Physical Education, Health and Social Sciences

https://journal-of-social-education.org

E-ISSN: 2958-5996

P-ISSN: 2958-5988

Assessment of Knowledge, Attitude and Behavior of Nursing Faculty about Simulation Based Teaching in Lahore, Pakistan: A Cross-Sectional Study

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Abstract

Background: Simulation-based teaching is widely known as an effective learning method and is widely used today in the education of nursing students to improve their competence, the development of critical thinking skills, and patient safety. Despite the potential of simulation-based teaching, limited evidence is available on nursing faculty members' knowledge, attitudes, and behaviors towards simulation-based teaching in Pakistan where the faculty preparedness is very important for successful implementation of simulation-based teaching. **Methodology**: This was a cross sectional study among 104 nurses' faculty of 6 nursing institutes of Lahore, Pakistan. Convenience sampling was used to recruit participants, who then filled out a structured questionnaire to measure the variables of knowledge, attitudes and behaviors that were measured, regarding simulation-based teaching. Data analysis employed in the study was SPSS Version 27 with Likert scale validated instruments. Data of the participant and study variables were summarized using descriptive statistics and the relationship and the predictor of simulation-based teaching behavior was examined using Spearman correlation, one-way ANOVA, and multiple linear regression analyses. All participants provided informed consent and the relevant institutional review boards provided ethical approval. **Results:** A total of 104 nursing faculty members participated in the study. The mean knowledge, attitude, and behavior scores were 1.98 ± 0.51, 1.95 ± 0.51, and 3.23 ± 1.05, respectively. Knowledge was significantly and positively correlated with attitude ($\rho = 0.489$, $p < 0.001$). Knowledge scores differed significantly across age groups ($F = 3.810$, $p = 0.012$), while attitude scores varied significantly according to qualification level ($F = 4.941$, $p = 0.009$). Multiple linear regression analysis showed that attitude was the only significant predictor of simulation-based teaching behavior ($\beta = 0.310$, $p = 0.006$). **Conclusion:** Nursing faculty demonstrated moderate knowledge and attitudes toward simulation-based teaching, while attitudes were found to be the strongest predictor of simulation-related teaching behavior. Strengthening faculty development initiatives and institutional support may enhance the effective integration of simulation-based teaching and improve the quality of nursing education in Pakistan.

Keywords: Simulation-based teaching, nursing education, faculty knowledge, attitudes, behaviors, clinical training.

Introduction

In developing countries, limited resources, insufficient infrastructure and facilities, scarcity of trained simulation educators, and availability of simulation technologies are challenges in nursing education institutions, which is why the assessment of faculty knowledge, attitudes and behaviors related to simulation-based teaching is significant (Ismail, Ajani et al. 2024, Mwalabu, Msosa et al. 2024, Abdulmohdi, Edmonds et al. 2025) . There is growing recognition of the value of simulation in nursing programs internationally, led by organizations like the International Nursing Association for Clinical Simulation and Learning and the National League for Nursing , but the uptake of simulation into programs is heterogeneous across the spectrum of education systems and facilities (Campbell, Nye et al. 2021, Baayd, Leigh et al. 2023, de Queiroz Xavier, Rodrigues de Oliveira et al. 2025). It is therefore critical to identify the obstacles educators face, pinpoint their professional development needs, and understand their attitudes and readiness toward simulation-based learning. Insights from this work can then guide institutions to design more effective policies and training initiatives that strengthen simulation education across the board.(Thompson and Sonke 2021, Gaberson, Foreman et al. 2024, Park, Lee et al. 2025). By summarizing some of the research from different countries, faculty members generally agree that simulation enhances student learning but they also cite training needs, workload, technological knowledge, time constraints and resource availability as concerns (Thompson and Sonke 2021, Aftab, Kirmani et al. 2024, Tellefson, Dawson et al. 2025).

The Knowledge–Attitude–Behavior (KAB) model offers a valuable framework for understanding how nursing faculty adopt simulation-based teaching approaches (Bdiri Gabbouj, Zedini et al. 2024). It is within the framework of this model that knowledge affects attitudes, which affect next educational practices and then educational intentions. The effective use of simulation to enhance the education of nursing students depends, in part, on having faculty who have sufficient knowledge of and positive attitudes about simulation pedagogy (Elendu, Amaechi et al. 2024, Nuampa, Ratinthorn et al. 2025). However, poor understanding, negative attitudes, or procedural problems of institutions can also delay the use of simulation materials, even if they have the simulation tools (Pueyo-Garrigues, Agüera et al. 2023).

The education of nurses has experienced a significant transformation in Pakistan to meet the growing demands of healthcare, the rapid changing situations of technology, and a focus on bringing educational levels to fit into the international best practices. Many nursing schools have set up dedicated simulation labs and integrated digital nursing learning tools to enrich students' hands-on clinical training experiences (Koukourikos, Tsaloglidou et al. 2021). Medical schools have introduced nursing learning technologies and established simulation laboratories, etc., to improve the learning effect of clinical experience (Koukourikos, Tsaloglidou et al. 2021, Elendu, Amaechi et al. 2024). Nevertheless, the inclusion of simulation-based teaching has different levels of implementation development in each institution, with evidence proving proficiency of faculty in implementing simulation being limited (Baayd, Leigh et al. 2023, Alghanaim, Rogers et al. 2025). Previously, the studies conducted in Pakistan have given more emphasis on student outcomes, satisfaction, and learning experience instead of comparing and evaluating the faculty related work which can be shown to be helpful for effective implementation of the simulation (Mossenson, Livingston et al. 2024). The existing literature in Pakistan emphasized more on student outcomes, satisfaction and all the learning experiences, while very less on the faculty

related factors that are much helpful to promote the effective adoption of simulation(Khan, Asim et al. 2025).

Secondly, though there are some studies on nursing faculty perceptions of simulation-based education, the findings of those studies conducted internationally might differ only because of differences in the educational infrastructure, faculty development opportunities, technology, and support systems in place in other countries (Akhtar-Danesh, Baxter et al. 2009, Baayd, Leigh et al. 2023). The knowledge, attainment, and attitudes of faculty members about simulation-based teaching are still largely unexplained in the Pakistani context, and hence, there is still a large gap in the knowledge. This knowledge is crucial to improve our understanding of institutional readiness, barriers, and facilitators to adoption of simulation tools, and the evidence base for faculty development strategies.

It is therefore important to gauge the level of knowledge, attitudes, and behaviors of nursing faculty about simulation-based teaching to understand the present level of adoption of simulation in Pakistan. This evidence can influence faculty development programs, curriculum development, institutional investment policies, and national educational policies to improve the quality of nursing education. This study seeks to build the body of knowledge on simulation-based nursing education and assist implementation of innovative teaching methods in Pakistan's nursing institutions, thus ensuring the services rendered better. This study will help in identifying the strengths and areas of improvement and hence support the effective application of innovative teaching methods in nursing institutions in Pakistan in order to achieve better services in nursing via the application of simulation-based educational approach.

Methodology

Study Design

A quantitative cross-sectional study design was employed to assess the knowledge, attitudes, and behaviors (KAB) of nursing faculty regarding simulation-based teaching (SBT) in Pakistan. Cross-sectional studies are appropriate for examining the prevalence of specific characteristics and exploring relationships among variables within a defined population at a single point in time (Wang and Cheng 2020). This design enabled the identification of current levels of faculty preparedness and the factors associated with SBT implementation. Reporting of this study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for cross-sectional studies.

Study Setting

The study was carried out in seven nursing Institutions (both public and private) of Lahore, Pakistan. Sheikha Fatima Institute of Nursing and Allied Health Sciences (SFINHS), Allama Iqbal College of Nursing (AION), Saeed Afridi College of Nursing (SACON), Services College of Nursing (SCON), RB Institute of Nursing, Post-Graduate College of Nursing (PGCN) and International College of Nursing were the institutes involved in the event. Representation of institutions from various sectors was to reflect the variety of educational contexts, experiences of faculty members, and resources available on simulation-based learning.

Study Duration

This study was carried out for five months of December 2025 to April 2026. In this time, the approval for institutions, participants were chosen, questionnaires were provided, and data management and data analysis were carried out.

Study Population

The target population was comprised of full-time nursing school faculty members at all of the participating schools. Nursing teachers from undergraduate education and Postgraduate education

were taken as eligible as they were directly engaged in delivering the curriculum and innovating the education. The study did not include any administrative staff who do not teach in the school.

Sample Size Determination

The sample size was determined using Slovin's formula for finite populations (Momin 2025):

$$n_f = \frac{n}{1+\frac{n-1}{N}}$$

In this formula n indicates the required sample size, N reflects the target population, and e represents the margin of error. Given a total population of 140 nursing faculty and a 5% acceptable margin of error, the minimum required sample size was determined as follows:

n = 140 / [1 + 140(0.05) ²]

n = 140 / 1.35

n = 103.7

Using a 95% confidence interval (Z-score = 1.96), a hypothesized 50% response proportion, and a 5% margin of error, the minimum sample size needed for this research was computed as 140 participants. However, due to practical constraints and participant availability during the data collection period, 120 questionnaires were distributed. Of these, out of 120 participant 104 were completed and returned, yielding a response rate of 85.7%. Consequently, 104 eligible participants were included in the final analysis.

Sampling Technique

A convenience sampling technique was used to recruit eligible participants from the selected institutions. Inclusion criteria included: (1) full-time nursing faculty status, (2) at least one year of teaching experience, (3) possession of a Post-RN, BSN, MSN, or higher nursing qualification, and (4) willingness to participate in the study. Faculty members who were unavailable during the data collection period or who declined participation were excluded.

Data Collection Instrument

The study was guided by the Knowledge–Attitude–Behavior (KAB) model, which proposes that knowledge influences attitudes, and attitudes subsequently influence behavior. A structured self-administered questionnaire was adapted from previously validated instruments used in simulation-based nursing education research (Bdiri Gabbouj, Zedini et al. 2024, Jallad 2024) .

The questionnaire consisted of four sections:

1. **Demographic and professional characteristics**, including age, gender, marital status, academic qualification, teaching experience, and institutional affiliation.
2. **Knowledge domain**, consisting 15 items assessing understanding of simulation-based teaching principles, including scenario design, facilitation strategies, debriefing methodologies, and simulation standards.
3. **Attitude domain**, containing ten items that measure respondents' perceptions regarding the usefulness, effectiveness, and practical feasibility of simulation-based instruction.
4. **Behavior domain**, containing 10 items that gauge how actively participants engage in simulation-focused educational activities

All knowledge and attitude statements were scored on a 5-point Likert scale, with response options spanning 1 (strongly disagree) to 5 (strongly agree). In contrast, behavioral items adopted a separate 5-point frequency scale, anchored by 1 (never) at the lowest end and 5 (always) at the highest.

Validity and Reliability

Content validity was verified via expert review from three nursing education specialists with rich experience in simulation-based teaching. Minor revisions were made based on their feedback to improve the instrument's clarity and contextual applicability. Instead of this, a pilot study was conducted on 15 nursing faculty members who were not a part of the final sample, to test reliability. Cronbach's alpha coefficients were used to test the internal consistency. The values obtained were found to be reliable with the knowledge domain ($\alpha = 0.78$), attitude ($\alpha = 0.77$), and behavior ($\alpha = 0.85$) and the overall Cronbach's alpha coefficient ($\alpha = .81$).

Study Variables

Independent variables were: demographic and professional variables (age, academic qualification, teaching experience and institutional affiliation).

The dependent variables were the three primary study outcomes:

- Knowledge regarding simulation-based teaching.
- Attitudes toward simulation-based teaching.
- Behaviors related to simulation-based teaching practices.

Composite scores were calculated for each domain, with higher scores indicating greater knowledge, more positive attitudes, and more frequent engagement in simulation-related behaviors.

Data Collection Procedure

Ethical clearance and the permission from the Institutions were followed by the approach of eligible participants at their respective institutions. The goal of the study, procedures, risks, and benefits were explained and written informed consent was obtained before entering the study. Each participant filled out questionnaires on paper, in a private area. This took about 15-20 minutes to complete. Researchers were on hand to address procedural questions while minimizing response bias. The completed questionnaires were checked and anonymous numbers were assigned to ensure anonymity. Questionnaires that had a high percentage of missing items were not used for analyses, while missing items on the questionnaires that were limited to one item were dealt with by data imputation techniques including mean substitution.

Ethical Considerations

The Institutional Review Board of Sheikh Zayed hospital Lahore (SZH/IRB/2025-1104) granted ethical approval. This study was conducted on the bases of the ethics principles being mentioned in the Declaration of Helsinki. All of the children and mothers voluntarily participated and signed informed consent forms. Confidentiality and anonymity were respected during the entire process of the study by removal of personal information and keeping the electronic data in files password protected for access only by the research group. Participants were explained they are free to leave the study without any penalties. There were no monetary rewards offered.

Data Analysis

After data were entered, cleaned, and analyzed using IBM SPSS Statistics v27. Participant characteristics and the participants' KAB scores were summarized using descriptive statistics: frequencies, percentages, means, and standard deviations. To investigate relationships among the demographic variables with the overall KAB outcomes, descriptive statistics and reliability analyses were performed first. The results then underwent spearman's rank correlation analysis for pairwise relationships between the individual knowledge, attitude, and behavioral sub scale scores. The level of significance for acceptance of all the statistical method was set at $p < 0.05$.

Utilizing one-way analysis of variance (ANOVA), differences in knowledge, attitude, and behavior scores were assessed across the various demographic groups; and multiple linear regression modelling was used to look at underlying causes for the nursing faculty's simulation-based teaching behaviors.

Results

Table 1. Demographic Characteristics of the Participants (N = 104)

Variable	Category	n (%)
Age Group	20–29 years	29 (27.9)
	30–39 years	43 (41.3)
	40–49 years	19 (18.3)
	≥50 years	13 (12.5)
Marital Status	Single	30 (28.8)
	Married	74 (71.2)
Qualification	BSN	20 (19.2)
	Post RN	53 (51.0)
	MSN	31 (29.8)
Institution	SFINHS	11 (10.6)
	SACON	10 (9.6)
	RB Institute of Nursing	14 (13.5)
	NICOF	11 (10.6)
	SIMS	24 (23.1)
	AIMC	34 (32.7)
Teaching Experience	1–5 years	81 (77.9)
	6–10 years	12 (11.5)
	11–15 years	10 (9.6)
	>15 years	1 (1.0)

Demographic Characteristics of the Participants

There were 104 nursing faculty members in the study. Most participants were unmarried (71.2%) and between 30 and 39 (41.3%) years old. A majority (51.0%) of the participants qualified as a Post RN and 29.8% qualified as an MSN and 19.2% qualified as a BSN. Participants were sampled from six nursing institutions, with the highest representation from AIMC (32.7%) and SIMS (23.1%). Most faculty members had relatively limited teaching experience, with 77.9% reporting between one and five years of professional teaching experience. Detailed demographic characteristics are presented in Table 1.

Table 2. Descriptive Statistics and Reliability Analysis of Knowledge, Attitude, and Behavior Toward Simulation-Based Teaching (N = 104)

Variable	Items	Mean ± SD	Minimum	Maximum	Cronbach's α
Knowledge	15	1.98 ± 0.51	1.00	3.13	0.789
Attitude	10	1.95 ± 0.51	1.00	3.10	0.772
Behavior	10	3.23 ± 1.05	1.10	6.20	0.852

Descriptive Statistics of Knowledge, Attitude, and Behavior

Descriptive statistics corresponding to each study variable are summarized in Table 2. Of the three measured domains, behavioral engagement with simulation-based teaching yielded the highest average score (M = 3.23, SD = 1.05). By comparison, knowledge (M = 1.98, SD = 0.51) and attitude (M = 1.95, SD = 0.51) produced nearly identical mean values. This noticeably higher behavioral score indicates that participants reported far more regular involvement in simulation activities, despite their comparatively low levels of related knowledge and positive attitudes. Variability was also greater for behavior compared with the other domains, indicating differences in the extent to which faculty members incorporated simulation-based teaching into their educational practices.

Table 3. Spearman Correlation Analysis Among Knowledge, Attitude, and Behavior Toward Simulation-Based Teaching (N = 104)

Variable	1	2	3
1. Attitude	1.000		
2. Behavior	0.151	1.000	
3. Knowledge	0.489**	-0.112	1.000

Note: p < .01 (2-tailed).

Correlation Analysis

Spearman's rank-order correlation tests were conducted to evaluate bivariate relationships among knowledge, attitude, and behavior toward simulation-based teaching (Table 4). A moderate, statistically significant positive correlation existed between knowledge and attitude ($\rho = 0.489$, $p < 0.001$). This finding implies that faculty with stronger theoretical understanding of simulation-based teaching generally hold more positive attitudes toward implementing such pedagogy.

Conversely, no meaningful statistical associations were found between attitude and behavior ($\rho = 0.151$, $p = 0.127$), nor between knowledge and behavior ($\rho = -0.112$, $p = 0.256$). These findings suggest that although knowledge and attitude are positively linked, neither variable demonstrated a direct bivariate association with simulation-related teaching behaviors.

Table 4. One-Way ANOVA Analysis of Knowledge, Attitude, and Behavior Scores According to Participant Characteristics (N = 104)

Outcome Variable	Grouping Variable	Mean ± SD	F	p-value
Knowledge	Age Group (20–29 years)	1.83 ± 0.52	3.810	0.012*
	Age Group (30–39 years)	1.91 ± 0.50		
	Age Group (40–49 years)	2.15 ± 0.40		
	Age Group (≥50 years)	2.31 ± 0.53		
Attitude	BSN	1.72 ± 0.50	4.941	0.009*
	Post RN	2.09 ± 0.52		
	MSN	1.87 ± 0.41		
Behavior	BSN	3.10 ± 1.07	0.520	0.596
	Post RN	3.33 ± 0.99		
	MSN	3.14 ± 1.17		

Note: *p < .05. (Only significant comparisons and key behavior comparison retained to avoid an oversized table.)

One-Way ANOVA Analysis

One-way ANOVA was performed to examine differences in knowledge, attitude, and behavior scores according to participants' demographic and professional characteristics (Table 5).

The difference in knowledge score among age groups was found to be statistically significant P = 0.012 at 5% level with F (3,100) = 3.810. The results showed that the average scores of Knowledges among faculty members of the older age groups were better than those in younger age groups, indicating that more knowledge gained may be attributed to age and experience of professionals.

There was also a significant difference in attitudes between qualifications, F (2,101) = 4.941, p = 0.009. Faculty with Post RN licenses was the group that had the most positive attitudes towards simulation-based teaching while faculty with BSN qualifications reported that they had somewhat lower attitude scores.

There were no statistically significant differences (all $p > 0.05$) between behavior scores for age, qualification, or years of experience. Likewise, knowledge scores did not differ significantly according to qualification or teaching experience, and attitude scores showed no significant variation across age or teaching experience groups.

Table 5. Multiple Linear Regression Analysis Predicting Simulation-Based Teaching Behavior Among Nursing Faculty (N = 104)

Predictor	B	SE	β	t	p-value
Constant	3.047	0.539	—	5.650	<0.001
Attitude Total	0.643	0.227	0.310	2.829	0.006*
Knowledge Total	-0.458	0.237	-0.223	-1.933	0.056
Age Group	-0.194	0.136	-0.179	-1.427	0.157
Teaching Experience Group	0.035	0.177	0.023	0.198	0.843
Qualification	0.097	0.152	0.064	0.634	0.528

Model Statistics

Statistic	Value
R	0.342
R^2	0.117
Adjusted R^2	0.072
F (5, 98)	2.592
p-value	0.030*

Note: *p < .05.

Multiple Linear Regression Analysis

Multiple linear regression analysis was conducted to identify factors associated with simulation-based teaching behavior among nursing faculty (Table 6). The overall regression model was statistically significant, $F(5,98) = 2.592$, $p = 0.030$, explaining 11.7% of the variance in behavior scores ($R^2 = 0.117$).

Among the variables entered the model, attitude toward simulation-based teaching emerged as the only significant predictor of behavior ($\beta = 0.310$, $p = 0.006$). Faculty who held more favorable

attitudes toward simulation teaching were significantly more likely to regularly carry out simulation-based instructional activities.

While knowledge showed a marginally non-significant relationship with behavioral engagement ($\beta = -0.223$, $p = 0.056$), it failed to serve as an independent predictor of simulation teaching behaviors once confounding variables were adjusted for. Likewise, age bracket, years of teaching experience, and academic qualification exerted no statistically significant predictive effects on educators' simulation practice. These findings highlight the central role of faculty attitudes in influencing simulation-related educational practices and suggest that favorable perceptions of simulation may be more important than demographic or professional characteristics in determining behavioral engagement.

Discussion

This study evaluated the knowledge, attitudes, and practices of nursing faculty about simulation-based teaching (SBT) in Pakistan and what factors may have affected the implementation of simulation in nursing education. The following are some important results of the analysis. First, there was a significant and positive correlation between knowledge and attitude towards simulation-based teaching ($\rho = 0.489$ at $p < 0.001$). Second, there was a significant difference in knowledge scores obtained by the different age groups ($F = 3.810$, $p = 0.012$) with the older faculty members having higher knowledge scores. Third, there was a large difference between the attitudes towards the simulation-based teaching across qualification level ($F = 4.941$, $p = 0.009$). Finally, the only significant predictor of simulation related teaching behavior was attitude ($\beta = 0.310$, $p = 0.006$), underscoring faculty perceptions as key drivers of implementing simulation-based teaching.

The results showed the knowledge, attitude and behavior scores of nursing faculty were equally similar regarding simulation-based teaching, but relatively higher among nursing faculty regarding behavior. To conclude, this pattern indicates that faculty members are participating in simulation related educational activities, although there are medium levels of knowledge and attitude. Perhaps this is due to the emphasis that has shifted to simulating education and competency-based learning in institutions. When the amount of simulation content in the curriculum is increasing, faculty might be engaged in simulation activities due to institutional expectations, content expectations, and/or exposure to simulation facilities without formal preparation. The same findings have been introduced into the literature of nursing education as educators prioritized the benefits of simulation but reported the lack of formal education and pedagogic preparedness to integrate the technology (Benchadlia, Rabia et al. 2023, Lalani 2023)

A strong positive correlation ($+0.489$, $p < 0.001$) was found between knowledge and attitude towards simulation-based teaching. Faculty attitudes toward simulation teaching correlated positively with their knowledge of core simulation principles, facilitation approaches, and the educational applications of simulation. This outcome is consistent with prior studies, which have documented that greater exposure to simulation training corresponds with more positive perceptions of simulation's educational effectiveness and value (Kim, Kang et al. 2021, Liaw, Tan et al. 2023, Ageel 2024, Karthik, Thakur et al. 2025). Theoretically, the result agrees with the Knowledge–Attitude–Behavior (KAB) model which suggests a stimulus of knowledge would precede the formation of attitude which in turn would affect a person's intention to act (Bettinghaus 1986). Some faculty with a greater familiarity with simulation pedagogy will be better able to recognize the benefits of simulation to improve clinical competence, critical thinking, communication skills, and patient safety(Issenberg, McGaghie et al. 2005, Alshehri, Alenazi et al. 2023, Soni, Ramachandran et al. 2024, Loubbairi, Lahlou et al. 2025). As a result,

faculty development programs geared towards enhancing simulation knowledge can also lead to an increased use of simulation while cultivating more positive attitudes to simulation adoption.
Results also showed that there was at least one age group difference in knowledge scores ($F = 3.810$, $p = 0.012$). Knowledge scores are higher among faculty members in older age categories, compared to younger aged faculty members. The discovery could be due to a compounding effect of professional experience, attendance at continuing education opportunities, and the experience of using new educational practices over extended periods. Senior educators typically hold institutional leadership responsibilities and participate extensively in curriculum design and faculty development initiatives, which allows them to build greater familiarity with simulation-based instructional approaches. Prior scholarship has established that teaching experience shapes educators' access to modern pedagogical tools and simulation technologies; seasoned faculty are more inclined to integrate these methods into practice due to wider exposure and more abundant professional training opportunities (Hershkovitz, Daniel et al. 2023, Manuel 2025, van Bruggen, Georgiou et al. 2026). Some other, studies have found no meaningful correlation between faculty age and simulation proficiency. Researchers attribute this inconsistency to uneven access to formal simulation training, highlighting that equitable training opportunities remain a critical factor in shaping educators' knowledge of simulation pedagogy (Foronda, Fernandez-Burgos et al. 2020, Patrick 2025). These results advocate the faculty preparedness and the need for simulation training opportunities in all stages of the career to achieve equitable faculty preparedness.
The present study also showed that amongst the three qualification levels (BTEC, AS-, UVQ), there was a marked difference in attitudes towards simulation-based teaching ($F = 4.941$, $p = 0.009$). Attitudes reported by Faculty with Post RN qualification were most positive as compared to the BSN and MSN qualified Faculty. This discovery may come about owing to the "rich mix" of clinical practice and education that are unique to Post RN programs. These faculty members will understand better the benefit of simulation to plug theory to practice. Educators' acceptance of innovative teaching strategies and pedagogies that value students through experiential learning have also been shown to be affected by previous investigations (Foronda, Fernandez-Burgos et al. 2020, Watts, McDermott et al. 2021, Saro, Pelesco et al. 2026). The authors' results indicate that such differences in qualifications should be considered in creating faculty development programs and simulation training protocols.
The most significant finding in the present study was that changes in attitudes were found to be significant ($\beta = 0.310$, $p = 0.006$) in predicting teaching behavior related to the simulation. The finding showed that knowledge had a positive association with attitude but did not explain behavior after the other variables, including professions and demographic, were taken into consideration. Evidence indicates that having a positive perception has a greater effect than just knowledge on practice activation in promoting faculty use of simulation in educational practice. Faculty who feels that "simulation is useful, successful and relevant" may be more likely to spend time and energy to develop scenario(s), facilitate and debrief. It is consistent with theories and models in educational innovation and technology acceptance, such as (Turner 2007) and (Davis, Bagozzi et al. 1989) work, which highlight the importance of attitudes and perceived usefulness in influencing a person's behavior in connection to innovation or technology. We found similar results in the simulation-based education research literature in which faculty attitudes were recognized as one of their important factors in positively influencing the adoption and use of simulation (Najjuma, Muhumuza et al. 2024, Khan, Asim et al. 2025). In the context of the KAB model, the finding further confirms the hypothesis that attitudes are an important link between knowledge and behavior. For this reason, training programs for faculty should emphasize

knowledge acquisition and improvement of faculty confidence and motivation and views on simulation effectiveness.

There are also several non-significant results of interest. The regression model for age and teaching behavior did not reveal any significant differences between children and adults, nor were there between most children and learning staff. The same applied for qualification and teaching behavior, as well as between children and teaching staff and teaching staff, with and without experience. No significant correlation was found between knowledge and teaching behavior ($\rho = -0.112$, $p = 0.256$). The results indicate that there could be more factors to consider other than demographic and professional ones to account for nurse faculty simulation adoption. One possible reason is the influence of institutional and organizational factors on influencing the implementation of simulations. Faculty may have sufficient knowledge but may experience factors that hinder them from engaging in and supporting simulation, which include: a limited set of simulation resources, inadequate administrative support, inadequate infrastructure, competing workload demands, and, lack of protected time for simulation activities. These challenges have been discussed in previous studies as significant barriers to the integration of simulation in the learning context, especially in education with limited resources(Ismail, Ajani et al. 2024, Park, Lee et al. 2025, Sivagami, Vijayalakshmi et al. 2025). The Q2 explained variance of the regression model ($R^2 = 0.117$) also indicates that there are other variables in the context and organization of pedagogy of simulation-related teaching behavior.

This study has several strengths. Firstly, it adds to the body of evidence on simulation-based teaching practice available with regards to nursing faculty in Pakistan, which is limited and studies regarding faculty preparedness are rare. Secondly, the study involved participants in several nursing homes, thereby giving the study a rich and truly representative sample. Third, multiple analytical tools such as reliability analysis, correlation analysis, ANOVA and multiple regression were used to get a comprehensive understanding of key factors related to simulation-based educational practices. Apart from that, satisfactory reliability coefficients were obtained for the knowledge ($\alpha = 0.789$), attitude ($\alpha = 0.772$), and behavior ($\alpha = 0.852$) scales which corroborates the credibility of the findings of the study.

The result will have huge significance in nursing education in Pakistan. Patient safety and preparedness in the clinical setting, along with the importance of competency-based education, are increasingly part of an emphasis in nursing programs; therefore, simulation-based education is likely to become a critical element in nursing programs. In fact, structured faculty development programs on simulation pedagogy, scenario design, facilitation techniques and debriefing competencies should be prioritized in an educational setting(Greenwood and Ewell 2018, Committee, Persico et al. 2025). Furthermore, national guidelines and competency frameworks need to be developed and advocated for to enable standardized implementation of simulation-based education, not only through academic and nursing leadership roles but by the education regulatory bodies as well. Given that attitudes emerged as the strongest predictor of faculty engagement in simulation teaching, interventions targeting educators' attitudes, self-confidence, and intrinsic motivation to implement simulation are likely to be particularly impactful for boosting widespread uptake of this pedagogy. Additional investment in the development of simulation infrastructure, ongoing professional development experiences, and the establishment of simulation support systems will continue to aid in the successful adoption of simulation-based teaching into the nursing profession in Pakistan.

In general, the results showed that knowledge is one of the factors influencing the formation of positive attitudes towards simulation-based teaching, but attitude had the greatest influence on the changes in education behavior related to simulation. Targeted training of faculty and

organizational support to strengthen attitudes could thus be identified as a fundamental one for fostering the growth of simulation-based education and better-quality education in nursing field in Pakistan.

Conclusion

This study assessed the knowledge, attitudes, and behaviors of nursing faculty regarding simulation-based teaching in nursing institutions in Lahore, Pakistan. The results showed moderate scores in regards to knowledge and attitudes about simulation-based teaching, with moderate or high scores in behavior. There was a clear positive correlation between knowledge and attitudes implying that the higher the knowledge, the more positive the attitudes. There are significant differences between the age groups in knowledge but not in attitudes, while qualification level is a differentiator in attitudes. Importantly, attitude emerged as the sole significant predictor of simulation-exemplifying teaching behavior, meaning that attitude perceived by faculty is a vital variable in the adoption of simulation to support educational practice. The results are in support of Knowledge – Attitude – Behavior (KAB) model used in this study which indicated that the knowledge in this study influenced the positive attitude that in turn influenced the education behavior in the study. Based on the findings of the study, it is important to develop structured Faculty Development programs, continuous Faculty Training, and supportive institutional support to augment the simulation related skills of the nursing Faculty members. An augmented faculty awareness and positive attitudes for simulation can enable using simulation-based teaching effectively and enhance the quality of nursing education and clinical training in Pakistan.

Limitations

The results of this study ought to be interpreted with the following limitations: First, the cross-sectional design prevented causal inferences, by only capturing the knowledge, attitudes, and behaviors of nursing faculty members at a single time. Secondly, the findings of this study might not be generalizable to other regions of Pakistan and educational settings, due to convenience sampling and the sampling of only nursing institutions in Lahore. Third, it may have been subject to social desirability and response biases for self-reported questionnaires. Fourth, the study's questionnaire drew upon well-known constructs that measure different aspects of simulation-based teaching, but did not capture actual simulation competency, quality of simulation implementation or other institutional considerations like resource availability, workload and administrative support that may affect the uptake of simulation. However, this study has undeniable value given its restraints as it presents an idea on the preparedness of nursing faculty to teach with simulation and can also act as a base line for more research or educational intervention in Pakistan.

Future Recommendations

Considering the results obtained from the present study, a few recommendations are made for further study. Longitudinal studies examining the evolution of nursing faculty members' knowledge, attitudes, and behaviors toward using simulation in nursing education over time are needed as well as long-term study of faculty development programs to assess their long-term benefits. Secondly, larger sample size and including multiple nursing homes from various provinces of Pakistan will generate better generalization of the results of the study. Third, qualitative or mixed-methods studies are recommended for better understanding barriers and facilitators to using simulation-based teaching with nursing faculty. These investigations could clarify issues associated with institutions or culture and resource inequalities which can only be

partially examined using quantitative methods. Fourth, intervention studies should test the effectiveness of simulation-based teaching workshops, faculty training and mentorship programmed to increase faculty competence and confidence about simulation pedagogy. Additionally, future studies could explore how prepared faculty are and how that preparedness affects student learning outcomes, and thus the educational impact of simulation-based teaching practices. In conclusion, further research is needed on organizational variables, including institutional support, availability of simulation resources, leadership support and funding mechanisms, that may have a bearing on the successful incorporation of simulation-based teaching into nursing education programs in Pakistan.

ABBREVIATIONS: High Fidelity Simulation (HFS), Low Fidelity Simulation (LFS), Simulation Based Medical Education (SBME) and Cardiopulmonary Resuscitation (CPR), Clinical Simulation (CS) International Association for Nursing Clinical Simulation and Learning (INACSL), Clinical Nursing Teachers (CNTs). Institutional Review Board (IRB), Evidence Based Practice (EBP) Statistical Package for the Social Sciences (SPSS),

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