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Correlations and predictors of nursing simulation among Saudi students

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Abstract

Background: In middle eastern countries, most nursing colleges use simulation-based learning activities. However, Saudi nursing students' correlators and predictors for simulation learning have been underreported.

Aim: This study investigated the variables that correlate to and predict Saudi nursing students' simulation learning competencies.

Methods: A descriptive cross-sectional design guided this study's understanding of simulation learning among nursing students ($n = 461$). We used three National League of Nursing instruments to collect data: the 13-item student satisfaction and self-confidence in learning scale (SCLS), 20-item simulation design scale (SDS), and 16-item educational practices questionnaire (EPQ). We applied analysis of variance, t tests, χ^2 tests, and linear regression to analyze the data.

Results: The SCLS and EPQ revealed significant differences in the participants' year level, gender, fidelity of simulation experience, number of nursing courses with simulation, and grade point average (GPA). Only GPA was insignificant in SDS. The number of nursing courses with simulations and GPA were significant predictors of the three instruments. Finally, year level and gender were important predictors of SDS and SCLS, respectively.

Conclusion: Our findings explain Saudi students' experiences of simulations in nursing education. Simulation is an important pedagogical approach that enhances students' achievements when implemented in nursing schools.

KEYWORDS

nursing simulation, nursing students, predictors, simulation learning

1 | INTRODUCTION

The National Council of State Boards of Nursing (NCSBN) defines clinical simulation as "an operation or experience that replicates clinical procedure [by] utilizing scenes, high-fidelity manikins, medium-fidelity manikins, standardized patients, role acting, skills stations, and computer-based strategic thinking simulations."[1] Clinical nursing education has been impacted by profound changes in clinical placements, patient health challenges, and students' direct experiences with health treatment and opportunities to handle problem-based clinical conditions, as it seeks to help students improve their problem-solving abilities by integrating academic knowledge from books with the expertize of real-life scenarios.[2] Therefore, the valuable alternative that has shown to enhance these skills is simulation.[3–5] Simulation is utilized in a range of settings, including clinical education, medical treatment in clinics, and improving the competencies of staff nurses.[6] According to a report released by the

NCSBN,[1,7] high-quality simulation settings will substitute up to 50% of typical clinical hours in prelicensure nursing programs.

Despite its popularity and prominence of simulation as one of the most effective methods for teaching nursing concepts in many healthcare settings and nursing schools globally,[8–11] only a few reported studies have been conducted on simulation among Saudi nursing students. One such study finds that simulation helps nursing students learn the requisite clinical knowledge and expertize that they then practice in a healthy and supervised atmosphere.[12] Moreover, Kaliyaperumal et al.[12] assert that simulation teaching could improve Saudi nursing students' satisfaction and self-confidence with their studies, resulting in high-quality healthcare and patient safety in actual clinical settings. Aljohani et al.[13] find that simulation offers a realistic, risk-free learning experience for Saudi nursing students and educators. Additionally, Al Najjar[14] observes that team-based learning, when combined with high-fidelity simulation, increases test scores among Saudi nursing students enrolled in a pediatric nursing course.

1.1 | Literature review

Simulation, as a learning tool, simulates real-life experiences to promote, enhance, and measure a learner's progress.[15] In nursing education, simulation promotes the use of modeling and repetitive practice to foster clinical reasoning and skill acquisition.[6] This study is guided by David A. Kolb's[16] *Experiential Learning Theory*. This theory involves four stages: (1) concrete experience, which enables learners to participate openly, without prejudice towards new experiences; (2) reflective observation, which allows learners to reflect on and observe their experiences from diverse perspectives; (3) abstract conceptualization, which permits learners to create concepts that integrate their observations into logically sound theories; and (4) active experimentation, which allows learners to use these theories to take decisions and solve problems.[16] All four phases are interconnected, and Kolb believes that throughout the learning phase, students establish four learning styles, making experiential learning a comprehensive learning method.[16] Experiential learning may require the learner to use all four stages; however, certain learners prefer one stage for problem solving and have the option to use some or more of the four stages to solve the given problems or exercises.[16] Other theories embedded in this study are of cognitivism that underscores learning, which is correlated to distinct adjustments in knowledge states, rather than fluctuations in result probabilities.[17] The theory of behaviorism states that learning is complete when an actual reaction is seen in response to changes to a given sensory input.[17] The positivism theory asserts that knowledge is produced by using a scientific method.[17]

Simulation designs provide a variety of structured activities that illustrate actual or potential scenarios of clinical nursing practice and enable nursing students to strengthen their skills, knowledge, and attitude by requiring them to objectively adapt to realistic clinical scenarios.[18] Therefore, it improves critical thought abilities, listening skills, and expertize in treating patients and their families.[19] When a nursing faculty provides a secure simulated educational environment, the setting creates unique clinical situations in which students can engage in systematic preparation that advances ability learning and sound clinical judgment.[20] Globally, simulation is a common pedagogical method in nursing education[21] and healthcare systems.[22] It has been used in nursing baccalaureate courses to meet learning objectives.[23] Nursing students exposed to simulation-based instruction had higher self-reported clinical critical thinking than those who were exposed to lecture-based instruction.[24] Simulation also improved their self-confidence, care abilities, expectations of competence, self-efficacy, and learning satisfaction.[25,26]

One of the most popular terms used to describe simulation is *fidelity*, which refers to how strongly a simulation environment resembles or mimics life.[27] Low fidelity simulation is the first type of simulation, which may include an intravenous (IV) arm or cardiopulmonary resuscitation (CPR) manikins.[27] The second type is mid-fidelity, which helps people learn new skills, such as full-body manikins with breath patterns, bowel sounds, and heartbeat tones.[27] Finally, high-fidelity is the most realistic type.[27] This simulation is highly realistic and engaging. Many students can engage with manikins and pre-programmed scenarios can be used.[28]

Simulation in nursing education for Saudi Arabia is scarce in literature. Saudi nursing simulation studies focus on evaluating simulation-based instructions to conventional teaching,[29] coordination problems during simulation,[30] and simulation awareness during advanced cardiac life support.[13] However, no studies have been published on the correlations and predictors of simulation learning among Saudi nursing students, to our knowledge. Therefore, this study's purpose is to assess the correlations and predictors that influence student satisfaction and self-confidence in simulation learning, their perception of the simulation design, and the process of instruction in nursing simulations. Furthermore, we identify the variables that predict Saudi nursing students' learning simulation competencies.

2 | MATERIALS AND METHODS

2.1 | Research design

A descriptive, cross-sectional design was conducted to determine: (1) nursing students' satisfaction and self-confidence in simulation learning, (2) nursing students' perceptions of the simulation design and instruction process, and (3) correlations and predictors of nursing students' simulations.

2.2 | Setting and participants

The study was conducted in a state university's College of Nursing (female and male branches) in north-central Saudi Arabia. The college was established in 2005. During the study, 579 students were

enrolled in the study setting. Of these, 58 were included for the pilot test, resulting in 521 participants. A total of 487 completed survey forms were obtained, with 461 (88%) considered error-free, and which were then analyzed following careful review and assessment. The eligibility criteria for the nursing students included: (1) enrolled in the study setting's nursing program during the second semester of the academic year 2020–2021; (2) enrolled in the second to fourth year levels; (3) attended nursing courses with simulation; and (4) provided full permission to participate. The exclusionary criterion was nursing students in their fifth year (internship).

2.3 | Ethical considerations

The Institutional Review Board (IRB) of a state university in Saudi Arabia's north-central region approved this study. The study plan and supporting materials were sent to the University Ethics Committee, and approval number H-2021-010 was obtained.

2.4 | Instruments

Three instruments relating to self-confidence, scenario design, and educational practices associated with the simulation were utilized. These were published by the National League for Nursing (NLN). The first instrument is the 13-item student satisfaction and self-confidence in learning scale (SCLS).[31] In a "satisfaction with instruction" subscale, five items assess satisfaction with instructional methods, diversity of learning opportunities, facilitation, motivation, and general suitability of simulation. Eight items assess the "self-confidence with learning" subscale for self-confidence in content mastery, subject requirement, ability growth, accessible tools, and awareness about how to get assistance with health issues in simulations. The scale is rated on a Likert scale, with choices ranging from 5 (*strongly agree*) to 1 (*strongly disagree*).[31] The Cronbach's alpha score for the instrument is 0.94 (satisfaction with instruction subscale) and 0.87 (self-confidence subscale) indicating high reliability.[31]

The second instrument is the simulation design scale (SDS), with 20-items that evaluates simulation objectives, information, support, problem solving, feedback, and fidelity expectations.[31] It is divided into five subscales: objectives and information (five items measuring perceptions of objectives, preparation materials, and cues during simulation), support (four items measuring perceptions of need for support and provision of support), feedback (four items measuring constructive feedback and opportunities for guided reflection, problem solving (five items measuring facilitation and opportunities for problem solving), and fidelity (two items measuring real-life factors).[31] These are also rated on a Likert scale of 5 (*strongly agree*) to 1 (*strongly disagree*), with a Cronbach's alpha score of 0.92 for feature inclusion and 0.96 for interface aspect significance, both indicating high reliability.[31]

The third instrument is the educational practices questionnaire (EPQ), which comprises of 16-items that assess expectations of the presence and significance of educational best practices in simulation.[31] Each item describes the perceptions of participants regarding existence of educational best practices with four subscales: productive learning (10 items measuring opportunities for active learning and participation in simulation), collaboration (two items about working together with peers), learning diversity (two items that assess the possibilities for learning information), and strong anticipation (two items that asked for participants' simulation goals and aspirations).[31] The response options and score meanings were the same as for the SCLS and SDS. The Cronbach's alpha score for presence of the educational best practices scale was 0.86, and 0.91 for the importance of best practices incorporated in simulation, both indicating high reliability.[31]

The correct procedure was implemented for translating and adapting the three instruments' original versions.[32] Three language experts associated with the study setting translated from English to Arabic. The reliability of the instrument was ensured by a forward-backward translation. The instrument was further tested by three expert researchers from the College of Nursing, who were fluent in both Arabic and English. The translated version of the instruments were pilot tested with a small fraction of the sample (58 students [10%]) to check for errors and inconsistencies.[33] Out of these, only 38 usable instruments were retrieved. The Cronbach's alpha score for the three instruments was 0.79, indicating high reliability.

2.5 | Data collection

Google forms were used to collect data from February 10 to March 20, 2021. This ensured that no face-to-face contact took place in compliance with COVID-19 regulations. The participants' individually registered emails were used to send the questionnaire forms. The survey stated that participation was voluntary, indicating that by sending back the filled forms they gave permission. No identities were used in the form to ensure that responses remained anonymous. Email and *WhatsApp* were used to remind participants every 3–4 days to complete the survey. *WhatsApp* is a free multi-platform messaging application that allows users to make video and voice calls or send text messages when there is internet connectivity. The Google form survey was then tabulated and prepared, for statistical analysis.

2.6 | Data analysis

The data were analyzed using IBM Statistical Package for Social Sciences (SPSS) version 27.0. The demographic profiles were presented using descriptive statistics. The response differences for participants of the SCLS, SDS, and EPQ (when grouped according to profile variables) were determined using analysis of variance (or Kruskal–Wallis test, as applicable) and a t test (or Mann–Whitney U test, as applicable). The χ^2 test was used to determine whether two categorical variables were related. The SCLS, SDS, and EPQ predictors were identified using linear regression analysis.

TABLE 1 Demographic profile of participants ($n = 461$)

Profile variables	Frequency distribution	Percentage distribution
Year level		
2nd year	185	40.1
3rd year	140	30.4
4th year	136	29.5
Gender		
Male	199	43.2
Female	262	56.8
Fidelity of simulation experience		
Low to mid	132	28.6
Mid to high	218	47.3
High only	18	3.9
All types of fidelity	93	20.2
Number nursing courses with simulation		
<3	90	19.5
>3	371	80.5
Grade point average (GPA)		
D+/D	11	2.4
C+/C	98	21.3
B+/B	191	41.4
A+/A	161	34.9

3 | RESULTS

3.1 | Demographic profile

This study included 461 participants. They were distributed according to their demographic profiles (Table 1). Second-year students accounted for the largest percentage (185 students, 40.1%), while fourth-year students were the lowest (136 students, 29.5%). There were more females (56.8%) than males (43.2%). Most participants had a simulation experience ranging from low to high fidelity. A total of 371 (80.5%) participants had more than three nursing courses with simulation, and about three-quarters of participants had a grade point average (GPA) of B+/B (41.4%) to A+/A (34.9%).

3.2 | Comparison of the NLN scale scores as per demographic profiles

Table 2 shows the comparison of the overall NLN SCLS, SDS, and EPQ to the participants' demographic profiles. There was a statistically significant difference in the overall SCLS score by year ($p = 0.006$). As the year level increased, the overall SCLS scores decreased. There was also a statistically significant difference in the overall SCLS scores by gender ($p = 0.03$). Females had slightly higher average NLN SCLS scores than males, with median scores of 4.31 and 4.23, respectively. Furthermore, simulation's fidelity had a significant impact on the overall SCLS scores ($p = 0.0001$). Consequently, there was a significant variability in the overall SCLS scores based on the number of participants who attended nursing courses with simulation ($p = 0.007$). Participants with less than three courses had significantly higher SCLS scores overall than those with more than three courses, with mean scores of 4.31 and 4.21, respectively. Additionally, there was a significant difference in the overall SCLS scores for GPA ($p = 0.0001$). Those with a GPA of B+/B had the maximum overall SCLS scores, whereas those with a GPA of A+/A had the lowest overall SCLS scores (mean ranking of 4.33 and 4.07, respectively).

Based on various demographic profiles for the SDS ranking, average results per year show a statistically significant difference ($p = 0.0001$). Total scores decreased as the year level increased. There was also a statistically significant difference in the overall scores per gender ($p = 0.0001$). Males ranked slightly higher than females, with median scores of 4.25 and 4.05, respectively. In addition, there was a substantial variation in the overall SDS ratings, based on simulation fidelity ($p = 0.04$). There was also significant heterogeneity in ratings based on the number of nursing courses with simulation ($p = 0.0001$). Participants with less than three courses had significantly higher overall SDS scores than those with more than three courses, with median scores of 4.40 and 4.05, respectively.

The EPQ scores were based on various demographic profiles. There was a statistically significant difference in overall score per year ($p = 0.01$). As the year level increased, a decreasing pattern in the overall EPQ ratings was observed. There was also a statistically significant difference in average scores per gender ($p = 0.04$). Males scored slightly higher on the average EPQ than females, with mean scores of 4.23 and 4.17, respectively. In addition, simulation practice fidelity had a significant impact on the overall scores ($p = 0.001$). Furthermore, there was great disparity in the overall EPQ ratings based on the number of nursing courses with simulation of the participants ($p = 0.0001$). Participants with less than three courses had significantly higher scores overall than those with more than three courses, with median scores of 4.31 and 4.13, respectively. Furthermore, there was a substantial gap in the overall EPQ scores for GPA ($p = 0.0001$). Those with GPAs of C+/C and B+/B had the maximum overall EPQ scores, whereas those with a GPA of A+/A had the lowest overall EPQ scores (mean ranking of 4.24 and 4.12, respectively).

3.3 | Predictors of NLN simulation scales

The multivariate regression that identified predictors of the three NLN scales is shown in Table 3. After regression analysis, the profiles of gender ($p = 0.006$), number nursing courses with simulation ($p = 0.0001$), and GPA ($p = 0.0001$) were observed as significant

TABLE 2 Comparison of the NLN scale scores as per demographic profiles ($n = 461$)

Profile variables	SCLS Mean ± *SD*	*p* Value*	SDS Mean ± *SD*	*p* Value*	EPQ Mean ± *SD*	*p* Value*
Year level						
2nd year	4.29 ± 0.31 (4.31)		4.20 ± 0.29 (4.25)		4.24 ± 0.28 (4.25)	
3rd year	4.21 ± 0.28 (4.23)	0.006 (S)[a]	4.07 ± 0.26 (4.10)	<0.0001 (S)[a]	4.20 ± 0.31 (4.19)	0.01 (S)[a]
4th year	4.16 ± 0.41 (4.21)		4.10 ± 0.32 (4.10)		4.14 ± 0.38 (4.13)	
Gender						
Male	4.18 ± 0.36 (4.23)		4.21 ± 0.30 (4.25)		4.23 ± 0.32	
Female	4.26 ± 0.31 (4.31)	0.03 (S)[b]	4.07 ± 0.27 (4.05)	<0.0001 (S)[c]	4.17 ± 0.32	0.04 (S)[c]
Fidelity of simulation experience						
Low to mid	4.34 ± 0.30 (4.38)		4.18 ± 0.30		4.25 ± 0.28	
Mid to high	4.07 ± 0.33 (4.08)	<0.0001 (S)[a]	4.09 ± 0.31	0.04 (S)[d]	4.14 ± 0.33	0.001 (S)[d]
High only	4.34 ± 0.29 (4.42)		4.14 ± 0.27		4.24 ± 0.36	
All types of fidelity	4.40 ± 0.24 (4.38)		4.15 ± 0.26		4.26 ± 0.32	
Number of nursing courses with simulation						
<3	4.31 ± 0.33		4.39 ± 0.15 (4.40)		4.33 ± 0.24 (4.31)	
>3	4.21 ± 0.34	0.007 (S)[c]	4.07 ± 0.29 (4.05)	<0.0001 (S)[b]	4.17 ± 0.33 (4.13)	<0.0001 (S)[b]
Grade point average (GPA)						
D+/D	4.20 ± 0.25		4.02 ± 0.20		4.18 ± 0.26	
C+/C	4.30 ± 0.30	<0.0001 (S)[d]	4.10 ± 0.28	0.30 (NS)[d]	4.24 ± 0.32	<0.0001 (S)[d]
B+/B	4.33 ± 0.31		4.14 ± 0.27		4.24 ± 0.31	
A+/A	4.07 ± 0.34		4.15 ± 0.32		4.12 ± 0.33	

Note: Values in parenthesis are median scores. *$p > 0.05$—not significant (NS); $p \leq 0.05$—significant (S).

Abbreviations: ANOVA, analysis of variance; EPQ, educational practices questionnaire; NLN, National League of Nursing; SCLS, self-confidence in learning scale; SDS, simulation design scale.

[a]Kruskal–Wallis test.

[b]Mann–Whitney *U* test.

[c]T-test.

[d]ANOVA.

predictors of the SCLS scale. In terms of the SDS scale, the profile year level ($p = 0.007$), number of nursing courses with simulation ($p = 0.0001$), and GPA ($p = 0.004$) were significant predictors. Finally, the number of nursing courses with simulation ($p = 0.0001$) and GPA ($p = 0.004$) were significant predictors of the EPQ scale.

4 | DISCUSSION

Most students reported that simulation was more engaging than conventional modes of learning.[34] When the year level increased, the overall SCLS, SDS, and EPQ scores declined, and participants with less than three simulation courses had significantly better SCLS, SDS, and EPQ scores than those with more than three courses. Three theories can be used to explain and support these findings: cognitivism, positivism, and behaviorism.

The cognitive theory of learning suggests that the mind searches for significance in experiences. Knowledge assertions encourage, cause issues, or adjust direction. The level of interest and curiosity decreases when an operation is repeated. If the same acts are replicated at various times, they no longer elicit the same level of curiosity in learning as they did at the outset.[35] Our study confirms these findings. When student nurses reached higher year levels, and the same simulation was repeated, their interest levels decreased, despite complexities and without new additional procedures. A classic positivist thinker, Feigl[36] asserted that there are integral parts of education that shape educational processes and establish learning outcomes. Therefore, learners value only certain procedures that they need, such as in simulation, where they are selective about the procedures to study and master.[36] Our study confirms that students become selective of procedures, based on their needs. Thus, they only retain what they believe they need for a particular

TABLE 3 Predictors of NLN simulation scales ($n = 461$)

Profile variables	SCLS β	SCLS SE	SCLS 95% CI	SCLS *p* Value	SDS β	SDS SE	SDS 95% CI	SDS *p* Value	EPQ β	EPQ SE	EPQ 95% CI	EPQ *p* Value
Year level	0.023	0.026	−0.028 to 0.075	0.37 (NS)	0.059	0.022	0.016 to 0.101	0.007 (S)	0.032	0.026	−0.018 to 0.082	0.214 (NS)
Gender	0.104	0.038	0.030 to 0.178	0.006 (S)	−0.039	0.031	−0.100 to 0.022	0.211 (NS)	−0.035	0.037	−0.108 to 0.037	0.336 (NS)
Fidelity of simulation experience	0.016	0.017	−0.018 to 0.050	0.36 (NS)	0.024	0.014	−0.004 to 0.052	0.099 (NS)	0.012	0.017	−0.021 to 0.045	0.471 (NS)
Number of nursing courses with simulation	−0.309	0.058	−0.423 to −0.194	<0.0001 (S)	−0.428	0.048	−0.523 to −0.334	<0.0001 (S)	−0.265	0.057	−0.377 to −0.153	<0.0001 (S)
GPA	−0.135	0.024	−0.182 to −0.088	<0.0001 (S)	−0.057	0.020	−0.095 to −0.018	0.004 (S)	−0.114	0.023	−0.159 to 0.068	<0.0001 (S)

Note: $R^2 = 0.140$ adjusted $R^2 = 0.131$.

Linear regression analysis.

Not significant (NS), significant (S).

Abbreviations: CI, confidence interval; EPQ, educational practices questionnaire; GPA, grade point average; NLN, National League of Nursing; SCLS, self-confidence in learning scale; SDS, simulation design scale.

situation in simulation. Thorndike[37] proposed that reinforcing the stimulus-response relation is the root of learning, in the theory of behaviorism. Any acquired behaviors will eventually cease if they are not reinforced.[37] When student nurses were promoted to higher levels, their interest in simulations ceased if the current course did not reinforce the original simulation procedure. Potential explanations for these findings are the study setting's nursing program curriculum and that most nursing courses use simulation in the second- and third-year levels. Most foundation subjects have incorporated many nursing procedure simulations in these years. As students' progress through the program, the courses become more focused on the "major courses." The procedures learned at earlier levels may only need to be recalled or reinforced, rather than performed. Thus, the focus is on specific procedures of the major nursing courses (e.g., mental health nursing practice subjects that are needed to integrate specific procedures, such as restraints and electroconvulsive therapy). Therefore, student satisfaction, understanding of simulation practices, and appraisal of simulation design features for teaching and learning methodologies also decrease.

In our study, males had higher scores on both SDS and EPQ, while females scored higher in the SCLS. In contrast to Liu's findings,[38] females had a higher score on the depression vignette instrument during their mental health nursing simulation. Specifically, they had higher scores in the use of vitamins as intervention in the depression vignette, resulting in their significantly higher confidence and satisfaction for this part of the simulation.[38] A gap was observed between male and female viewpoints in clinical education, with females being more interested in the complex dimensions of clinical simulation, while men were more detail-oriented.[39]

In our study, as the year level increased, students' SCLS, SDS, and EPQ scores decreased. This finding is contrary to the prepandemic study conducted by Aljohani et al.[13] on CLS simulation. As revealed by the predictor posttest scores, fourth year students had higher CLS simulation awareness than third year students.[13] This may be influenced by curriculum differences, socio-cultural backgrounds, educational achievements, and the challenges of implementing simulations during the COVID-19 pandemic in the study setting.

The study by Kim et al.[21] contradicts our results by showing a positive correlation between the three instruments (SCLS [$p = 0.0001$], SDS [$p = 0.04$], and EPQ [$p = 0.001$]) and participants' simulation fidelity experience. However, our findings are supported by Au et al.[40] and Pinar et al.[41] According to Kim et al.,[21] the degree of simulation fidelity used has no influence on the effectiveness of simulation teaching. According to them, the true measure of simulation's usefulness is in appropriate level of use to accomplish each instructional goal and outcome.[21] Contrarily, students prefer high fidelity simulation (HFS) over other levels of fidelity,[40] and over usual practice setting, while increasing resourcefulness.[40] Pinar[41] confirmed these results, reporting that the students' simulation experience had a positive impact on their overall learning perception. HFS has been shown to increase nursing student self-confidence and minimize anxiety when caring for patients and/or utilizing nursing skills.[42] It gives students a learning experience that allows for information

enhancement, skill creation, protection, and confidence.[43] However, limitations in the utilization of HFS include lack of instruction, restricted access, and learning transferability.[44]

Across the three instruments, the number of nursing courses with simulation and GPA were significant predictor variables. Gaps were noted among these profile variables as predictors of the three instruments. Year levels can only predict SDS, whereas gender only predicts SCLS. Interestingly, fidelity simulation experience had no predictive ability. These gaps in the variables' predictive abilities may be attributed to nursing students' assimilation of learning experiences during the simulation.

Although students' talents and aptitudes played a role in their academic success, their learning styles often played a more decisive role. This explains why students with an A+ or A GPA had lower appraisal of the simulation design features, practices, and satisfaction measured by the SDS, EPQ, and SCLS, respectively, compared to those with a B+/B or even a C+/C GPA. According to Kolb,[16] learning should be seen as a method rather than a sequence of results, since it necessitates the resolution of differences between dialectically conflicting modes of world adaptation and is a systemic process of adaptation.[45] A systematic process of adaptation is described as a learner's willingness to adopt a process to acquire new experiences.[46] The learner comprehends the procedures in reaction to external adjustments within the learning environment, which may operate as learning obstacles or facilitators.[46]

More simulation courses increase students' satisfaction and understanding of simulation. The abovementioned theories that support our findings are behaviorism, where a behavior that is consistently repeated can enhance learner retention;[17,37] and positivism, where if other learning methodologies support the learning process and its complexities, the learning will be reinforced for the students.[17,36] Finally, a study of Saudi nursing students' preferred learning styles revealed visual, responsive, and sequential style preferences.[47] The study concluded that ethnicity, academic achievement, and previously earned grades are not correlated with learning preferences, which is compatible with our findings.[47]

This study will help Saudi nurse educators recognize that each student has special developmental requirements, necessitating an individualized strategy. Thus, the educators should know various learning theories for guiding their pedagogy. Nursing educators and administrators should develop a method to ensure that students' nursing simulation requirements are satisfied, and that knowledge, appraisals, and competencies for simulation nursing procedures do not wane, but improve. They can conduct evaluations for the final semester of the nursing degree in a way that reflects students' academic and clinical competencies, ensuring that the evaluation covers all areas of learning and nursing courses included in the program, and not just simulation learning.

5 | LIMITATIONS

The results of this study were specific to Saudi nursing students. The results may be similar to those of other nursing schools, but our study cannot confirm this. Outcomes may vary among nursing students who use similar simulation methods and applications. Other factors, in comparison to those investigated in this study, may yield different results. In addition to the variables included in this study, there may be other variables that predict simulation learning. Finally, this research was conducted during the COVID-19 pandemic. In nonpandemic situations, the outcomes may vary.

6 | CONCLUSION

This study's findings fill certain gaps in Saudi students' experiences of simulation nursing education. Since the NLN simulation scales measured similar competencies of the simulation, the participants' responses to the SCLS, SDS, and EPQ scales were substantially different in terms of predictors. The number of nursing courses with simulation and GPA were found to be common predictors for all three scales. Gender was found to be a predictor for SCLS and year level for SDS, in addition to the common predictors.

7 | RECOMMENDATION

Similar studies can be conducted in other nursing schools and countries, to establish the correlations and predictors of simulation for nursing students. Additionally, a qualitative interview can be conducted to learn more about the students' individual perceptions of simulation in an objective manner. This could begin the requisite adjustments of simulation design and implementation. Simulation learning is a useful teaching and learning approach, which can only be embraced and implemented fully if nursing schools undertake deliberate implementation for all reasonable methods and circumstances.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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