



Perceptions regarding attitude towards simulation-based learning among nursing students in Saudi Arabia: A cross-sectional study

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Abstract

Background: Simulation-based education is essential for preparing nursing students for their professional roles and enhancing their learning experiences and patient care skills. However, there is a gap in understanding how nursing students perceive and engage with simulation-based learning, particularly in the context of Saudi Arabia. This lack of insight limits the ability to develop effective educational strategies.

Objective: This study aimed to evaluate nursing students' perceptions regarding attitudes toward simulation-based learning in Saudi Arabia.

Methods: A cross-sectional study was conducted from December 2023 to February 2024, involving 173 nursing students from a single university. Participants completed a structured questionnaire assessing their attitudes toward simulation-based learning, focusing on its relevance, interprofessional education opportunities, communication, situation awareness, and roles and responsibilities. Descriptive statistics were used to analyze the data. Mann-Whitney and Kruskal-Wallis tests were used to examine correlations between variables, with a significance level of $p < 0.05$.

Results: The study found that 91.3% of participants had a favorable attitude toward simulation-based learning (Median = 4.43, IQR = 4 - 5). Age and grade level significantly influenced attitudes; younger students (under 20 years) had lower scores ($Z = -2.490$, $p = 0.013$), while fourth-year students had higher scores than third-year students, showing a statistically significant difference ($H = 8.573$, $p = 0.014$). Additionally, grade point average (GPA) was a significant factor, as students with GPAs between 5.00 and 4.50 scored higher than those in the 3.74–2.75 range ($H = 25.893$, $p < 0.001$).

Conclusion: The study concluded that nursing students in Saudi Arabia have a generally positive attitude toward simulation-based learning, recognizing its importance in enhancing their educational journey and clinical preparedness. These findings highlight the need to integrate simulation-based pedagogical approaches in nursing education to foster critical thinking and improve communication skills, thereby enhancing patient care outcomes.

Keywords

Saudi Arabia; student attitudes; simulation-based learning; perceptions; nursing education

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Background

Simulation-based learning (SBL) is an educational approach that utilizes simulations to enhance the learning experience. This method has proven effective for teaching skills to students and practitioners in healthcare by simulating clinical settings (Astbury et al., 2021). The nursing education system in universities needs improvement to better prepare nursing students for clinical patient care. Nursing students require education in history taking, physical examination, diagnosis, and management (Joseph et al., 2015). Simulation is a teaching technique that actively engages students, challenging them to utilize critical thinking and clinical

reasoning skills in a safe, controlled environment. It also facilitates reflective learning and helps students consolidate their knowledge (Gharaibeh et al., 2017).

A cutting-edge pedagogical strategy that has dramatically enhanced nursing education is simulation-based learning. With SBL, instructional goals can be met safely without risking actual patients (Alshutwi et al., 2022). This form of education helps train nursing students in clinical and decision-making skills, allowing them to practice in realistic scenarios without endangering patients. SBL can include patient simulators, technology, trained actors, virtual environments, and role-playing. It helps new and experienced nurses develop non-technical skills, prepare for rare emergencies, and experience

a range of realistic clinical situations (Masooth Mohamed, 2023).

Over the past decade, the importance of SBL in nursing has become increasingly apparent. This approach has effectively bridged the gap between theoretical knowledge and practical application. Nursing education strives to enhance students' ability to identify and address patient deterioration. Many universities have included SBL in their nursing curricula to help students develop essential skills, including teamwork, self-evaluation, and critical thinking when working with actual patients (Oh et al., 2015).

Globally, there is a rising demand for training institutions to increase their students' competencies while minimizing the negative consequences of clinical placements. This has led university educators to reconsider how to foster the development of practical clinical skills in effective, safe, and supportive learning environments (Tay et al., 2020). As a result, simulation learning reflects a learner-centered experience that incorporates several components (cognitive, motivational, emotional, psychomotor, and social) and provides realism that is unmatched by traditional teaching methods. Simulation in the classroom is a highly effective teaching approach because it engages students, encourages them to employ critical thinking and clinical reasoning, and prompts reflection on and integration of prior knowledge. Applying theoretical teaching strategies to instruct students in patient management presents significant challenges (AlBalawi et al., 2022). Simulation learning has revealed disparities in communication training, styles, and expectations between nurses and physicians while effectively enhancing communication skills. Practical communication abilities can be improved by understanding students' communication attitudes (Erica et al., 2022).

To benefit from SBL, students must first comprehend its general concepts. This understanding is critical for maintaining their motivation and self-direction throughout the simulation experience. Research indicates that learners often perform better in SBL than in real-life situations because they are more aware of being observed (Alsuwaidi et al., 2021). However, one major challenge in SBL is learners' emotional exposure, which is significant due to students' high emotional and motivational engagement levels. Therefore, analyzing attitudes, beliefs, and perceptions is essential to design an effective practice-based simulated learning environment that addresses these issues (Alsuwaidi et al., 2021).

In Saudi Arabia, the use of simulation as an instructional tool in medical science institutions is gaining popularity. Understanding students' attitudes toward different simulation methodologies is essential for effective implementation. By evaluating their attitudes toward educational simulation, we can gain insights into how they perceive the value and effectiveness of this instructional approach. Additionally, understanding their experiences with simulation will provide valuable information on the benefits and challenges associated with its implementation (Lababidi et al., 2015). Limited research has been published on nursing students' attitudes toward simulation-based learning. Therefore, this study aimed to assess students' perceptions regarding attitudes toward using SBL in Saudi Arabia.

Methods

Study Design

A descriptive cross-sectional study was conducted for this research.

Samples/Participants

Quota sampling was employed to ensure that the sample accurately reflects the diversity of the student population. This non-probability sampling method involves segmenting the population into mutually exclusive subgroups and selecting participants non-randomly to fill predetermined quotas. A power analysis was conducted to determine the appropriate sample size. Given a total population of 251 students, it was calculated that a sample size of 251 would be necessary to achieve a confidence level of 95%. This calculation was based on a Type I error (α) of 0.05 and a Type II error (β) of 0.2, corresponding to a test power of 0.80, ensuring that the study has sufficient power to detect significant effects.

The final sample size for this study comprised 173 nursing student participants. A larger sample size than the minimum required by the power analysis protects against potential attrition, ensuring sufficient statistical power is maintained even if some participants are lost. The majority of participants were female, which aligns with the anticipated outcome, as the first enrollment of male students into the nursing school had only recently begun. Consequently, no male students were enrolled in the internship year at the time of data collection. The recruitment process specifically targeted students with prior experience in simulation-based learning, typically introduced in the program's third year.

Instruments

The researchers developed the tool to evaluate respondents' attitudes toward simulation-based learning. The questionnaire includes sections on demographic information and perceptions regarding attitudes toward simulation-based learning. Each item is rated on a Likert scale from 1 (strongly disagree) to 5 (strongly agree), with higher scores reflecting more positive attitudes.

The instrument development process was completed in five stages: (1) Development of the item pool, (2) Content validity, (3) Face validity, (4) Construct validity of the instrument, (5) Reliability. The initial item pool was created through a comprehensive analysis of relevant literature (Joseph et al., 2015; Sigale et al., 2012; Yeun et al., 2014). Thirty-five items formed the first item pool.

To determine content validity, a panel of five experts in the field of simulation-based learning examined the initial set of items. The experts evaluated the items' comprehensiveness, clarity, and relevance. Their feedback helped refine and modify the item pool. Each expert had an average of five years of experience in simulation-based education. The experts scored each item on relevance, clarity, and comprehensiveness using a 4-point scoring system. The Content Validity Index (CVI) for each item was calculated, with a minimum acceptable CVI of 0.80. A final pool of 30 items was obtained by revising or eliminating items with a CVI of less than 0.80. The Scale-level Content Validity Index (S-CVI) overall score was 0.92, indicating excellent content validity.

The instrument's face validity was evaluated by a panel of 10 learners, who provided feedback on the clarity and relevance of the items.

For construct validity, to achieve sufficient statistical power for factor analysis and reliability testing, data were gathered from a convenience sample of 73 students from different levels for the complete validation research, which was not included in the data collection of the current study. Factor analysis confirmed the hypothesized factor structure, with significant loadings on the expected factors. Additionally, the I-CVI and S-CVI indices were above acceptable levels, demonstrating high content validity. Factor analysis was performed using principal component analysis with varimax rotation. The Kaiser-Meyer-Olkin (KMO) measure, which assesses sample adequacy, yielded a value of 0.91.

Furthermore, Bartlett's test of sphericity was statistically significant ($p < 0.001$), indicating that the data were appropriate for factor analysis. The factor analysis yielded a 5-factor solution, explaining 62.3% of the variance. The factors included: 1) opportunities for interprofessional education (IPE) with seven items and a reliability coefficient of 0.91, 2) relevance of simulation with six items and a reliability coefficient of 0.84, 3) communication with eight items and a reliability coefficient of 0.84, 4) situation awareness with three items and a reliability coefficient of 0.80, and 5) roles and responsibilities with six items and a reliability coefficient of 0.85.

Scores were categorized using Bloom's cut-off point: a score between 4 and 5 points indicated a favorable attitude, a score of less than 4 to 3 points indicated a neutral attitude, and a score of less than 3 points indicated a poor attitude.

Data Collection

Data were collected from December 2023 to February 2024. The researchers used a self-administered survey via Google Forms. The survey's opening page stated the study's purpose, provided recommendations for completing the questionnaire, and emphasized the importance of voluntary participation.

Data Analysis

Descriptive statistics were used to present data, including frequencies and percentages for qualitative variables and means and standard deviations for quantitative variables. The Shapiro-Wilk and Kolmogorov-Smirnov tests were employed to assess whether a variable adhered to a normal distribution. As the assumption of normal distribution was not met, the non-parametric Mann-Whitney test (Z) and Kruskal-Wallis test (H) were utilized. A p -value of less than 0.05 was used to determine statistical significance.

Ethical Considerations

Ethical approval to conduct this study was obtained from the Local Committee of Bioethics (HAP-09-A-043) at Northern Border University (approval No. 69/44/H) on 12 July 2023. After explaining the purpose of the research, the researchers obtained written consent from the participants. Participants were assured that all information would remain confidential and anonymous. They were informed about their right to withdraw from the study until data collection was concluded

without any consequences. If they agreed to participate in the study, they were asked to complete all survey questions to avoid missing data and were encouraged to answer honestly to reflect their accurate perceptions. The researchers emphasized the importance of their responses in contributing to a better understanding of simulation-based learning in nursing education. Additionally, participants were given the option to ask questions or seek clarification about any aspect of the study to ensure they felt comfortable and informed throughout the process. The researchers also provided a brief overview of how the findings would be used to enhance nursing education, reinforcing the significance of their participation in advancing the field.

Results

Table 1 presents the demographic profile of nursing students. The median age was 21 years, with 64.7% ($n = 112$) being 20 years or older. The sample included 127 females (73.4%) and 46 males (26.6%). Most participants were in the fourth year (47.9%, $n = 83$) and lived with their families (91.9%, $n = 159$). In terms of grade point average (GPA), 49.7% ($n = 86$) had GPAs between 5.00 and 4.50, while 37.0% ($n = 64$) had GPAs between 4.49 and 3.75.

Table 1 The demographic characteristics of the nursing students ($N = 173$)

Items	<i>n</i>	%
Age (years)		
<20	61	35.3
≥20	112	64.7
Median (IQR)	21 (20 - 21)	
Gender		
Male	46	26.6
Female	127	73.4
Grade		
Third	65	37.6
Fourth	83	47.9
Internship	25	14.5
Resident		
With family	159	91.9
Alone	10	5.8
Student housing	4	2.3
GPA		
5.00–4.50	86	49.7
4.49–3.75	64	37.0
3.74–2.75	23	13.3

Table 2 presents the median and interquartile range of nursing students' responses regarding their attitudes toward simulation-based learning. The majority of items received a median score of 5, indicating a strong positive attitude, particularly regarding the relevance of simulation for learning alongside other healthcare professionals and the importance of interprofessional collaboration. Items related to communication and roles within teams also received a median score of 5, emphasizing the perceived necessity of effective communication and teamwork in enhancing patient care and safety. Overall, the data suggest that students view simulation-based learning as a valuable tool for developing essential skills in a collaborative healthcare environment.

Table 2 Median and interquartile range of nursing student perceptions regarding their attitude toward SBL ($N=173$)

Items	Median	25th (Q1)	75th (Q3)
Relevance of Simulation			
Simulation is an excellent atmosphere for learning alongside other healthcare professionals.	5	4.00	5.00
Simulation provides chances to change attitudes.	5	4.00	5.00
Practicing teamwork offers opportunities for students to learn about inter-professional roles.	5	4.00	5.00
The experience of learning alongside other healthcare professionals has enhanced my comprehension of their respective roles.	5	4.00	5.00
Simulation is a valuable tool for practicing team decision-making abilities.	4	4.00	5.00
Thoughtful practice can enhance clinical decision-making abilities	4	4.00	5.00
Opportunities for Interprofessional Education			
Working together with other experts is crucial to learning.	5	4.00	5.00
I must prioritize opportunities to learn with other professionals during my education.	5	4.00	5.00
I would like additional chances to study alongside experts.	5	4.00	5.00
My comprehension of clinical problems will increase because of collaborative learning with other team members.	5	4.00	5.00
Opportunities to collaborate in a simulated environment with other professionals can alter attitudes toward teamwork.	4	4.00	5.00
Learning alongside other healthcare specialists before qualification fosters future inter-professional relations.	5	4.00	5.00
The collaboration between different healthcare professionals in learning will enhance patient outcomes.	5	4.00	5.00
Communication			
Every student ought to be taught how to collaborate with healthcare teams.	5	4.00	5.00
Team leaders ought to update their fellow teammates on patients regularly.	5	4.00	5.00
Team leaders ought to encourage members to raise inquiries.	5	4.00	5.00
Technical expertise is not as vital as team communication.	5	4.00	5.00
Team members managing patients' urgent care should speak out loud about what they are doing.	5	4.00	5.00
To ensure understanding, team members should summarize or reiterate instructions.	5	4.00	5.00
Patient safety depends on communication among teamwork	5	4.00	5.00
For a team to work well, members who do not hold the leader position play equally important roles.	5	4.00	5.00
Roles and Responsibilities			
My ability to enhance patient care will be strengthened through feedback from teamwork exercises.	5	4.00	5.00
It is important to monitor the actions taken by each team member to maximize patient safety.	5	4.00	5.00
will improve the comprehension of my role in patient health care by other team members.	5	4.00	5.00
Teamwork skills will enable me to identify the most effective ways to assist my fellow teammates in completing their tasks.	5	4.00	5.00
Members of the team who require help finishing a task should ask for it.	5	4.00	5.00
Practicing teamwork enables role flexibility in emergencies.	5	4.00	5.00
Situation Awareness			
Regardless of who might be impacted, I will communicate if I see a problem.	5	4.00	5.00
Patient care is significantly enhanced when every team member shares a comprehensive understanding of both assessment and treatment protocols.	5	4.00	5.00
Team leaders should frequently summarize patient findings to keep team members informed.	5	4.00	5.00

Table 3 displays the frequency of nursing students' responses regarding their overall attitude toward simulation-based learning. A significant majority of students expressed a favorable attitude across all categories, with 89.6% ($n = 155$) supporting the relevance of simulation and 91.3% ($n = 158$) endorsing roles and responsibilities within a team. In terms of opportunities for interprofessional education, 87.9% ($n = 152$)

held a favorable view. The median scores for the relevance of simulation, opportunities for interprofessional education, communication, roles and responsibilities, and situation awareness were all between 4.33 and 4.57, indicating a generally positive perception. Overall, 91.3% ($n = 158$) of students reported a favorable attitude toward simulation-based learning, with a median score of 4.43.

Table 3 Description of perceptions of attitude towards SBL ($N=173$)

Items	Poor attitude		Neutral attitude		Favorable attitude		Median (IQR)
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Relevance of Simulation	1	0.6	17	9.8	155	89.6	4.33 (4 - 5)
Opportunities for Interprofessional Education	1	0.6	20	11.6	152	87.9	4.57 (4 - 5)
Communication	1	0.6	16	9.2	156	90.2	4.5 (4 - 5)
Roles and Responsibilities	1	0.6	14	8.1	158	91.3	4.5 (4 - 5)
Situation Awareness	0	0	21	12.1	152	87.9	4.33 (4 - 5)
Total Score	0	0	15	8.7	158	91.3	4.43 (4 - 5)

Table 4 shows the relationship between demographic characteristics and the total score of the perception regarding

attitude toward simulation-based learning. The results indicate a significant difference in attitudes based on age, with younger

students (under 20 years) having a median score of 4.20 compared to 4.65 for those 20 years and older ($Z = -2.490$, $p = 0.013$). Additionally, grade level influenced attitudes; third-year students had a median score of 4.13, while fourth-year and internship students scored higher at 4.73 and 4.63, respectively ($H = 8.573$, $p = 0.014$). Gender and living situation

did not show significant differences in attitudes, with males scoring a median of 4.80 and females 4.39 ($Z = -1.233$, $p = 0.218$). GPA also had a notable impact, as those with GPAs between 5.00 and 4.50 had a median score of 4.63, compared to 3.24 for those in the 3.74–2.75 range ($H = 25.893$, $p < 0.001$).

Table 4 Relation of demographic characteristics and perceptions of attitude towards SBL ($N = 173$)

Variable	Total Attitude of Simulation-Based Learning			Z/H test value	p-value
	Median	IQR			
		25th (Q1)	75 th (Q3)		
Age (years)					
<20	4.20	3.83	4.87	Z = -2.490	0.013*
≥20	4.65	4.00	5.00		
Gender					
Male	4.80	4.00	5.00	Z = -1.233	0.218
Female	4.39	4.00	4.97		
Grade					
Third	4.13	3.78	4.87	H = 8.573	0.014*
Fourth	4.73	4.00	5.00		
Internship	4.63	4.085	5.00		
Resident					
With family	4.40	4.00	5.00	H = 1.784	0.410
Alone	4.77	4.49	4.86		
Student housing	4.63	4.20	5.00		
GPA					
5.00–4.50	4.63	4.03	5.00	H = 25.893	<0.001*
4.49–3.75	4.51	4.00	5.00		
3.74–2.75	3.24	3.00	4.43		

Note. *Significant level at $p < 0.05$

Discussion

Simulation-based education is vital for preparing nursing students for their professional careers. It enhances the learning experience and positively impacts patient care by providing a safe and engaging environment for skill development. This educational approach is particularly beneficial for practicing skills that cannot be performed on actual patients due to practical and ethical considerations. Research indicates that simulation-based clinical education effectively equips nursing students with the necessary competencies (Kim et al., 2016), and its adaptability to various clinical content is essential for producing quality nurses (Mishra & Trivedi, 2023).

In this study, we assessed the attitudes and perceptions of 173 Saudi nursing students toward SBL. The results revealed that students were generally satisfied with SBL, expressing positive views about its benefits for education and teamwork. This finding aligns with AlBalawi et al. (2022), who noted that students perceive simulation as a valuable strategy that fosters a positive learning atmosphere and encourages collaboration.

Students recognized the relevance of simulation as a teaching strategy that facilitates learning alongside other healthcare professionals. They acknowledged that practicing teamwork enhanced their understanding of interprofessional roles and improved decision-making skills, which likely increased their motivation and retention of information. This is supported by El Naggar and Almaeen (2020), who found that simulation-based learning enhances clinical decision-making, communication with patients, and material retention. Mascarenhas et al. (2021) also noted that SBE interventions

positively influenced students' attitudes, promoting empathy and communication with patients.

Our study further explored students' beliefs about communication and teamwork, highlighting the importance of encouraging inquiries and effective communication for patient safety. Previous research by Hsu et al. (2015) emphasized that simulation-based training improves nurses' communication skills in clinical settings, while Gelis et al. (2020) found simulations to be particularly effective for teaching interpersonal skills.

Regarding interprofessional education (IPE) opportunities, participants valued collaboration and teamwork in learning, recognizing its role in enhancing understanding of clinical situations and improving patient outcomes. This is consistent with studies (Granheim et al., 2018; Labrague et al., 2018), which demonstrated that interprofessional simulation in nursing programs increases students' self-confidence, satisfaction, teamwork, and communication skills.

Our findings also indicated that students appreciated how simulation-based learning clarified their responsibilities and teamwork abilities. They strongly committed to situational awareness and effective communication, aligning with AlBalawi et al. (2022), who emphasized SBL's role in fostering collaboration among health science students. A study by Bø et al. (2022) similarly reported increased knowledge and confidence among students after participating in simulation-based education.

The current study revealed that a majority of students (89.6%) had a favorable attitude toward the relevance of simulation, and 87.9% appreciated the opportunities for interprofessional education. These findings resonate with El Naggar and Almaeen (2020), who concluded that simulation-

based learning enhances professionalism and medical knowledge in a safe environment. Mascarenhas et al. (2021) also found that SBL improved students' attitudes regarding professionalism and professional identity development.

Regarding demographic factors, students aged 20 or older had higher attitude scores, with a statistically significant difference noted between age groups ($p \leq 0.05$). This could be attributed to greater experience and maturity among older students. While male students scored higher than females, no significant difference in attitudes was observed between genders, contradicting Joseph et al. (2015), who found that age had little effect on attitudes toward SBL and that female students held more favorable views ($p = 0.04$).

Additionally, fourth-year students had higher attitude scores compared to third-year students, which is statistically significant ($p \leq 0.05$). This suggests that attitudes toward simulation-based learning may improve with increased experience. Lee and Park (2020) found similar results, indicating that student perspectives on SBL differ based on grade level.

Our findings also indicated that students with GPAs in the range of 5.00–4.50 had more favorable attitudes, with a significant difference observed across GPA ranges ($p \leq 0.05$). This supports previous findings by AlBalawi et al. (2022), who identified GPA as a key factor influencing attitudes toward SBL. High-achieving students often view simulations as beneficial, reinforcing their effectiveness in learning.

Implication for Nursing Practice and Education

This study's findings have significant implications for nursing practice and education, highlighting the importance of integrating simulation-based learning into nursing curricula. By recognizing the positive attitudes of nursing students toward simulation, educators can design and implement more effective training programs that enhance critical thinking, communication skills, and teamwork among future healthcare professionals. This approach not only prepares students for real-world clinical scenarios but also fosters a deeper understanding of interprofessional collaboration, leading to improved patient care outcomes. As nursing education evolves, it is essential to ensure that simulation experiences meet the diverse needs of students, enhancing their confidence and competence in clinical practice. Prioritizing simulation-based education will better equip nursing students to navigate the complexities of modern healthcare environments.

Limitations

This study was conducted at a single university, which may limit the generalizability of its findings. Future research should explore nursing students' perceptions regarding attitudes toward simulation-based learning across various institutions. Additionally, the cross-sectional design captured students' perceptions at a specific time rather than over an extended period. Longitudinal studies could provide more comprehensive insights into students' evolving attitudes and perceptions. Studies should also be conducted to assess the relationship between nursing students' attitudes toward simulation-based learning and their clinical competence, particularly comparing high-fidelity and low-fidelity simulations. Cross-cultural studies could enhance understanding of how

cultural beliefs and educational backgrounds shape students' engagement and learning outcomes in simulation environments.

Conclusion

This study concluded that participants held a satisfactory attitude toward SBL. The findings indicate that students valued SBL as an effective educational strategy, enhancing their competence and preparedness for practical skills. The results emphasize the role of simulation in fostering critical thinking, boosting students' confidence, and bridging the gap between theoretical knowledge and clinical practice. Furthermore, they highlight the importance of incorporating simulation-based pedagogical approaches in undergraduate nursing education.

Declaration of Conflicting Interest

The authors have declared no conflict of interest.

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Authors' Contributions

Fatma Abdou Eltaib contributed to the conception of the study and wrote the manuscript. Fadiyah Jadid Alanazi was responsible for the study design and article review. Fathia Ahmed Mersal contributed to data analysis and results. Taghreed Hussien Aboelola contributed to data collection. All authors approved the article's final version to be published and were accountable for each step of the study.

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Data Availability

The dataset generated during and analyzed during the current study is available from the corresponding author upon reasonable request.

Declaration of Use of AI in Scientific Writing

There is nothing to declare.

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