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Uncovering The Link Between Kolb's Learning Styles and Clinical Competence Among Undergraduate Nursing Students in Pakistan: A Descriptive-Correlational Study

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ABSTRACT:

Background: Learning styles can impact the way nursing students learn, process, and utilize knowledge and skills during clinical practice. Although previous research has examined learning styles and clinical competence separately, limited evidence has directly linked contemporary Kolb-based learning dimensions with clinical competence, particularly in Pakistan. This study examined their relationship among undergraduate nursing students and addressed this contextual and conceptual gap.

Methods: The study used descriptive-correlational design and targeted undergraduate students of nursing from selected nursing institutes of Lahore, Pakistan. Data were collected using a 30-item Learning Styles Scale covering Initiating/Deciding, Experiencing/Acting, Creating/Imagining, Reflecting, Analyzing/Thinking, and Balancing, and a 47-item Clinical Competencies Scale. Data were analyzed using descriptive statistics, correlation analysis, and multiple linear regression in SPSS version 27.0.

Results: A total of 865 questionnaires were collected; 797 questionnaires were suitable for analysis. The learning-style dimension most prevalent was reflecting, and the highest rated clinical competency area was Therapeutic Measures. Each of the six learning style dimensions was significantly and positively related to clinical competence. The total variance in clinical competence was explained by the learning styles together. Balancing proved to be the most significant predictor, while Initiating/Deciding was not an independent predictor of clinical competence.

Conclusion: This study is based on the novel evidence that relates contemporary Kolb's learning dimensions to clinical competence in the Pakistani context of nursing education. The findings contribute to nursing education by highlighting learner diversity and supporting the use of varied experiential, reflective, analytical, and practical learning opportunities to strengthen students' clinical preparation.

INTRODUCTION

Clinical education is considered a core part of nursing education since it equips the undergraduate learners to apply theoretical knowledge to safe, effective and context-specific patient care. In a more complex healthcare environment, nursing graduates must not only have theoretical knowledge and technical skills, but also clinical judgment and critical thinking, communication, ethical decision making and the capacity to adapt to changing patient needs [1]. In undergraduate nursing programs, clinical competence is a central outcome of nursing education that reflects the knowledge, psychomotor skills, cognitive skills, communication skills, and professional attitudes that are essential for safe and effective nursing care [2]. Poor clinical preparation can have negative consequences for patient safety, quality of care, and the professional competence of nurses, and clinical competence is therefore a significant concern for nursing educators and health care organizations [3, 4].

Despite the common curriculum and clinical requirements experienced by nursing students, students do not necessarily develop clinical competence at the same level. Differences in educational backgrounds, clinical exposure, engagement with learning experiences, and ways of processing information may contribute to variations in how students acquire and apply clinical knowledge and skills. This is an important educational challenge, as the nursing educator needs to prepare the student for complex practice and needs to acknowledge that pupils differ in their ways of learning and engaging with learning experiences. Understanding factors that may be associated with variation in clinical competence is therefore important for strengthening clinical education and supporting students' transition from classroom learning to professional practice.

One potentially relevant factor is students' learning style. Learning styles refer to relatively preferred ways in which learners perceive, process, and respond to learning experiences [5]. Recognizing differences in learning approaches may help educators better understand how students engage with educational activities and clinical experiences. Recognizing differences in learning approaches may help educators better understand how students engage with educational activities and clinical experiences. The experiential learning model by Kolb (1984) is a more appropriate theoretical framework because learning is an ongoing process that requires concrete experience, reflective observation, abstract conceptualization, and active experimentation [6, 7]. Concrete experience is learning from a real experience, reflective observation is learning by looking and reflecting on an experience, abstract conceptualization is learning by developing concepts and theoretical understanding, and active experimentation is learning by doing something with what has been learned. Although all learners engage in these processes, they may differ in their relative preferences for particular ways of learning, resulting in different learning orientations or styles [8].

Modern versions of Kolb's experiential learning model also cover dimensions such as Initiating/Deciding, Experiencing/Acting, Creating/Imagining, Reflecting, Analyzing/Thinking, and Balancing [9]. These orientations are alternative modes of approach to learning. Learners with Initiating/Deciding tendencies may be more inclined toward taking initiative, making decisions, and applying knowledge to practical situations, whereas Experiencing/Acting learners emphasize direct involvement and hands-on experience. Creating/Imagining learners tend to think in terms of possibilities and other ways of thinking, whereas Reflecting learners think in terms of observing, evaluating and considering well before they act [10]. Analyzing/Thinking learners emphasize logical reasoning, evidence, and theoretical explanations, whereas Balancing learners integrate different approaches to learning by combining practical experience with analytical and reflective processes [9]. Theoretically, these differences are relevant to nursing education as clinical practice involves experiencing patient situations, reflecting on those experiences, interpreting the clinical information, working with decisions, and taking appropriate actions based on knowledge [11].

Clinical competence is a multidimensional phenomenon, which is not limited to the performance of individual technical skills. It includes assisting, teaching and coaching, diagnostic, managing, therapeutic, quality-related, and professional work roles [12]. Nursing students should demonstrate the ability and skills to deliver patient-centered care, make clinical judgments, communicate effectively, make ethical decisions, apply evidence into practice, and work collaboratively with other health care members in clinical settings [13]. Consequently, clinical learning requires students to continuously transform theoretical knowledge and clinical experiences into practical actions. From an experiential learning perspective, differences in how students experience, reflect upon, analyze, and act on clinical situations may therefore be associated with differences in the development and demonstration of clinical competence [14]. For instance, students who tend to be experiential and reflective may react to clinical scenarios differently than those who are more analytical or conceptual. However, whether these differences in learning orientation are actually associated with students' clinical competence remains an empirical question.

This unresolved relationship is a research enigma. Existing studies have examined nursing students' learning styles and clinical competence as important aspects of nursing education, but relatively limited evidence has directly examined whether and how Kolb-based learning orientations are associated with clinical competence. The theoretical relationship is possible, as both constructs consist of processes which are central to clinical learning: experiencing, reflecting, conceptualizing, deciding, and acting; however, the empirical relationship between students' preferred learning approaches and their clinical competence has not yet been sufficiently established. This uncertainty is especially pertinent in the context of developing countries where nursing education systems could be exposed to variations in students' background education, learning opportunities, clinical support, and practice environment.

This is a significant challenge in Pakistan where undergraduate nursing education is still developing and has been gaining greater focus on competency-based education and preparing graduates who are able to provide safe and effective care. Within this context, undergraduate nursing students may enter clinical education with diverse educational experiences and learning preferences and may encounter varying opportunities to develop and apply clinical skills. However, evidence concerning the relationship between Kolb's learning styles and clinical competence among undergraduate nursing students in Pakistan remains limited. Establishing whether such an association exists can contribute to a better understanding of individual differences in clinical learning and provide an empirical basis for considering learner diversity in nursing education.

Therefore, this study aimed to investigate the relationship between Kolb's learning styles and clinical competence among undergraduate nursing students in Pakistan using a descriptive-correlational design. The aim of this study is to examine this relationship to fill an important research gap in nursing education and to further the understanding of whether variations in the learning orientations of nursing students align with variations in their reported clinical competence. The findings may provide useful insights for nursing educators and curriculum developers seeking to understand learner diversity and design educational and clinical learning experiences that better support students' development and readiness for professional nursing practice.

METHODS

The reporting of the study followed Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement guidelines.

Study Design and respondents

A cross-sectional study was conducted from January 2026 to May 2026, using proportionate stratified random sampling method. Students majoring in Nursing (4-year BS program) were recruited from 16 colleges in the Lahore, Pakistan, comprising 8 public and 8 private nursing colleges/schools operating under different universities/higher education institutes (HEIs) duly accredited by the Pakistan Nursing and Midwifery Council (PNMC), Islamabad, Pakistan. The inclusion criteria were as follows: BS Nursing Students and Nursing students which will give their willful consent. The exclusion criteria were as follows: Absent BS Nursing Student at the time of data collection, Students from Non-Accredited Nursing Colleges/schools from the Pakistan Nursing & Midwifery Council (PNMC).

The required sample size was calculated using the formula for estimating sample size in correlation studies: $N = \left[\frac{Z_{\alpha} + Z_{\beta}}{C} \right]^2 + 3$, where N represents the required sample size, Z_{α} is the standard normal deviate corresponding to the selected significance level, and Z_{β} represents the standard normal deviate corresponding to the desired statistical power. The significance level (α) was set at 0.05, corresponding to a 95% confidence interval, with a type II error rate (β) of 0.20, indicating 80% statistical power. Accordingly, Z_{α} was 1.96 and Z_{β} was 0.842. The value of C represents Fisher's Z-transformation of the anticipated correlation coefficient (r) and was calculated using the formula: $C = 0.5 \times \ln[1+r/1-r] = 0.100335$. Based on an expected correlation coefficient of $r = 0.20$, the Fisher's Z-transformation value was calculated as $C = 0.100335$ [15]. The calculated sample size was then adjusted for possible non-response and missing questionnaires to ensure power in examining the relationship between Kolb's learning styles and clinical competence among the undergraduate nursing population.

Data collection

The study employed an online questionnaire-based survey approach for data collection. Before initiating the survey, the researchers contacted management of the selected 16 nursing colleges/schools, with whom the research team had established institutional collaboration to get formal permission for data collection. The faculty members assisted in facilitating

communication with eligible undergraduate nursing students and distributing the online research questionnaire link of Google Forms through emails/WhatsApp. Detailed instructions regarding the purpose of the study, voluntary participation, confidentiality of responses, and completion procedures were provided to the students before they accessed the questionnaire. Participants were informed that their responses would remain anonymous and would only be used for research purposes. Respondents were invited to complete the self-administered questionnaire within two weeks. The reminder messages were sent to respondent to encourage them for participation in the survey to increase the response rate. The online data collection method facilitates the researcher to gather data efficiently and also maintain the confidentiality of the personal information of the respondents.

MEASURES

Kolb's Learning Styles

The study employed the adapted Kolb's Learning Style Questionnaire developed by Rashvand Semiyari and Azad (2022) to assess undergraduate nursing students' learning preferences. The instrument is based on Kolb's Experiential Learning Theory and consists of 30 items representing six learning dimensions: Initiating/Deciding, Experiencing/Acting, Creating/Imagining, Reflecting, Analyzing/Thinking, and Balancing. Each dimension contains five items measuring students' preferred approaches to acquiring, processing, and applying knowledge. Participants rated each statement on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scores for each dimension were calculated by summing responses to corresponding items, where higher scores indicate stronger preferences for specific learning approaches. The questionnaire captures individual differences in experiential learning patterns among nursing students and provides insight into how students engage with educational and clinical learning experiences.

Clinical Competence

Clinical competence was assessed using the revised nursing clinical competency questionnaire developed by Meretoja et al. (2004) and modified by Mousavi et al. (2024). The instrument evaluates nursing students' ability to apply professional knowledge and skills in clinical practice. The revised questionnaire consists of 47 items categorized into five competency domains: assisting patients (7 items), teaching and guidance (12 items), diagnostic measures (8 items), therapeutic measures (5 items), and occupational responsibilities (15 items). Participants rated the extent to which they utilized each clinical skill using a 4-point Likert scale. Higher scores indicate greater levels of clinical competence. Previous psychometric evaluations have demonstrated acceptable validity and reliability of the instrument, with Cronbach's alpha reported as 0.91 in the study by Mousavi et al. (2024).

Variables

Sociodemographic characteristics obtained: age, gender, family type, socioeconomic level, residence and grading. Grades included Grade 2.00 ~ 4.00. 'Family type' was identified using the question: "do you live in nuclear or extended family?" and was divided into "Nuclear" and "Extended".

Educational characteristics obtained: school type, discipline, academic performance, reason as the first choice. School type was classified into "private sector" and "public sector" nursing colleges. Socioeconomic level was categorized as "low (below Rs. 50,000)", medium (from Rs. 50,000 to Rs. 90,000) and "High (Above Rs. 90,000)". Academic performance was evaluated using the question, "What is your CGPA?". The response options were as follows: "below 2.00", "2.00 to 2.50", "2.51 to 3.00", "3.01 to 3.50" and 3.51 to 4.00. Reason of choosing nursing profession was evaluated using the question, "What was the basic reason to choose nursing profession?", and categorized into "because I like it", "because of my family's wish", "because it is easy to find a job" and "to serve humanity".

Learning styles and clinical competencies were assessed using structured self-administered questionnaires. Learning styles were measured using 30 items adapted from the KOLB 4.0 Learning Style Questionnaire developed by Rashvand Semiyari and Azad (2022). The items covered six learning dimensions/styles: Initiating/Deciding, Experiencing/Acting, Creating/Imagining, Reflecting, Analyzing/Thinking, and Balancing, with five items representing each dimension. Participants rated each statement on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Clinical competencies were assessed using a 47-item modified clinical competence questionnaire based on Meretoja et al. (2004) and Mousavi et al. (2024). The questionnaire comprised five competency areas: assisting patients (7 items), teaching and guidance (12 items), diagnostic

measures (8 items), therapeutic measures (5 items), and occupational responsibilities (15 items). Participants rated their level of competence on a five-point scale ranging from 1 = very low (0–20) to 5 = very good (80–100).

Statistical analysis

The data were collected through a structured online research questionnaire developed by using Google Forms. The completed responses were automatically recorded in a Google Sheets/Excel-compatible spreadsheet, which was downloaded and reviewed for completeness and consistency before analysis. The cleaned dataset was then imported into IBM SPSS Statistics (version 27.0) for statistical analysis. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the participants' demographic and academic characteristics, learning styles, and clinical competencies. Differences in learning styles and clinical competencies across demographic and academic characteristics were examined using independent-samples t-tests and one-way analysis of variance (ANOVA), where appropriate. Pearson's correlation analysis was performed to examine the relationships between the six learning-style dimensions such as Initiating/Deciding, Experiencing/Acting, Creating/Imagining, Reflecting, Analyzing/Thinking, and Balancing and clinical competencies. Statistical significance was set at $p < 0.05$.

ETHICAL CONSIDERATIONS

The study received approval from the University of Lahore, School of Nursing, Institute Research Ethics Board (IREB) vide approval number UOL/IREB/26/19/02/0030 and adhered to the principles of the declarations of Helsinki [16]. The questionnaire's cover page outlined the study's purpose, voluntary participation, confidentiality measures, and implied consent upon submission.

RESULTS

Of the 865 questionnaires collected in total, 797 were suitable for analysis, representing a response rate of 92.14%. The mean age of the nursing students was 21.68 (4.70) years, ranging from 16 to 37 years. The participants' demographic and academic characteristics included gender, family type, socioeconomic level, residence, academic year, overall CGPA, and reason for choosing the nursing profession. Learning styles were assessed using 30 items representing six dimensions: Initiating/Deciding, Experiencing/Acting, Creating/Imagining, Reflecting, Analyzing/Thinking, and Balancing with five items for each dimension. Among the six learning-style dimensions, Reflecting was the highest (80.10%), followed by Analyzing/Thinking (79.38%), Creating/Imagining (79.16%), Balancing (79.06%), Initiating/Deciding (78.78%), and Experiencing/Acting (78.32%). Clinical competencies were assessed using 47 items across five domains, with Therapeutic Measures showing the highest score (80.50%).

The total clinical competency score was 188.23 (24.91), ranging from 56 to 235. For the five clinical competency domains, the Assisting Patients (items 1–7) score was 27.80 (4.06), ranging from 8 to 35; the Teaching and Guidance (items 8–19) score was 47.95 (6.74), ranging from 13 to 60.

The Diagnostic Measures (items 20–27) score was 32.18 (4.74), ranging from 8 to 40; the Therapeutic Measures (items 28–32) score was 20.13 (3.15), ranging from 5 to 25; and the Occupational Responsibilities (items 33–47) score was 60.17 (8.58), ranging from 15 to 75. Overall, the findings indicated a good to very good level of clinical competency among the nursing students, with Therapeutic Measures showing the highest relative level of competency.

The results of the independent-samples t-test and one-way ANOVA showed that reason for choosing nursing was the only characteristic significantly associated with overall clinical competency ($F = 5.091$, $p < 0.001$). Students who chose nursing to serve humanity had the highest mean clinical competency score (4.110), whereas those who selected salary packages are high had the lowest mean score (3.861).

No statistically significant differences in clinical competency were observed according to age ($F = 0.306$, $p = 0.580$), gender ($t = -0.178$, $p = 0.859$), family type ($t = -0.115$, $p = 0.909$), socioeconomic level ($F = 0.434$, $p = 0.648$), residence ($t = -0.361$, $p = 0.718$), or overall CGPA ($F = 1.086$, $p = 0.362$). These findings suggest that, among the demographic and academic characteristics examined, the reason for choosing the nursing profession was significantly related to students' clinical competency.

Table 1: Influencing factors of attitudes toward IPE ($n = 797$)

Characteristic	N	Mean	SD	t/f	p-value
Age				f = 0.306	0.580
Up to 22 years	543	3.961	0.533		
23–27 years	141	0.994	0.548		
28–32 years	97	4.228	0.429		
33–37 years	16	4.227	0.481		
Gender				t = -0.178	0.859
Male	130	3.997	0.534		
Female	667	4.006	0.530		
Family Type				t = -0.115	0.909
Nuclear	319	3.996	0.545		
Extended	379	0.400	0.527		
Socioeconomic Level				f = 0.434	0.648
Low	319	3.996	0.545		
Medium	379	0.400	0.527		
High	99	0.405	0.494		
Residence				t = -0.361	0.718
Rural	199	3.993	0.574		
Urban	598	4.008	0.515		
Overall CGPA				f = 1.086	0.362
Below 2.00	22	3.911	0.368		
2.00–2.50	61	3.971	0.570		
2.51–3.00	166	3.945	0.477		
3.01–3.50	384	4.029	0.538		
3.51–4.00	164	4.033	0.563		
Reason for choosing Nursing				f = 5.091	<0.001
Because I like it	212	4.028	0.605		
Because of my family's wish	167	3.919	0.523		
Easy to find a job	121	3.946	0.436		
Salary packages are high	59	3.861	0.641		
To serve humanity	238	4.110	0.454		

Correlation Analysis of Learning styles towards clinical competencies

Correlation analysis revealed that all six learning-style dimensions were positively and significantly associated with clinical competency ($p < 0.01$). The correlations ranged from $r = 0.618$ to $r = 0.736$, indicating moderate to strong positive relationships. Balancing demonstrated the strongest association with clinical competency ($r = 0.736$, $p < 0.01$), followed by Analyzing/Thinking ($r = 0.730$, $p < 0.01$), Creating/Imagining ($r = 0.708$, $p < 0.01$), Reflecting ($r = 0.694$, $p < 0.01$), and Experiencing/Acting ($r = 0.678$, $p < 0.01$). Initiating/Deciding showed the lowest association, although the relationship remained strong and statistically significant ($r = 0.618$, $p < 0.01$). These findings indicate that greater endorsement of each learning-style dimension was associated with higher levels of clinical competency among undergraduate nursing students.

Table 2: Correlation Analysis of Learning Styles towards Clinical Competencies

	Mean	SD	ID	EA	CI	REF	AT	BAL	CC
ID	3.939	0.661	--						
EA	3.916	0.624	.682**	--					
CI	3.958	0.604	.669**	.741**	--				
REF	4.005	0.617	.639**	.701**	.717**	--			
AT	3.969	0.599	.648**	.661**	.722**	.748**	--		
BAL	3.953	0.617	.613**	.700**	.717**	.692**	.811**	--	
CC	4.005	0.530	.618**	.678**	.708**	.694**	.730**	.736**	--

***. Correlation is significant at the 0.01 level (2-tailed).*

ID = Initiating Deciding, EA = Experiencing Acting, CI = Creating Imagining, REF = Reflecting, AT = Analyzing Thinking, BAL = Balancing, CC = Clinical Competencies

Multifactor analysis of attitudes toward Clinical Competencies

Multiple linear regression analysis was performed to determine if the six dimensions of learning styles predicted clinical competency of the undergraduate nursing students when analyzed individually. The overall regression model was statistically significant, $F(6, 721) = 187.129$, $p < 0.001$, with $R = 0.780$, $R^2 = 0.609$, and adjusted $R^2 = 0.606$. Therefore, the total variance of clinical competency was accounted for by the six learning-style dimensions with 60.9% variance. Residual autocorrelation was not of serious concern as indicated by the Durbin–Watson statistic of 1.919.

Five of the six learning-style dimensions were significant positive predictors of clinical competency. Finally, Balancing had the strongest independent association ($B = 0.209$, $\beta = 0.248$, $t = 6.040$, $p < 0.001$, 95% CI: 0.141–0.277), with higher scores being correlated with higher clinical competency, after the other LS dimensions were controlled. Analyzing/Thinking was the next strongest predictor ($B = 0.157$, $\beta = 0.180$, $t = 4.187$, $p < 0.001$, 95% CI: 0.083–0.230), followed by Creating/Imagining ($B = 0.141$, $\beta = 0.163$, $t = 4.210$, $p < 0.001$, 95% CI: 0.075–0.206), Reflecting ($B = 0.117$, $\beta = 0.140$, $t = 3.709$, $p < 0.001$, 95% CI: 0.055–0.180), and Experiencing/Acting ($B = 0.094$, $\beta = 0.112$, $t = 2.973$, $p = 0.003$, 95% CI: 0.032–0.156). Finally, Initiating/Deciding was not a statistically significant independent predictor of clinical competency ($B = 0.050$, $\beta = 0.064$, $t = 1.925$, $p = 0.055$, 95% CI: –0.001–0.101) because its confidence interval contained the null value.

The results showed that increased scores on Balancing, Analyzing/Thinking, Creating/Imagining, Reflecting, and Experiencing/Acting were independently related to increased clinical competency, with Balancing being the most powerful unique predictor.

The non-significant finding for Initiating/Deciding implies that while there might be a positive relationship with clinical competency in the bivariate relationship, the unique contribution of this dimension is negligible when the other learning-style dimensions are held constant.

Table 3: Regression Analysis of Learning Styles towards Clinical Competencies (n = 797)

Predictor	B	SE(B)	β	t	P	95% CI
Constant	0.970	0.092	—	10.572	<0.001	[0.790–1.150]
Initiating/Deciding	0.050	0.026	0.064	1.925	0.055	[–0.001–0.101]
Experiencing/Acting	0.094	0.032	0.112	2.973	0.003	[0.032–0.156]
Creating/Imagining	0.141	0.033	0.163	4.210	<0.001	[0.075–0.206]
Reflecting	0.117	0.032	0.140	3.709	<0.001	[0.055–0.180]
Analyzing/Thinking	0.157	0.037	0.180	4.187	<0.001	[0.083–0.230]
Balancing	0.209	0.035	0.248	6.040	<0.001	[0.141–0.277]

Note: R = 0.780; R² = 0.609; adjusted R² = 0.606; F(6, 721) = 187.129, p < 0.001; Durbin–Watson = 1.919. B = unstandardized regression coefficient; SE = standard error; β = standardized regression coefficient; CI = 95% confidence interval.

DISCUSSION

Student Learning Styles and Clinical Competence

The present study found a significant relationship between the six learning-style dimensions and clinical competence among undergraduate nursing students. Collectively, these dimensions explained 60.9% of the variance in clinical competence, indicating substantial explanatory value of students' learning orientations. This result corresponds with the recent data on learning styles correlation with educational results in nursing students [17, 18] and is related with Kolb's experiential learning framework which focuses on the experiential components of learning, namely experience, reflection, conceptualization, and action [13, 14]. Among the six dimensions, Balancing was the strongest predictor, followed by Analyzing/Thinking, Creating/Imagining, Reflecting, and Experiencing/Acting.

Balancing is a strong contribution in the role of the clinical nurse that may be a reflection of the complexity of clinical nursing practice, in which students are required to shift from theory to practice, interpret patient information, reflect on experiences, make decisions and adapt care according to changing patient needs [17]. However, a balanced orientation might help integrate learning processes, not just one. This interpretation aligns with the findings of nursing education research that discusses the importance of integrating clinical practice experiences with reflection, discussion, simulation, and application [19].

The analysis/thinking factor was also significant, emphasizing the importance of logical thinking, conceptual understanding, clinical interpretation, and evidence-based decision making. Clinical competence is not just about technical performance, but also about clinical reasoning, clinical judgment, problem solving, and decision making [4, 20]. Similarly, the significant contributions of Creating/Imagining and Reflecting suggest that considering alternative perspectives and critically examining previous experiences may support students' clinical development [13]. Reflection is especially relevant to experiential learning because without interpretation and evaluation, experience is not meaningful [14]. Recent nursing research has also identified reflective activities as valuable for learning following simulation and clinical experiences [21, 22].

Experiencing/Acting was another significant positive predictor, reinforcing the importance of active participation and hands-on learning. Nursing students need opportunities to apply theory, do skills, engage with patients, and respond to real or simulated clinical situations. Experiential and simulation-based learning can facilitate the transfer of knowledge into practical performance [17, 19].

Although Initiating/Deciding showed a positive association with clinical competence, it did not make a statistically significant independent contribution after the other dimensions were controlled. This may reflect overlap among the learning dimensions

rather than a lack of relevance of initiative or decision-making. These dimensions are related aspects of experiential learning, so some shared variance is possible. This discovery also reinforces wariness of using individual learning styles as discrete traits with stable effects on learning [9, 18]. The findings suggest that clinical competence may be more closely associated with the integration of complementary learning processes than with one particular learning orientation.

Demographic and Academic Characteristics and Clinical Competence

Most demographic and academic characteristics were not significantly associated with clinical competence. Gender, age, family type, socioeconomic level, residence, and CGPA showed no statistically significant differences. Although female students and those with higher CGPA tended to report slightly higher competency scores, these differences were not significant. This study indicates that demographic factors and academic performance may not be sufficient to explain clinical competence. Competency development may be more associated with clinical exposure, supervised practice, learning engagement and opportunities to apply knowledge [3]. The lack of significant relationship with CGPA also emphasizes the difference between academic achievement and clinical competence, which involves the association of knowledge with psychomotor skills, clinical reasoning, communication, and professional behavior [20].

In contrast, the reason for choosing nursing was significantly associated with clinical competence. Students who selected nursing as “service to humanity” reported the highest competency scores, whereas those who selected nursing because of a “high salary package” reported the lowest. This pattern suggests that service orientation is related to higher professional learning and clinical work involvement. This interpretation is still provisional, however, due to the cross-sectional design of the study, and the lack of causality. The discovery does, however, indicate that students’ professional motivation could be given more attention in nursing education. Highlights for Nursing Education.

Implications in Nursing Education

The results confirm that a multimodal modality of clinical education that incorporates several learning processes is useful rather than just one. Nursing educators may incorporate hands-on clinical experiences, structured reflection, analytical case discussions, simulation, and creative problem-solving to provide students with opportunities to connect experience, reasoning, reflection, and action. Special emphasis might be placed on learning activities that involve theory and practice, since Balancing exhibited the most substantial contribution to clinical competence.

The findings also indicate that clinical competence does not depend only on demographic factors and/or classroom achievement. It is important to continue to include supportive clinical environments, enough supervision, active participation and repeated opportunities to apply and reflect on knowledge as factors contributing to competency development. Recognizing variation in students’ learning orientations may help educators provide more diverse and inclusive clinical learning opportunities.

Overall, the present study adds to the growing evidence that learning orientations are relevant to clinical competence among nursing students. The findings particularly highlight the importance of integrating balancing, analytical, creative, reflective, and experiential processes within clinical learning. The results specifically stress the need to incorporate processes of balancing, analyzing, creating, reflecting and experiencing in clinical learning. This was a cross-sectional descriptive-correlational study thus its results showed association but not causation. Longitudinal and intervention-based research is needed to establish if educational approaches that use integrated experiential learning led to lasting improvements in clinical competence.

Strengths and Limitations

This study has several strengths. First, the sample of undergraduate nursing students is relatively large, giving sufficient statistical power and increasing the reliability of the results. Structured and established measures were also employed to evaluate learning styles and clinical competencies, enabling a systematic evaluation of the relationship between these variables. Furthermore, the presence of students from various years of study in nursing adds to the broader perspective of learning styles and clinical competence in undergraduate nursing education.

However, several limitations should be considered. First, because of the cross-sectional design, causal relationships between learning styles and clinical competencies are not established. Although the findings demonstrated significant associations, it cannot be determined whether particular learning styles contribute to higher clinical competency or whether clinical experiences influence students’ learning styles. Longitudinal studies could yield better evidence of the temporal relationship between these

variables. Second, the study used self-reported data from questionnaires which could be open to responding and social-desirability bias, especially when students assess their own clinical skills. Third, the study involved the nursing students from selected nursing institutes of Lahore, Pakistan, and the results may not be representative of nursing students in other areas or educational institutions. Future studies may benefit by using longitudinal and multicenter designs, objective clinical competence assessments, and include nursing institution from other parts of Pakistan for generalizability and evidence base.

CONCLUSION

This study demonstrated a significant relationship between learning styles and clinical competencies among undergraduate nursing students. Overall, the students reported relatively high levels of both learning-style dimensions and clinical competency. The clinical competency domain with the highest overall score was Therapeutic Measures, and the learning-style dimension with the highest score was Reflecting. The correlation study revealed that all six learning style dimensions were positively correlated with clinical competency. The multiple regression analysis further demonstrated that Experiencing/Acting, Creating/Imagining, Reflecting, Analyzing/Thinking, and Balancing were significant positive predictors of clinical competency, with Balancing emerging as the strongest predictor. Initiating/Deciding had a positive, though not significant, independent association in the final regression model. Based on the findings, it can be concluded that the learning approach that facilitates clinical competence includes an approach that enables students to apply practice, reflection, analysis, creativity, and adaptability. The study highlights the importance of recognizing diverse learning approaches in undergraduate nursing education and designing learning activities that provide opportunities for students to apply, reflect on, analyze, and integrate their knowledge and clinical experiences. The results of this cross-sectional study suggest association, not causation, and future studies with a larger, multi-center, longitudinal design are required in order to deepen the understanding of the relationship between learning style and clinical competency development.

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AUTHOR CONTRIBUTIONS

SJ collected the data. SJ and SJ analyzed and interpreted the data. SJ wrote the manuscript. SJ was responsible for reviewing the paper. SJ made critical revisions and played an essential role in guiding the research process. All authors read the final manuscript and approved the submission.

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DATA AVAILABILITY

The research data from this study are not publicly available due to concerns about participant privacy, but can be obtained from the corresponding author upon reasonable request.

DECLARATIONS

Ethics approval and consent to participate

This research follows the ethical guidelines of the Declaration of Helsinki and has been approved and registered by the University of Lahore's Ethics Committee, with approval number, UOL/IREB/26/19/02/0030 on 09 April 2026. Adhering to informed consent, all participants were volunteers and the investigators adhered to it. All research information will be private and confidential, and will not be used for any other study.

CONSENT FOR PUBLICATION

Not applicable.

COMPETING INTERESTS

The authors declare no competing interests.

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