (**r = 0.87**, **p = 0.02**), the correlation was weaker. 4+ Methods demonstrated the strongest correlation overall (**r = 0.99**, **p = 0.0006**), and 2-3 Methods showed a strong correlation (**r = 0.93**, **p = 0.001**) with significant improvements in outcomes. While 1 Method was statistically significant (**r = 0.87**, **p = 0.02**), the correlation was weaker than that of more diverse methods.

Part VII: interview questions:

The question, **"Was the simulation helpful in your learning?"** Thirty-six participants found the simulation generally helpful for their learning. Additionally, twenty-three learners said it helped them differentiate between normal and abnormal conditions, and others found it helpful in learning how to collect patient data. One student answered, "Yes, it helped me to know the normal and abnormal." Another participant noted, "It helped me learn how to collect patient data." Additionally, a student shared, "Yes, it helped me learn different sounds of the chest."

The question, **"How did you feel before the simulation?"** twenty-four participants expressed fear, and one student articulated this sentiment, stating, "I feel worried about making a mistake for the patient," and sixteen participants reported feeling anxious. In contrast, seventeen felt tense before the simulation. One participant noted, "I felt tense because I wanted to do well,"

Despite these concerns, eleven students expressed anticipation, suggesting that many viewed simulations as valuable learning opportunities. One student remarked, "I was excited to practice what I have learned," highlighting the eagerness to apply theoretical knowledge in a practical context. Furthermore, thirteen students specifically mentioned worries about making mistakes.

Twenty-seven participants expressed enthusiasm in the question, "How did you feel during the simulation?" one student shared, "I felt excited to apply my skills in a real-life setting." On the contrary, twenty-four students reported feeling nervous, suggesting that despite the excitement, one participant noted, "I was nervous about making mistakes." Additionally, twenty-two participants indicated feelings of worry. One student expressed, "I was worried about not being able to respond correctly," and only six reported feeling fear. Lastly, two students mentioned feeling comfortable during the simulation, indicating that a sense of ease was not a widespread experience.

The question, **"How did you feel after the simulation?"** thirty-seven students reported experiencing comfort and satisfaction post-simulation. A student remarked, "I felt happy and relieved after completing the simulation," and nineteen students expressed confidence. One participant noted, "I felt more confident in my abilities following the simulation." Additionally, fourteen participants expressed satisfaction with their performance; a student stated, "I was pleased with my management of the scenarios," seven students reported a general sense of positivity following the simulation, but three participants expressed sentiments of trust, indicating that the experience may have cultivated confidence in their classmates and the learning environment. Only one student reported feeling proud, suggesting that although pride was infrequently stated, it constitutes a substantial emotional reaction to their success.

The following question was asked to obtain significant qualitative insights into students' preferences for improving their simulation-based learning experiences: **"How would you prefer this simulation to be designed?"**. Twenty-nine participants demonstrated a pronounced inclination for the simulation to encompass additional procedures. A student stated, "I desire more hands-on procedures to apply the learning." Furthermore, eighteen students sought additional time throughout simulations, indicating that the time limitations may hinder their ability to connect with the scenarios thoroughly. A participant remarked, "I feel hurried and would benefit from additional time to contemplate my actions," Additionally, twenty students preferred increased simulations, suggesting a need for supplementary practice to enhance their understanding. A student emphasized the need for more simulations, stating, "Having more scenarios would enhance my preparedness for real-life situations." Nine learners proposed diverse patient scenarios to enhance their experiences. However, just five participants wanted to integrate additional technology into the simulations.

4- Discussion

Part (I): characteristics of students and simulation activity:

Regarding age, the present study illustrated that more than half of the respondents are between 15 and 18 years old, while the remaining participants are between 19 and 21 years old. **Regarding gender,** the present study is predominantly female, with slightly more than two-thirds of the respondents identifying as female and less than one-third identifying as male. The findings align with global trends in nursing education, as highlighted by **Stjernetun et al. (2024)** in their study *"Effects of a Suit Simulation on Nursing Students' Perspectives on*

Providing Care to Older Persons Education Intervention Study." They found that most participants were female and aged between 17 and 19 years, similar to the current study's findings. Conversely, some studies, such as **Rahmania (2024)** in "Exploring School Environmental Psychology in Children and Adolescents: The Influence of Environmental and Psychosocial Factors on Sustainable Behavior in Indonesia," reported a more balanced gender distribution, suggesting that cultural and regional factors may play a role in shaping participation demographics.

From the researcher's perspective, the age distribution in this study underscores the relevance of targeting adolescent and young adult learners in simulation-based education. With more than half of the respondents aged between 15 and 18, this group represents a formative stage in their educational journey. Engaging this age group in simulation-based learning can be particularly impactful, as it coincides with a period when foundational skills and knowledge are being developed. Including participants aged 19 to 21 further enriches the dataset, as this cohort often.

Regarding Student Engagement in Simulation-Based Learning, the study indicates that most students participated in simulation-based learning only 1-2 times, primarily using a single method. This limited exposure suggests that the curriculum's typical introductory approach to simulations may not encourage broader engagement. A smaller group of students engaged in simulations 3-5 times or utilized multiple methods, likely leading to enhanced learning outcomes. The findings align with **Rico et al.'s (2023)** study, "*Evaluating the impact of simulation-based instruction on critical thinking and academic performance in undergraduate students*." This study was conducted in Northern Colombia and found that simulation-based learning significantly enhances student understanding and academic success, aligning with the observation that limited participation can still yield positive educational outcomes.

The present study's findings do not align with **Ng et al.'s (2024)** titled *"The effects of simulation-based education on undergraduate nursing students: a multicenter randomized controlled trial."* In their research, Ng and colleagues conducted a multicenter randomized controlled trial involving 270 nursing students from five universities in China. The study involved nursing students divided into three groups based on simulation frequency: Group A (one-third of the participants engaged in 1–2 simulations), Group B (about one-third participated in 3–5 simulations), and Group C (just under one-third, engaged in more than five simulations).

The **Ng et al. (2024)** study involved four types of simulations: high-fidelity simulation (one-third of the participants), computer-based simulation (approximately one-quarter), a hybrid approach combining both (approximately one-third), and traditional case studies (one-sixth). The hybrid approach showed the highest engagement and learning outcomes, particularly in Group C, where most students participated in more than five simulations, combining realistic scenarios and virtual learning. With limited exposure to 1–2 simulations and relying primarily on a single method, Group A demonstrated the lowest engagement and skill development levels.

From the researcher's point of view, the causes of limited engagement include constraints such as time, resource availability, and the design of the educational program, which hinder the opportunity for more frequent and varied simulation experiences. The findings highlight the importance of addressing these limitations to improve exposure to simulation-based learning, which could lead to better educational benefits for students. Balancing accessibility with strategies to increase engagement could enhance overall outcomes.

Seethamraju et al.'s (2022) study, "Factors affecting the implementation of simulation-based education after faculty training in a low-resource setting. *Simulation in Healthcare*," aligns with the researcher's perspective on the causes of limited engagement in simulation-based learning. The study identifies significant barriers such as time constraints, limited resource availability, and challenges in educational program design, which collectively hinder the opportunity for more frequent and varied simulation experiences.

Part II: Self-efficacy level of students studied

The present study shows that most studied students had high self-efficacy post-simulation program implementation compared to the majority with moderate self-efficacy pre-program. Moreover, there was a highly statistically significant difference between pre and post-simulation program implementation, as evidenced by the significant reduction in moderate self-efficacy ratings and a substantial increase in high self-efficacy ratings. It aligns with the research hypothesis that first-year nursing students who receive simulation-based learning will report a high perception of self-efficacy.In the same line as the study titled *"The effect of simulation-based training on problem-solving skills, critical thinking skills, and self-efficacy among nursing students in Vietnam: a before-and-after study"* by **Oanh et al. (2024)** was conducted to evaluate the impact of simulation-based training on nursing students' skills and self-efficacy. The results showed a substantial increase in self-efficacy among nursing students following the simulation training, aligning with previous research indicating that simulation can boost students' confidence in their clinical abilities.

In contrast, a study by **Alrashidi et al. (2023),** titled *"Effects of simulation in improving the self-confidence of student nurses in clinical practice: a systematic review,"* presents findings that differ from the current study's conclusions regarding self-efficacy. This systematic review analyzed 15 primary research studies and found that simulation-based learning (SBL) can enhance nursing students' self-confidence in clinical tasks. However, the degree of improvement varied across studies. Some studies reported only modest gains in self-confidence, and the review highlighted inconsistencies in measuring self-efficacy outcomes. Additionally, the review emphasized the need for more rigorous research to determine the long-term impact of SBL on self-efficacy. These findings contrast with the present study, which reported a significant increase in students' self-efficacy following simulation-based learning interventions.

From the researcher's point of view, these results strongly validate the study's hypothesis that first-year nursing students exposed to simulation-based learning will report enhanced self-efficacy perceptions. Simulation programs bridge critical gaps in confidence and preparedness by providing experiential learning opportunities that closely mimic real-world clinical scenarios. Such programs bolster problem-solving capabilities and improve students' self-efficacy in handling challenges and maintaining composure under pressure, further reinforcing the hypothesis.

This point of view aligns with **Kassabry's (2023)** quasi-experimental study assessing the effect of high-fidelity simulation training on nursing students' self-efficacy, attitudes, and anxiety in the context of Advanced Cardiac Life Support (ACLS). The study revealed significant improvements in self-efficacy and attitudes and reduced anxiety levels post-simulation, highlighting the effectiveness of simulation-based training in nursing education.

Part III: Knowledge level of studied students

Regarding the total level of knowledge among nursing students, the present study shows that one-quarter of students were at a satisfactory level in the pre-program, and this percentage increased significantly to more than half in the post-program. About three-quarters of students had an unsatisfactory level in the pre-program, and this percentage decreased substantially to less than half in the post-program.

These findings align with **Fuglsang et al. (2022)** in a study titled *"Simulation Training and Professional Self-confidence: A large-scale study of third-year nursing students*." The study indicates limited knowledge improvement. While there was a slight relative increase in grade attainment during the treatment semester, this improvement in knowledge acquisition was not statistically significant and dissipated over time. The study noted that most knowledge-related effects were overshadowed by other factors, particularly intensive clinical training experiences.

These findings do not align with **those of Vangone et al. (2024)** in a study titled *"The Efficacy of high-fidelity Simulation on Knowledge and Performance in Undergraduate Nursing Students: An Umbrella review of systematic Reviews and Meta-analysis."* The umbrella review consolidates evidence from multiple systematic reviews and meta-analyses, indicating that high-fidelity simulation significantly enhances nursing students' knowledge acquisition. The pooled data suggest a substantial improvement in knowledge, with a standardized mean difference (SMD) of 1.73 ($p < 0.001$).

From the researcher's point of view, these results may be due to the program's ability to address specific knowledge gaps and provide focused content. The significant improvement could also reflect the students' low baseline knowledge, making the gains more noticeable. Additionally, interactive or practical elements in the program likely contributed to better engagement and understanding. However, the improvement might be short-term, as similar studies highlight the need for reinforcement through clinical practice to sustain knowledge gains.

A study by **Alharbi et al. (2024)** titled *"The Effectiveness of Simulation-based Learning (SBL) on Students' Knowledge and Skills in Nursing Programs: A Systematic Review"* supports the view that while simulation-based learning enhances nursing students' knowledge and skills, retention of these competencies over time remains uncertain. The review analysed 33 studies and found consistent improvements in knowledge and skills immediately following SBL interventions. The study suggests that while educational programs can effectively improve nursing students' knowledge in the short term, the sustainability of these improvements may require ongoing reinforcement and integration with clinical practice.

Part IV: Clinical performance level of studied students

Post-simulation program, satisfactory levels increased markedly, with patient assessment showing the most significant improvement, reaching the most satisfaction, and communication having the highest remaining unsatisfactory level. There are statistically significant differences between pre-and post-simulation program results for all items, with p-values < 0.001, indicating the program's effectiveness in enhancing nursing performance and competence in these areas.

The results align with **Kawase et al. (2024),** who conducted the study *"Effectiveness of a Simulation-Based Education Program to Improve Novice Nurses' Clinical Judgment Skills"* ***in*** *Cureus.* The simulation-based education program was implemented for 21 novice nurses, with evaluations conducted before, immediately after, and two months' post-program. The study concluded that participation in the simulation program correlated with enhanced clinical

judgment skills among novice nurses. While the program itself may not be solely responsible for all observed improvements—given that participants were likely practicing nursing actively—the correlation between completion of the simulation and enhanced skills was evident.

From the researcher's perspective, the findings suggest that the simulation program significantly improves clinical performance due to hands-on practice and immediate feedback, which leads to notable advancements in patient assessment, communication, clinical judgment, and safety. High levels of unsatisfactory patient assessment before the program indicate gaps in traditional education, while lower levels in patient safety imply a basic understanding but insufficient skills. Ongoing communication issues highlight the need for further training. Overall, the findings support the conclusion that simulation-based learning enhances self-efficacy and competence in first-year nursing students.

This point of view aligns with **Guerrero et al. (2021),** who conducted a study titled *"Repeated Exposure to high-fidelity Simulation and Nursing Interns' Clinical Performance: Impact on Practice Readiness*." The study shows that HFS significantly improves clinical skills, such as patient assessment, communication, clinical judgment, and safety. It is attributed to the hands-on practice and immediate feedback simulation programs, which are crucial for developing and refining clinical competencies.

Part V: Perception of competency level of studied students

The present study shows that most of the students studied reported a satisfactory level of pre-briefing and learning, indicating the program's success in improving learning outcomes. However, most students reported a satisfactory level regarding trust levels and debriefing sessions. The findings supported the first hypothesis of the study: that first-year nursing students who receive simulation-based learning will report a high perception of self-efficacy and competence.

The study by **Fung et al. (2024)**, "*Enhancing Nursing Students' Clinical Competency Using a Multi-Patient Simulation Learning Model: A Randomized Controlled Study*," aligns with the present study's findings regarding the effectiveness of simulation-based learning in enhancing nursing students' clinical competency. The study also highlights that most students reported satisfactory levels of learning, indicating the program's success in improving learning outcomes.

These findings agree with **Lertsakulbunlue and Kantiwong (2024)** in the study titled *"Development of Peer Assessment Rubrics in Simulation-based Learning for Advanced Cardiac Life Support Skills among* Medical Students."The study uses a narrative analysis to explore students' learning experiences during pre-briefing and observation. Most students report high levels of student satisfaction, indicating that simulation-based learning is well-received and effective in promoting learning outcomes.

Conversely, **Bray & Østergaard (2024)** conducted a study titled *"A Qualitative Study of the Value of Simulation-based Training for Nursing Students in Primary Care."* Publishing in *BMC Nursing*. The study explored the integration of SBL into primary care nursing education. The findings indicated that while SBL can enhance learning, its effectiveness is contingent upon proper implementation and contextual relevance. Inadequate adaptation of simulation scenarios to reflect primary care settings led to less meaningful learning experiences for students. It

suggests that misalignment between simulation content and actual clinical practice can hinder the effectiveness of SBL.

Part VI: Satisfaction and self-confidence level of studied students

The present study shows high student satisfaction and self-confidence in learning after the simulation program. Most students reported being satisfied with their overall learning experience. Additionally, a majority of students expressed confidence in their learning abilities. The result supported the second hypothesis: first-year nursing students who receive simulation-based learning will have positive satisfaction with the learning process.

From the researcher's point of view, these remarkable results in satisfaction and self-confidence could be attributed to several factors. Firstly, designing realistic scenarios is crucial, enabling students to authentically engage with the simulation experience. Additionally, the provision of feedback (debriefing) during the simulation sessions and the continuous support offered by the instructor contribute significantly to enhancing students' self-confidence.

These findings are consistent with **Moreno-Cámara et al.'s (2024)** study *"Evaluating Satisfaction and Self-Confidence among Nursing Students in Clinical Simulation Learning* ."The results indicate a notably high level of satisfaction and self-confidence in learning after the simulation scenario among participants. This elevated satisfaction can be attributed to factors such as the quality and realism of the simulation environment. A well-designed simulation environment that accurately mirrors real clinical situations has been shown to foster higher participant commitment and satisfaction.

These findings and the researcher's point of view are supported by a recent study by **Bdiri Gabbouj et al. (2024)** titled *"Nursing Students' Satisfaction and Self-confidence with Simulation-based Learning and Its Associations with Simulation Design Characteristics and Educational Practices."* The study showed that nursing students were satisfied and self-confident after their simulation experience. Simulation is an effective technique in nursing education because it improves student satisfaction and should be integrated into nursing educational programs.

Part VI: Correlation and the relation between the studied variables

The correlation between total knowledge level, total performance level, and total perception of competency level among nursing students in the post-simulation program indicates high statistical significance between total knowledge level and total perception of competency level, evidenced by a robust positive relationship with r = 0.9969 (p=0.0002). Additionally, the correlation between total knowledge level and total performance level is highly statically significant, with an r = 0.9992 (p=0.0001) emphasizing the role of knowledge in driving performance outcomes.

These findings are consistent with **Tong et al.'s (2024)** study titled *"The effects of simulation-based education on undergraduate nursing students' competencies: a multicenter randomized controlled trial."* The study evaluated the effect of simulated education on nursing students' knowledge, performance, and satisfaction. After simulation training, the results showed a positive correlation between learning and procedural practice (correlation coefficient = 0.291) and performance (correlation coefficient = 0.133). Results indicate that their procedural practice and performance improved significantly as students' knowledge increased.

The present study indicates high statistical significance between total performance level and total perception of competency level, with r = 0.9981 (p=0.0001). The results align with **the study by Shen et al. (2024)** titled *"A Comparative Study on the Effectiveness of Online and In-class Team-based Learning on Student Performance and Perceptions in Virtual Simulation Experiments."* The results emphasized that nursing students' perceptions of the quality of their education were closely linked to their performance outcomes. The findings suggest that positive perceptions correlate with better performance in academic assessments, although specific correlation values were not detailed in the provided search results.

The correlation between total self-efficacy and total performance level (pre/post-simulation program among nursing students indicates a statistically significant relationship between total self-efficacy level and total performance level post-simulation programs among nursing students and no statistically significant pre-simulation program. The pre-simulation program showed a weak relation between total self-efficacy and performance levels, with r = **0.50** (p=0.12). The post-simulation program observed that the relationship became stronger post-simulation, with r = **0.9998** (p=0.00001).

It demonstrates the significant impact of the simulation program on enhancing self-efficacy and performance levels, suggesting that the program effectively builds students' confidence and competence. It supports the research hypothesis that first-year nursing students receiving simulation-based learning will report a high perceived self-efficacy and competence.

These findings align with **Kim's (2024)** study *"The Effects of Simulation-Based Practical Education on Nursing Students' Self-efficacy, Performance Confidence, and Educational Satisfaction."* The study found that self-efficacy scores increased significantly post-simulation, with strong correlations to performance confidence (r=0.62*r*=0.62) and educational satisfaction (r=0.67*r*=0.67).

These findings are consistent with **Ma et al.'s (2024)** study *"Enhancing Surgical Nursing Student Performance: Comparative Study of Simulation-Based Learning and Problem-Based Learning.*"The study highlights that higher self-efficacy is associated with increased performance confidence and educational satisfaction among nursing students, suggesting that enhancing one area can lead to improvements in others within nursing education contexts.

From the researcher's point of view, this shift likely occurred because simulation allowed students to apply their knowledge in realistic scenarios, receive feedback, and correct mistakes in a controlled environment, leading to a stronger connection between their confidence and actual ability. Essentially, the program helped bridge the gap between knowing and doing, making self-efficacy a more accurate predictor of performance.

A study titled *"Improvements in Practicing Nurses' Knowledge, skills, self-efficacy, confidence, and Satisfaction after a Simulated Clinical Experience of Caring for a Patient Undergoing Chemotherapy: A Quasi-experimental Study"* by **Guerrero et al. (2024)** supports the view that simulation-based education enhances nurses' ability to apply theoretical knowledge in practical settings. The study found that nurses exposed to high-fidelity and virtual simulations significantly improved knowledge, skills, self-efficacy, confidence, and satisfaction. The controlled environment of the simulation allowed participants to practice skills, receive immediate feedback, and correct mistakes without the risk of harming actual patients, thereby bridging the gap between theoretical knowledge and practical application.

The correlation between total self-efficacy, total satisfaction, and total performance levels among nursing students in the post-simulation program indicates high statistical significance between total self-efficacy and total satisfaction, evidenced by a robust positive relationship with r = 0.9999 (p=0.00000). There is also high statistical significance between the total satisfaction and performance levels, with r = 0.9998 (p=0.00001). Additionally, the correlation between total self-efficacy and performance levels is highly statistically significant, with r = 0.9997 (p=0.00001).

The results emphasized the critical connection between self-efficacy, satisfaction, and performance in enhancing nursing students' outcomes after the simulation program. These findings supported the research hypothesis that students who self-report positive satisfaction regarding simulation-based learning will report higher levels of clinical performance.

These findings align with **Salameh et al.'s (2024)** study *titled "Effect of Virtual Reality Simulation as a Teaching Strategy on Nursing Students' Satisfaction, self-confidence, performance, and Physiological Measures in Jordan* ."The study found that nursing students reported enhanced satisfaction with their learning experience when engaging with VR simulations. Participants exhibited high statistical significance regarding self-efficacy, satisfaction, and performance.

These agree with **Mahmoud et al.'s (2024)** study *"Effect of Using Virtual Reality Simulation versus Instructor-Led Demonstration on Nursing Students' Clinical Performance and Self-efficacy***."** The study reported that self-efficacy and performance levels in measuring central venous pressure had a positive statistically significant correlation during the tenth week of the student's clinical rotation. It indicates that as students' self-efficacy increased, their clinical performance improved.

From the researcher's point of view, this could be attributed to the simulation program's ability to provide a structured, immersive, and supportive learning environment where students gain confidence through practice, receive constructive feedback, and refine their skills without the fear of real-world consequences. The strong link between satisfaction and performance further supports the idea that students who feel more competent and engaged in their learning process are likelier to perform better. These results reinforce the importance of simulation-based training as a tool for skill development and boosting confidence and motivation, ultimately leading to better educational and clinical outcomes.

The findings and points of view are not in the same line as the study titled *"Effects of Simulation in Improving the Self-confidence of Student Nurses in Clinical Practice: A Systematic Review"* by **Alrashidi et al. (2023)**, which provides a nuanced perspective on the impact of simulation-based learning (SBL) in nursing education. While the review acknowledges that SBL can enhance nursing students' self-confidence in performing clinical tasks, it also highlights significant limitations, including heterogeneity in study designs and a lack of long-term follow-up. These limitations constrain the ability to make generalizable claims about the durability of SBL's effectiveness. The authors emphasize the need for further research to address these gaps and to evaluate the long-term retention of competencies acquired through SBL.

The correlation between total knowledge level, total self-confidence level, and total performance level among nursing students in the post-simulation program indicates high statistical significance between total knowledge level and total self-confidence level and high statistical significance between total self-confidence level and total performance level.

Additionally, the correlation between total knowledge and total performance levels is statistically significant, emphasizing the connection between learning, self-confidence, and performance in enhancing nursing students' outcomes post-simulation program.

These findings are not in the same line with the study titled *"Nursing Students' Learning Flow, self-efficacy and Satisfaction in Virtual Clinical Simulation and Clinical Case Seminar"* by **Choi et al.,** published in December **2023,** which examines the impact of virtual clinical simulations and clinical case seminars on nursing students' learning experiences. The researchers found significant differences between the two methods in aspects of learning flow, specifically in challenge-skill balance and action-awareness merging. However, no significant differences were observed in learning self-efficacy and satisfaction between the two methods. The study suggests that mismatches between perceived challenges and students' skill levels can hinder the learning process, emphasizing the importance for instructors to assess and adjust the difficulty levels of educational methods to align with students' competencies.

From the researcher's point of view, this could be because simulation provides an opportunity for active learning, where students apply theoretical concepts in realistic clinical scenarios, reinforcing their understanding and boosting their confidence through hands-on experience. The strong link between self-confidence and performance further highlights the role of psychological readiness in clinical competency—students who feel more assured in their skills are likely to perform better. These results reinforce the importance of simulation-based education in fostering technical knowledge and the self-efficacy necessary for real-world nursing practice.

Guerrero et al. (2024) study aligns with this point of view as it emphasizes how simulation-based education provides an active learning environment where nurses can apply theoretical knowledge in realistic clinical scenarios. The study found that high-fidelity and virtual simulations significantly improved nurses' knowledge, skills, self-efficacy, confidence, and satisfaction, reinforcing that hands-on experience strengthens understanding and builds confidence.

Regarding the correlation between total self-efficacy level, total satisfaction level, total performance level, and simulation type among nursing students' post-simulation programs, the present study indicates that 6+ Times exhibited the highest correlation with student outcomes. While 1—Times was still significant, the correlation was weaker. 4+ Methods demonstrated the strongest correlation overall. While one method was statistically significant, the correlation was weaker than that of more diverse methods.

These findings emphasize the critical role of simulation frequency and methodological diversity in enhancing nursing students' self-efficacy, satisfaction, and post-simulation performance. The results suggest that students engaged in six or more simulation sessions exhibited the highest correlation with improved outcomes, indicating that repeated simulation exposure reinforces learning, boosts confidence, and refines clinical skills. Similarly, students who experienced multiple teaching methods (four or more) demonstrated the strongest correlation with positive outcomes, reinforcing that various instructional techniques enhance learning engagement, adaptability, and problem-solving abilities.

The declining correlation strength observed in students with fewer simulation sessions (1-2) or limited exposure to teaching methods suggests that single-exposure simulations may not provide sufficient reinforcement for skill mastery. These results align with educational theories

emphasizing the importance of deliberate practice and multimodal learning approaches in skill acquisition. The findings support the recommendation that nursing programs incorporate multiple simulation sessions with diverse teaching strategies to maximize student confidence, satisfaction, and overall clinical competency.

The study titled *"Equity, Diversity, and Inclusion in Simulation-based Education: Constructing a Developmental Framework for Medical Educators"* by **Mutch et al.,** published in May **2024,** emphasizes the importance of integrating diverse and inclusive practices in simulation-based education to enhance learning outcomes. The authors developed a developmental framework for simulation educators, outlining ten key areas for incorporating equity, diversity, and inclusion (EDI) into simulation programs during the design, delivery, and debriefing phases. Educators can improve students' self-efficacy and performance by adopting various simulation methods that address the unique needs of a diverse student population, thereby fostering a more inclusive and effective learning environment.

Part VI: interview questions:

The qualitative analysis of students' perceptions and emotional experiences during simulation-based learning provides valuable insights into the effectiveness and areas for improvement of this pedagogical approach. The findings reveal the strengths and challenges of simulation as a learning tool and highlight students' emotional journeys from pre-simulation apprehension to post-simulation satisfaction.

The question, *"Was the simulation helpful in your learning?"* elicited overwhelmingly positive responses, with less than half of students confirming its general utility. Specific comments highlighted the role of simulation in improving diagnostic skills, as illustrated by a participant who stated, *"Yes, it helped me to know normal and abnormal."* It aligns with recent findings by **Hansen et al. (2023),** who reported that SBL significantly enhances students' ability to identify clinical abnormalities through hands-on practice. Another participant remarked, *"It helped me in learning how to collect data from patients,"* emphasizing the simulation's reinforcement of practical assessment skills. These responses resonate with **Jensen et al. (2023),** who found that simulations provide a safe environment to practice patient data collection, a critical component of clinical competence.

It aligns with recent literature emphasizing the role of simulation in bridging theoretical knowledge and practical application. **Stokes-Parish et al. (2023)** highlighted that simulation-based learning enhances clinical decision-making and diagnostic accuracy, fostering critical thinking in real-world scenarios. Additionally, the findings support the idea that simulation is an effective medium for practicing complex tasks in a controlled and risk-free environment, as **Foronda et al. (2020) noted.**

Before the Simulation: Anticipation, anxiety, and the duality of emotion: In the lead-up to the simulation, a considerable number of participants reported experiencing fear, anxiety, and tension, highlighting a widespread sense of apprehension about the event. Many students described physical manifestations of stress, such as feeling a *knot in their stomachs* or experiencing elevated heartbeats, underscoring the emotional intensity associated with simulation-based learning. One participant stated, *"I feel worried about making a mistake for the patient,"* reflecting concerns about performance and patient safety. It aligns with **Creighton et al. (2025)** study titled *"Promoting Self-Efficacy of Nursing Students in Academic Integrity*

Through a Digital Serious Game: A Pre/Post-Test Study," which found that performance anxiety is a common challenge due to the high-stakes nature of clinical scenarios.

However, less than one-quarter of students expressed excitement despite the anxiety, indicating that simulations are also perceived as valuable learning opportunities. This duality of fear and anticipation mirrors the findings of **Bahl et al. (2024)**, who examined the implementation of standardized educational programs to improve peripheral vascular access outcomes in emergency departments. Their study emphasized that experiential learning often elicits a mix of emotions, where stress coexists with enthusiasm for skill acquisition.

These findings reinforce the idea that pre-simulation anxiety is a natural response to challenging learning environments. However, it is often balanced by a sense of opportunity and eagerness to apply knowledge. Addressing this emotional spectrum through psychological safety measures, structured pre-briefing, and supportive facilitation can help students transition from anxiety to confidence, ultimately enhancing their simulation experience and overall clinical preparedness.

During the Simulation: Shifts in emotional responses and learning impact. Throughout the simulation, students experienced a range of emotional responses that reflected their engagement and the learning process. More than one-third of participants reported feeling excited, suggesting that the immersive nature of the simulation heightened motivation and enthusiasm for applying their skills in a realistic clinical setting. One participant expressed, *"I felt excited to apply my skills in a real-life setting,"* reinforcing that simulations foster active learning and hands-on engagement. It aligns with **Aamlid and Tveit (2022)**, who explored simulation as a collaborative learning activity in clinical placements, highlighting the interaction between first-year nursing students and qualified nurses as a critical skill development component.

However, the emotional response was not universally positive—more than one-quarter of participants reported nervousness and worry, underscoring the psychological challenges associated with high-stakes learning environments. This finding emphasizes the need for psychological safety, structured debriefing, and constructive feedback to help students manage anxiety and build confidence in their clinical decision-making. **Hansen et al. (2023)** examined the role of simulation-based learning in enhancing diagnostic accuracy in nursing education. Similarly, they emphasized the importance of supportive learning environments to ensure students develop competence and confidence through repeated practice and guided reflection.

The mixed emotional responses observed during the simulation highlight its engaging and stimulating nature and the challenges it presents to students' emotional resilience. While many participants felt excited and motivated, others experienced nervousness and worry, indicating that simulations enhance learning and test students' ability to manage stress in high-pressure environments.

It aligns with **Tyerman et al. (2021)**, who conducted an integrative review of the emotional experiences of nursing students in simulation-based learning. Their findings suggest that simulation scenarios require students to regulate their emotions effectively while applying theoretical knowledge in real-time clinical decision-making. It underscores the importance of providing structured support, psychological safety, and guided reflection to ensure students can navigate simulation-based education's emotional demands while maximizing learning outcomes.

After the Simulation: A shift toward positive emotions and confidence, a notable positive emotional shift was observed following the simulation, with nearly half of the students reporting feelings of comfort and happiness. One participant shared, *"I felt happy and relieved after completing the simulation,"* highlighting the sense of accomplishment derived from overcoming challenges in a controlled clinical environment. Additionally, less than one-quarter of students expressed confidence, reflecting the simulation's role in bolstering self-assurance and preparedness for real-world practice. These findings align with **Abdulmohdi & McVicar (2024)**, whose qualitative research on student nurses' perceptions of high-fidelity simulation revealed that simulation-based learning significantly enhances students' confidence in clinical decision-making.

Post-simulation reflections further demonstrated a widespread shift toward positive emotions, with most students reporting increased confidence, comfort, and satisfaction. This transition from anxiety to confidence highlights simulation-based education's effectiveness in developing emotional resilience and clinical competence. The findings also support **Labrague et al. (2021)**, who examined the role of emotional intelligence and resilience in predicting stress levels among nursing students. Their study found that repeated exposure to simulation-based learning reduces anxiety while progressively building confidence, reinforcing that structured, experiential learning is a powerful tool for improving self-efficacy and stress management in nursing education.

Preferred Simulation Design: Expanding scope and engagement, the responses to the question, *"How would you prefer this simulation to be designed?"* provide valuable insights for enhancing simulation-based learning (SBL). Most students strongly preferred incorporating additional procedures, while less than one-third advocated increased simulation activities. One student stated, *"Having more scenarios would enhance my preparedness for real-life situations,"* reinforcing the argument that scenario diversity strengthens clinical preparedness. It aligns with **Hansen et al. (2023)**, who explored the role of simulation-based learning in improving diagnostic accuracy in nursing education and emphasized that exposure to diverse scenarios better equips students for the varied challenges of clinical practice.

Additionally, less than one-quarter of students requested more time per simulation, highlighting the need for well-paced sessions that allow deeper learning, reflection, and skill reinforcement. This observation is consistent with **Kim et al. (2021)**, whose research on the impact of simulation-based education on nursing students found that more extended and varied simulation sessions significantly enhance students' perceived clinical preparedness.

The demand for more frequent simulation activities aligns with findings from **Barlow et al. (2024)**, which suggest that increased exposure to simulation strengthens skill retention and boosts student confidence. While there was less emphasis on integrating advanced technology, some students expressed openness to innovations such as virtual reality (VR) and augmented reality (AR) simulations. It indicates a potential area for future enhancements, where emerging technologies could complement traditional simulations to enrich the learning experience further.

Bridging theory and practice: The findings affirm that simulation bridges theoretical knowledge and practical application. Educators should incorporate more diverse and complex clinical scenarios to optimize student outcomes, extend simulation durations, and increase hands-on training opportunities. Adapting simulations to include advanced technologies can enhance realism, engagement, and overall learning effectiveness. These recommendations align with

Morgan (2024), who examined the role of Universal Design for Learning (UDL) and Scenario-Based Learning (SBL) in enhancing accessibility and emphasized the need for continuous adaptation of SBL to meet evolving educational needs.

An Evidence Base for the Future (2024) This report highlights the transformative potential of Simulated Practice Learning (SPL) in nursing education. It emphasizes that SPL enhances pre-registration nursing programs by aligning theoretical knowledge with practical skills, particularly in light of updated regulatory standards such as the NMC's *Future Nurse: Standards of Proficiency*. The findings underscore SPL's ability to expand placement opportunities beyond traditional clinical settings and foster essential skills for modern healthcare demands (**Council of Deans of Health, 2024**).

The emotional responses to simulations suggest that while they are highly effective in skill development, students often experience anxiety and apprehension before and during simulations. It underscores the importance of fostering psychological safety within the learning environment. Strategies such as structured pre-briefings, supportive debriefings, and stress management interventions can help mitigate these concerns.

This approach is supported by **Elendu et al. (2024)**, who investigated the impact of simulation-based training in medical education and emphasized that psychological safety is critical for maximizing learning outcomes. **Vaughn et al. (2024)** developed and evaluated the *"Simulation Tool to Enhance Psychological Safety"* (STEPS), a visual intervention designed to improve psychological safety in advanced practice nursing simulations. The study demonstrated measurable improvements in learners' confidence, error management, and engagement through structured implementation.

The findings of this study reinforce the significance of simulation-based learning (SBL) in enhancing nursing students' self-efficacy, clinical performance, and overall competency. By providing a controlled, immersive environment, SBL allows students to apply theoretical knowledge in realistic clinical scenarios, fostering confidence, critical thinking, and decision-making skills. The statistically significant post-simulation improvements highlight its effectiveness in bridging the gap between classroom learning and practical application.

However, despite its evident benefits, challenges such as limited exposure, resource constraints, and the need for long-term evaluation must be addressed to optimize its integration into nursing curricula. Future research should focus on longitudinal studies, comparative analyses with traditional teaching methods, and developing structured reinforcement strategies to ensure sustained knowledge retention and skill mastery. By addressing these aspects, nursing education can further leverage SBL as a transformative tool in preparing competent, confident, and skilled healthcare professionals.

5- Conclusion:

Based on the current study's findings, this study reveals a significant improvement in nursing students' self-efficacy, knowledge acquisition, clinical performance, and overall competency following simulation-based learning (SBL). The results indicate a statistically significant relationship between total knowledge level, total perception of competency level, total performance level, and total self-efficacy level post-simulation-based learning. The study also indicates a highly significant correlation between self-efficacy, satisfaction, and performance. Additionally, it highlights a significant shift in student's ability to remain calm under pressure,

handle clinical challenges, and engage in effective decision-making post-simulation, reinforcing the effectiveness of structured high-frequency simulation training.

6- Recommendations

In light of the findings of this study, the following are recommended:

- **Integration with Real Clinical Practice:** Simulation-based training should be directly linked to clinical rotations to reinforce learning. Allowing students to apply skills learned in simulations in real-world hospital settings.
- **Use of Advanced Technology:** Schools should explore the use of augmented reality (AR), virtual reality (VR), and artificial intelligence (AI)-driven simulations to enhance interactive learning experiences and better prepare students for modern healthcare settings.
- **Faculty Development Programs:** Institutions should provide specialized training for nursing educators on effectively facilitating and evaluating simulation-based learning, ensuring consistency in teaching quality across different instructors.
- **Longitudinal Studies:** Future research should explore the long-term impact of simulation-based learning (SBL). Tracking students' progress beyond the immediate post-simulation phase can help evaluate knowledge retention and skill application in real clinical settings.
- **Diverse Simulation Methods:** Research should investigate the impact of different simulation modalities (e.g., high-fidelity simulations, virtual reality, hybrid models) on student engagement, confidence, and competency development.
- **Faculty Readiness and Training:** Research should explore how instructors' preparedness and training in SBL influence student outcomes. Examining faculty perceptions and challenges in integrating SBL can provide insights into improving teaching strategies.

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