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Perception of Clinical Simulation Methodology Among Obstetrics Students at the Center for Health Training and Innovation, Universidad Viña del Mar.

Percepción de los Estudiantes de Obstetricia Frente al Uso de la Metodología de Simulación Clínica en el Centro de Entrenamiento e Innovación en Salud de la Universidad Viña del Mar.

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Abstract. Introduction: Clinical simulation has become a key educational strategy in health sciences, promoting critical thinking, technical proficiency, and decision-making. In Midwifery education, it supports the development of clinical competencies in a safe, structured environment. Understanding students' perceptions of simulation-based learning is essential for continuous curricular improvement. **Methods:** A descriptive, observational study was conducted among 171 Obstetrics students at Universidad Viña del Mar during the second semester of 2024. Participants had previous exposure to high-fidelity simulation scenarios at the university's Center for Health Training and Innovation (CEIS). Data were collected using a validated perception survey with Likert-scale items. Descriptive statistics, correlation analyses, and regression models were applied using GraphPad Prism 9.0. **Results:** The survey showed excellent internal consistency (Cronbach's alpha coefficient= 0.94). Overall, student perception was highly positive: over 70% *Agreed* or *Strongly Agreed* on the educational value of simulation. Items related to critical thinking, decision-making, and clinical competence received the highest scores (>80% positive responses). A weak but statistically significant inverse correlation was found between *academic year* and *perception scores* ($r = -0.20$, $p = 0.0054$), suggesting a slight decline in perception among senior students. **Conclusion:** Obstetrics students perceive high-fidelity clinical simulation as a valuable and effective educational tool. The method supports both course-level learning and professional competencies. While satisfaction remains high across academic levels, refinement in scenario design and instructor training may enhance its impact, especially for advanced students. These findings reinforce the role of simulation in competency-based midwifery education.

Keywords: High-Fidelity Simulation, Midwifery Education, Obstetrics Students, Student Perception.

Resumen. Introducción: La simulación clínica es una estrategia educativa clave en ciencias de la salud, que promueve el pensamiento crítico, las habilidades técnicas y la toma de decisiones. En la formación en Obstetricia, permite desarrollar competencias clínicas en un entorno seguro y controlado. Comprender la percepción estudiantil sobre esta metodología es esencial para optimizar su implementación curricular. **Métodos:** Se realizó un estudio descriptivo y observacional en 171 estudiantes de Obstetricia de la Universidad Viña del Mar durante el segundo semestre de 2024. Todos habían participado previamente en escenarios de simulación de alta fidelidad en el Centro de Entrenamiento e Innovación en Salud (CEIS). Se utilizó una encuesta

validada con ítems tipo Likert para evaluar su percepción. El análisis estadístico incluyó estadística descriptiva, análisis de correlación y regresión, mediante el software GraphPad Prism 9.0. **Resultados:** La encuesta presentó una alta consistencia interna (alfa de Cronbach = 0,94). La percepción global fue mayoritariamente positiva: más del 70% de las respuestas se ubicaron en las categorías *De acuerdo* o *Totalmente de acuerdo*. Los ítems sobre *pensamiento crítico*, *toma de decisiones* y *competencia clínica* destacaron con más del 80% de respuestas positivas. Se identificó una correlación inversa débil pero significativa entre el *nivel académico* y los *puntajes de percepción* (r = –0,20; p = 0,0054), indicando una leve disminución en estudiantes de cursos superiores. **Conclusión:** La simulación clínica de alta fidelidad es percibida como una herramienta educativa eficaz por los estudiantes de Obstetricia. Su integración fortalece el aprendizaje teórico-práctico y el desarrollo de competencias profesionales.

Palabras clave: Simulación de Alta Fidelidad, Educación en Obstetricia, Estudiantes de Obstetricia, Percepción Estudiantil.

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1. Introduction

Clinical simulation, which consists of guided experiences that replicate essential aspects of the real world (1), has emerged as a key pedagogical strategy in health sciences education, enabling the development of clinical competencies in a controlled, ethical, and learner-centered environment (2-3). The International Confederation of Midwives (ICM) has endorsed the integration of simulation into Midwifery education to ensure safe and effective training (4). This teaching method is typically categorized by fidelity levels: low-fidelity (e.g., task trainers for specific skills), medium-fidelity (e.g., partial mannequins with limited interaction), and high-fidelity simulation (HFS), which involves complex, immersive scenarios using advanced mannequins or trained actors. HFS enables learners to engage in realistic clinical situations that replicate physiological responses and decision-making processes, making it particularly suitable for training in obstetrics, where real emergencies are infrequent yet high-risk (5-6).

Simulation offers several pedagogical advantages. It provides a safe environment for deliberate practice, allows for the repetition of clinical scenarios without risk to real patients, contributing to patient safety and quality of care (7), and standardizes learning opportunities across student cohorts. Furthermore, simulation fosters reflective learning through structured feedback and debriefing, promoting deeper cognitive processing and metacognitive awareness (8-9). Additionally, students report feeling more confident and prepared to manage both routine and critical care situations, which may translate into improved maternal and neonatal health outcomes (10).

In Latin American countries such as Chile, Brazil, and Mexico, clinical simulation has been incorporated into academic settings for over two decades, experiencing notable growth within higher education institutions. It is widely implemented as a core strategy to foster clinical skills, critical thinking, and professional competence (11). A study conducted in Chile indicates that, beyond enhancing clinical competencies, simulation can also strengthen students' sense of self-efficacy in successfully performing tasks (12).

Despite its widespread use and perceived benefits, there is still a notable shortage of studies evaluating the actual impact of HFS on student learning and professional development in midwifery programs. This gap is especially evident in Chile and Latin America, were research remains limited and few studies have applied validated perception instruments to assess student satisfaction and learning outcomes (13). Although international literature includes comparable perception instruments (14-15), substantial contextual differences- such as curricular structures,

pedagogical models, and resource availability- make local evaluation essential for understanding how students in the region experience simulation- based education.

The Center for Health Training and Innovation (CEIS) at Universidad Viña del Mar is a simulation center that plays a central role in Midwifery education, as it is integrated transversally throughout our curriculum and contributes to the progressive development of clinical competencies. This institutional context is particularly relevant in Chile—a country where Midwifery is an independent undergraduate degree (16), unlike other nations in the Americas such as Mexico, Brazil, and Colombia (17), as well as most countries in Europe, Asia, and North America, where Midwifery is structured as a post-nursing specialization (18-19)—which places CEIS in a unique position to operationalize a longitudinal, simulation-rich curriculum. In our Midwifery program, simulation-based experiences begin early in the curriculum—starting in the third semester with the Nursing Procedures course—and extend across every academic term, with approximately 45% of all disciplinary courses incorporating structured simulation activities. Additionally, the entire Neonatology Internship is conducted within the CEIS, allowing students to engage in high-fidelity scenarios that replicate complex neonatal care before entering real clinical environments. This continuous exposure positions CEIS not only as a platform for identifying opportunities to refine simulation methodology, but also as a key contributor to strengthening students' confidence, thereby improving patient safety during their transition to clinical practice.

The objective of this study was to evaluate obstetrics students' perceptions of high-fidelity clinical simulation at the Center for Health Training and Innovation (CEIS) of the Universidad Viña del Mar and to assess the internal consistency of the validated perception instrument used. A secondary objective was to explore the relationship between *student perceptions* and *sociodemographic* or *academic characteristics*, thereby contributing to a deeper understanding of the educational impact of simulation in Midwifery training. By producing context-sensitive data using a validated instrument, this study contributes novel insights to regional literature and strengthens the empirical foundation for simulation-based education Midwifery. Furthermore, the evidence generated through this study may support curricular improvements in other health sciences programs at our university, drawing on the successful and long-standing implementation of simulation within the Midwifery curriculum.

2. Methods

2.1. Study design

This was a non-experimental, descriptive, and observational study.

2.2. Sample Size

The study population consisted of 305 students enrolled in the second academic semester of 2024, distributed across the following courses: Neonatology II (70 students), Pathological Obstetrics (66 students), Newborn Clinical Practice (101 students), and Clinical Internship (68 students). A representative sample size was calculated using the formula for finite population sampling, considering a 95% confidence level and a 5% margin of error.

2.3. Participants

The inclusion criteria were: (a) be regular students of the Obstetrics program at the Universidad Viña del Mar from the sixth semester onwards; (b) have participated in one or more high-fidelity simulation scenarios at CEIS, within the courses Neonatology II, Pathological Obstetrics, Newborn Clinical Practice, or Internship; and (c) have signed the informed consent form**.** And the exclusion criteria were: any of the following conditions: (a) not be regular student of

the Obstetrics program at Universidad Viña del Mar from the sixth semester onwards; (b) no prior experience in high-fidelity simulation scenarios at CEIS; and (c) failure to sign the informed consent form.

2.4. Informed Consent

Participation in the study was voluntary and confidential. Students were informed that their decision not to participate would not affect their involvement in their academic activities.

2.5. Ethics Committee

This study was approved by the Scientific Ethics Committee of Universidad Viña del Mar (Approval Code 36-24, August 13, 2024).

2.6. Evaluation Instrument

The instrument applied was titled *"Obstetrics Students' Perception of the Clinical Simulation Methodology at CEIS."* It consisted of two sections, section I: Personal and sociodemographic information, comprising 13 multiple-choice questions and section II: Clinical Simulation Quality and Satisfaction Survey, which included 16 Likert-scale questions (Q1-Q16; Table 1), each with five response options scored from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). This section was based on a survey previously validated in Chile by Astudillo et al (1). That study confirmed the instrument's suitability for comprehension by undergraduate students, in a sample highly comparable to the one used in the present study (1). Responses were scored by summing the values assigned to each item in Section II, yielding a maximum possible score of 80, interpreted as a high level of satisfaction, and a minimum of 16, indicating low satisfaction.

Table 1. Section II. Clinical Simulation Quality and Satisfaction Survey. Survey questions (Q1-Q16) are used to assess students' perceptions of clinical simulation at CEIS. Adapted from Astudillo et al., 2017 (1).

N°	Questions
Q1	Simulation is a useful teaching method for learning.
Q2	The scenarios in which simulation takes place are realistic.
Q3	The simulation experience has improved my technical skills.
Q4	Simulation helps to develop critical thinking.
Q5	Simulation helps to develop decision-making skills.
Q6	Simulated cases are aligned with my theoretical knowledge.
Q7	The experience with the simulator has increased my sense of safety and confidence.
Q8	Simulation has helped me to integrate theory and practice.
Q9	Simulator-based workshops have motivated me to learn.
Q10	In simulation, it is useful to watch recordings of one's own performance.
Q11	The duration of the case is appropriate.
Q12	Professor's training is adequate.
Q13	Simulation promotes communication among team members.
Q14	Clinical simulation helps to prioritize obstetric interventions.
Q15	Interaction with simulation has improved my clinical competence.
Q16	The clinical simulation experience has been satisfactory.

2.7. Data Collection Technique

Student recruitment was carried out in the classroom during one of the courses or directly at CEIS. The instrument was administered either by the principal investigator or by the faculty member responsible for the corresponding course. The survey was completed anonymously by the students to protect their identity, using the Google Forms platform, which collected only the information necessary to meet the objectives of the study. All data were safeguarded by the CEIS Directorate at Universidad Viña del Mar. The data were backed up both digitally in a cloud storage system and physically at CEIS, where they will be kept for a period of two years.

2.8. Statistical Analysis

Data were analyzed using GraphPad Prism 9.0 software (La Jolla, CA, USA). Descriptive and inferential statistical methods were applied to assess the perceptions of Obstetrics students regarding the clinical simulation methodology. A quantitative analysis was conducted by establishing absolute and relative frequencies across the different levels of the Likert scale in response to the items for each dimension (Q1–Q16). Data normality was assessed using the Shapiro–Wilk test. When assumptions of normality were not met, non-parametric alternatives were applied. For comparisons involving two groups (e.g., academic levels), the Mann–Whitney U test was used. For comparisons involving more than two groups, one-way ANOVA was applied; when normality assumptions were not fulfilled, Kruskal–Wallis test was used, followed by Dunn's multiple comparison test for post hoc analysis. A significance level of $p < 0.05$ was considered for all analyses. A univariate quantitative analysis was performed using Spearman's correlation to identify the individual association between each sociodemographic variable and satisfaction score obtained about simulation methodology. Internal consistency of the survey instrument was evaluated using Cronbach's alpha coefficient, with values above 0.7 considered acceptable. A multiple linear regression model was applied to identify predictors of overall satisfaction with clinical simulation. Independent variables included *academic level* (third-, fourth-, or fifth-year students, reflecting their level of experience); *type of secondary educational institution* attended prior to university enrollment (public, private, or subsidized); *type of curriculum at that institution* (academic-humanistic or technical); and whether the *student had paid employment* while studying (employed or not employed).

3. Results

The Cronbach's alpha coefficient obtained was 0.94, indicating excellent internal consistency of the instrument. This suggests that the survey items are strongly correlated and consistently measure students' perceptions of clinical simulation at CEIS, Universidad Viña del Mar.

3.1. Sociodemographic Characteristics of the Students Surveyed

The sample of this study consisted of 171 Obstetrics students who voluntarily participated in a survey designed to explore their perceptions regarding academic training. Sociodemographic variables are summarized at table 2.

3.2. Students' Satisfaction Level with the Simulation Methodology

The Shapiro–Wilk test applied to the total score obtained for each question yielded a p-value < 0.0001, indicating that the data distribution significantly deviates from normality. Based on this finding, non-parametric statistical tests were used for comparative and correlational analyses, thereby ensuring the validity of the results. In terms of Obstetrics students' perceptions of the clinical simulation methodology, the data presented in figure 1A reflect a clearly favorable trend. Analysis of the responses shows that 46,2% of participants indicated they *Agree* with the evaluated aspect, while 28,2% reported they *Strongly Agree*. These results highlight a significant predominantly positive perception of the methodology (over 70% of responses). Conversely, negative responses were minimal: only 1,9%

Strongly Disagreed and 4,7% *Disagreed*. Additionally, 16% of the students adopted a neutral stance, selecting the option *Neither agree nor disagree*. The statistical analysis reveals limited variability in responses, as represented by the error bars in the graph, which reinforces the reliability of the data presented. The heatmap format shows these patterns and supports the identification of items with the highest levels of consensus or divergence (figure 1B).

Analysis of the responses to the 16 questions concerning students' perceptions reveal a high proportion of positive responses (Agree and Strongly Agree) for most of the evaluated items (Fig. 2). Questions Q1 (utility of simulation for learning), Q4 (development of critical thinking), Q5 (decision-making skills), and Q14 (clinical prioritization) stand out, with over 80% of responses falling into the positive categories, underscoring students' favorable perception of the educational value of simulation related to reasoning and clinical judgment. For questions such as Q3 (technical skills), Q7 (safety and confidence), Q8 (integration of theory and practice), and Q15 (clinical competence), the proportion of positive responses ranges from 70% to 80%, reflecting a favorable impact, albeit with slight variability in students' perceptions. Conversely, in items such as Q2 (realistic scenarios), Q10 (utility to watch one's own performance) and Q11 (duration of simulation cases), neutral responses (Neither agree nor disagree) had a higher percentage compared to other items, suggesting a more divided perception or uncertainty in these aspects. Negative responses (Disagree and Strongly Disagree) were minimal across all questions, not exceeding 10% in any case. These findings suggest that students value simulation primarily for its contribution to the development of cognitive and decision-making competencies.

3.3. Perception scores by academic level

The distribution of total *perception scores* across *academic years* is shown in figure 3A. The average total survey scores were similar among third-, fourth-, and fifth-year students, remaining within a range close to 60-65 points. Third- and fourth-year students exhibited higher median scores compared to fifth-year students. While the score dispersion was relatively wide in all groups, fifth-year students demonstrated a greater presence of low outliers, indicating increased variability in their perception of the clinical simulation experience. Figure 3B displays the trend in mean total scores by *academic year*, including error bars representing ±1 standard deviation. A gradual downward trend was observed as students progressed through the curriculum. The highest mean score was reported by third-year students, followed by a slight decrease in the fourth year, and a more pronounced reduction in the fifth year. Univariate analysis using Spearman's correlation revealed a weak relationship between academic level and the total score obtained on the perception survey ($r = –0.2$), indicating that this variable accounts for only a small portion of the variability observed in satisfaction levels. Nevertheless, this association achieved a statistically significant ($p= 0.0054$), indicating that it is unlikely to have occurred by chance. In this regard, the results indicate that as students progress in their academic training, they tend to report slightly lower satisfaction scores. This trend, although modest, may be influenced by additional factors not considered in this analysis and warrants further exploration in future studies. On the other hand, the remaining sociodemographic variables analyzed did not show a significant association with the satisfaction levels reported in the survey ($p > 0.05$).

Multiple linear regression analysis provided specific results regarding the relationship between academic level and the scores obtained for each of the survey questions (data not shown). This analysis revealed negative correlations, which are mostly weak, between academic level and nearly all questions (Q1 to Q16). The most notable result was observed for Q1 ($r = –0.26$), suggesting that as academic level increases, scores for the item "Simulation is a useful teaching method" tend to be slightly lower. The remaining correlations with academic level ranged from –0.15 to –0.21, indicating a moderately low inverse relationship.

3.4. Interrelated dimensions of students' perceptions

The analysis of associations among the 16 survey items (Q1 to Q16) revealed predominantly positive correlations, many of which were of moderate to strong magnitude ($r > 0.60$). This pattern supports the internal consistency of the instrument and suggests that the items assess conceptually interrelated dimensions of students' perceptions of clinical simulation, such as usefulness, critical thinking, confidence, motivation, and competence (figure 4).

One of the strongest observed associations was between Q4 (development of critical thinking) and Q5 (simulation helps to develop decision-making skills), with a Spearman coefficient of $r = 0.76$, reflecting the close conceptual link between these two high-level cognitive processes fostered through simulation. Similarly, Q8 (simulation has helped me to integrate theory and practice) was strongly correlated with Q9 (workshops with the simulator have motivated me to learn) ($r = 0.72$), suggesting that integration of theoretical and practical content is closely tied to students' intrinsic motivation. Additional moderate to strong correlations included: Q3 and Q7 ($r = 0.64$): Technical skill development and increased self-confidence; Q3 and Q15 ($r = 0.63$): Technical skills and perceived clinical competence; Q5 and Q6 ($r = 0.62$): Decision-making and theoretical alignment; Q5 and Q9 ($r > 0.60$): Decision-making and motivation; Q5 and Q8 ($r = 0.61$): Decision-making and theory–practice integration; Q13 and Q14, as well as Q15 and Q16, also showed correlation values exceeding 0.60, further underscoring the conceptual interdependence across domains such as communication, prioritization of clinical actions, competence, and overall satisfaction. Collectively, these findings reflect a high degree of coherence across the instrument and reinforce the interrelated nature of learning outcomes derived from clinical simulation. The strong associations between domains such as critical reasoning, decision-making, and motivation suggest that simulation-based experiences are perceived as integrative and pedagogically effective.

In contrast, the variable academic year demonstrated a slight inverse relationship with several of the positively rated items, indicating a possible decline in perception scores as students' progress in their training. This trend may be influenced by increased clinical exposure, heightened criticality, or evolving expectations at advanced stages of professional formation.

Table 2. Sociodemographic characteristics of students who participated in the study. Frequencies (n) and percentages (%) are presented for each category within the main variables.

Sociodemographic variable	Category	n	%
Gender	Female	164	95,9
	Male	7	4,1
Age group (years)	20–25	125	73,1
	26–30	37	21,6
	31–35	9	5,3
Academic level	3rd year	72	42,1
	4th year	69	40,4
	5th year	30	17,5
Area of origin	Urban	149	87,1
	Rural	22	12,9
Current residence	Viña del Mar	112	65,5
	Other Valparaíso municipalities	52	30,4
	Other regions	7	4,1
Type of secondary school	Private	9	5,3
	Public	50	29,2
	Subsidized private	112	65,5
First-generation university student	No	77	45,0
	Yes	94	55,0
Previous higher education	No	158	92,4
	Yes	13	7,6
Has children	No	163	95,3
	Yes	8	4,7
Employment status	No	123	71,9
	Yes	48	28,1

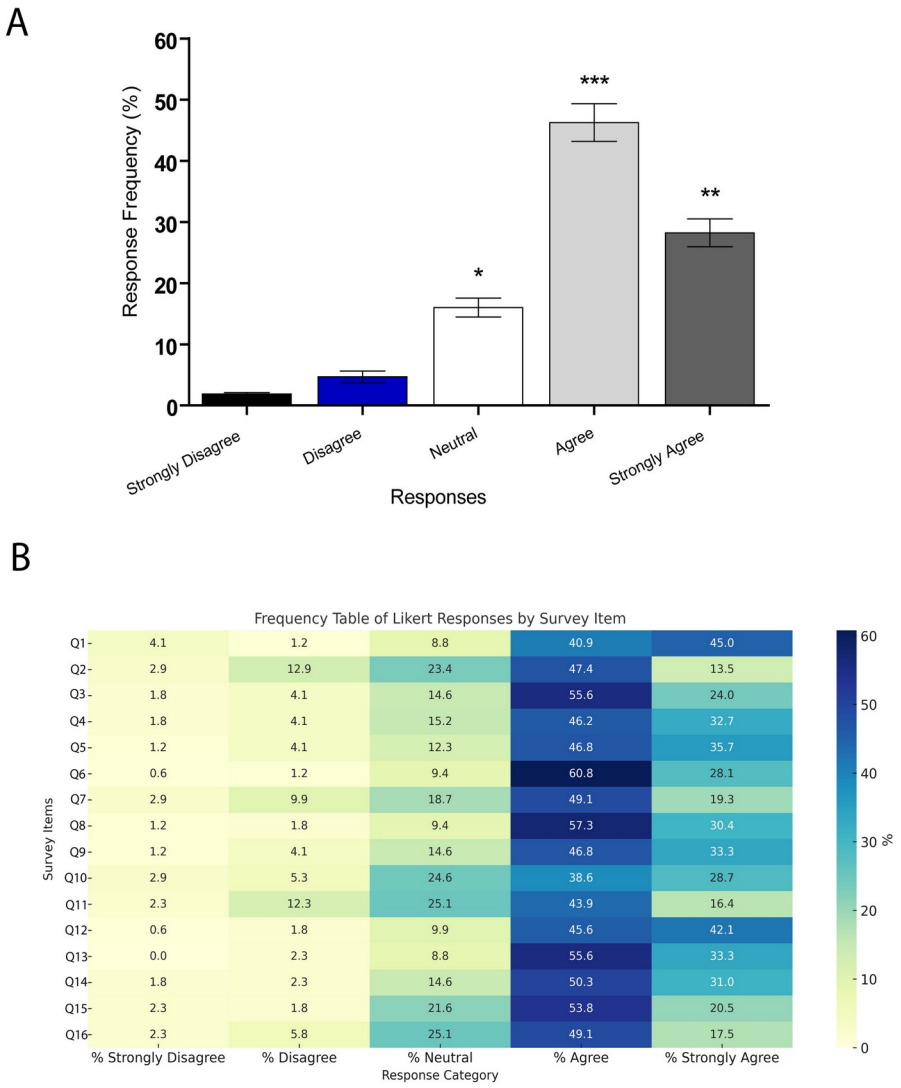

Figure 1. Frequency distribution of the Likert responses by survey item (Q1-Q16). **A.** Bar plot summarizing the overall frequency of responses. Error bars indicate standard deviations. Statistical significance is reported in comparison to the reference group ("Neutral"): *p < 0.05, **p < 0.01, ***p < 0.001. **B.** Heatmap displaying the percentage distribution of responses across the Likert categories, from *Strongly Disagree* to *Strongly Agree.*

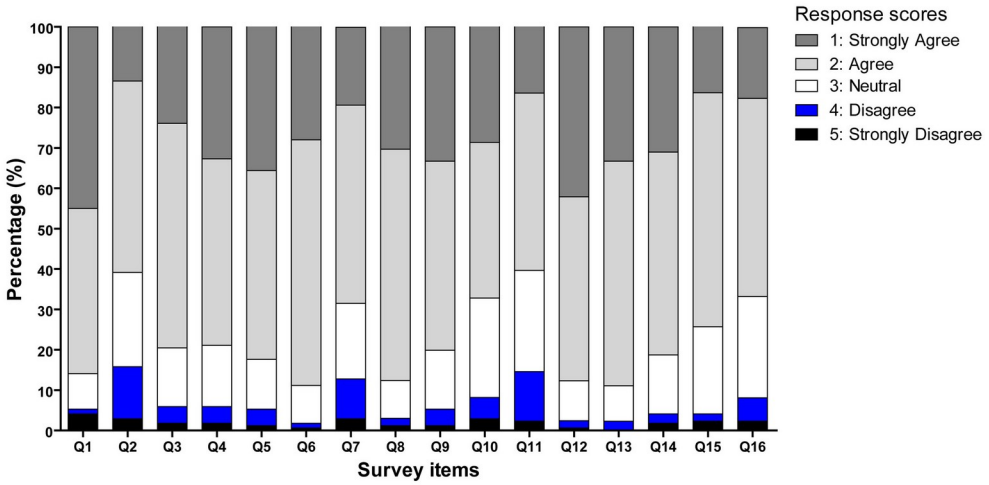

Figure 2. Percentage distribution of responses to perception items regarding clinical simulation. Stacked bar chart showing the proportion of responses on the Likert scale for items Q1 to Q16 of the instrument applied to Obstetrics students.

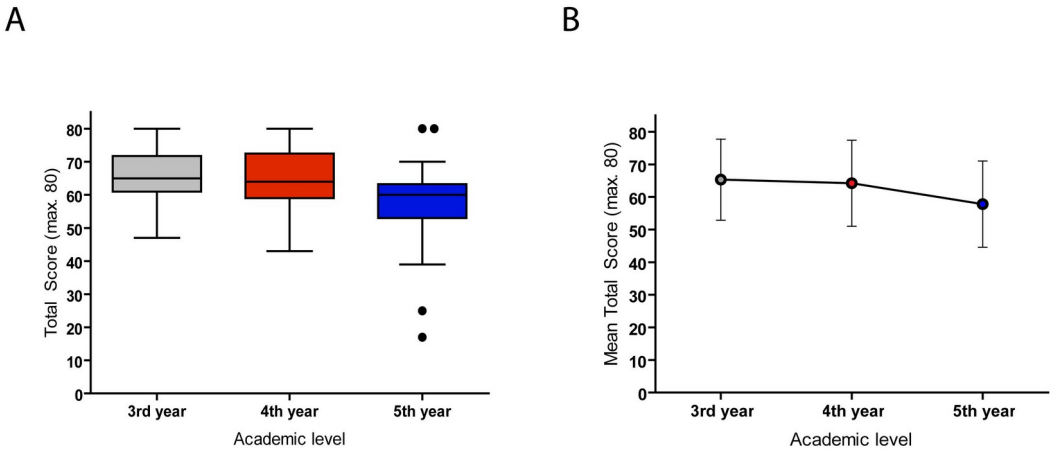

Figure 3. Perception of clinical simulation by academic year. **A.** Distribution of total perception scores by academic year. Boxplot illustrates the distribution of total perception scores for clinical simulation. Each box represents the interquartile range (IQR), with the horizontal line indicating the median score, and whiskers extending to 1.5 times the IQR. Individual outliers are shown as dots. **B.** Trend of total perception scores. Line graph showing the mean total perception scores. Error bars represent one standard deviation.

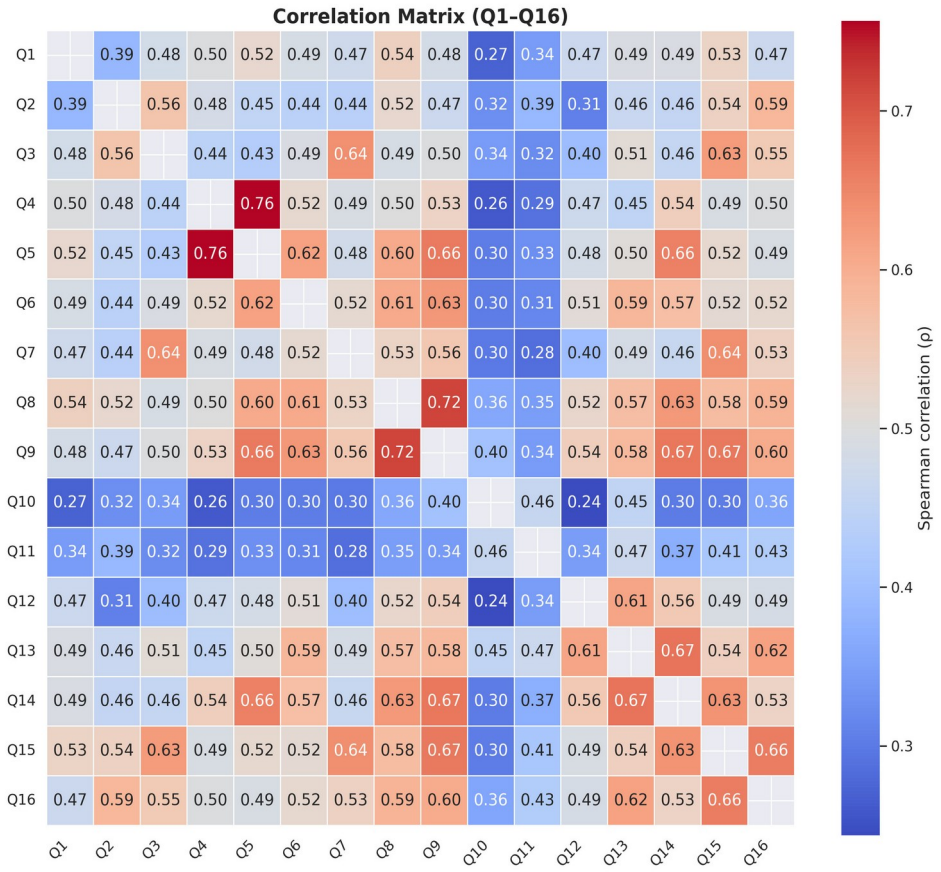

Figure 4. Spearman correlation matrix between survey items Q1 to Q16. Heatmap showing the Spearman correlation coefficients between the 16 Likert-scale items from the clinical simulation perception survey. Each cell represents the strength of the monotonic relationship between a pair of questions.

4. Discussion

This study examined obstetrics students' perceptions of high-fidelity clinical simulation in our institution and assessed the internal consistency of a validated survey instrument. The findings revealed an overall highly favorable evaluation of the simulation methodology. Items addressing *critical thinking*, *decision-making*, *clinical competence*, and *prioritization of obstetric interventions* received particularly high ratings. The instrument demonstrated excellent internal consistency and several moderates to strong inter-item correlations were observed, suggesting coherence across the assessed domains. A slight but statistically significant inverse correlation was found between *academic year* and *perception scores*, indicating a trend toward decreased satisfaction among more senior students.

The demographic profile of the cohort—predominantly women, consistent with the gender distribution typical of Chilean Midwifery programs (20-21) —did not significantly affect perception scores. Similarly, students' geographic origin and high-school background were not associated with differences in perceptions, suggesting that the instrument functions consistently across subgroups and that the student cohort shows relative homogeneity in readiness for simulation-based learning.

The correlation matrix reinforced the multidimensional structure of the instrument, with strong associations among cognitive, technical, and affective dimensions. For example, *critical*

thinking and *decision-making skills* were strongly correlated, as were *theory–practice integration* and *motivation to learn*. Additional associations—such as *technical skills* with *confidence* and *competence*—these relations suggest that students who value one component of the simulation experience are likely to value others, reinforcing the integrative nature of this educational strategy (22–25). The patterns observed here align with studies from Chile, Colombia, and Spain reporting high satisfaction and perceived educational value of simulation (1, 26). Notably, the Manizales study using the same instrument similarly identified critical thinking and decision-making as the most positively rated competencies (27), consistent with findings from broader Latin American and Spanish literature (28).

In our findings, items related to *realistic scenarios*, *video debriefing* and *scenario duration* received more neutral ratings, highlighting specific elements requiring further examination. According to Akaike et al. (29), structured and ongoing training led by qualified instructors is essential to promote the acquisition of clinical skills and critical event management (29). Similarly, Dieckmann et al. (30) emphasizes the importance of scenario design and structured facilitation (30), while Barlow et al. (31) advocates for the development of clear simulation guides to support learning (31). These considerations highlight the need for continued investment in faculty members development and instructional design by institutions.

These findings are consistent not only with regional trends but also with global literature addressing similar pedagogical challenges. A broader examination of international evidence shows that the challenges identified in our study—particularly regarding scenario realism, debriefing quality, and session duration—are widely documented across diverse educational contexts. Students' neutral evaluations align with literature indicating that simulation effectiveness depends critically on the quality of instructional design, prebriefing, and especially structured debriefing (32,33). When these components are insufficiently developed or inconsistently applied, learners tend to perceive the simulation as less realistic and less effective, which mirrors the patterns observed in our data.

Formative studies conducted in Latin American institutions report similar issues, particularly those related to limited standardization of scenario templates and gaps in facilitator preparation. In Mexico, Olvera-Cortés et al. (34) found that the absence of structured debriefing guides and insufficient faculty training were recurrent factors affecting learners' perceived usefulness and reflective depth of simulation-based learning (34). This aligns with our results and suggests that students may be recognizing potential but unrealized pedagogical value within certain simulation components.

European and U.S. research reinforces this interpretation by underscoring that high-quality debriefing requires specific facilitator competencies and consistent application of structured models such as DML or PEARLS. Niu et al. (35) demonstrated that structured debriefing methods significantly improve critical thinking and clinical decision-making, while inconsistent approaches produce more ambiguous learning experiences (35). Similarly, Rueda-Medina et al. (36) provide evidence showing that debriefing enhances learning outcomes when implemented through clear guides and focused feedback (36)—elements that may be insufficiently standardized in our context. Leading universities and international organizations have addressed these challenges by implementing robust faculty development programs focused on structured debriefing, scenario design, and pedagogical standardization (37-38).

Regarding scenario design, recent European research highlights that the use of standardized templates—with clearly articulated learning objectives and fidelity levels aligned to students' developmental stage—enhances perceived realism and supports deeper debriefing. Martins et al.

(2023) demonstrated that systematically designed scenarios increase immersion and facilitate transfer to real clinical environments (39). As highlighted by Harrington and Simon (40) effective simulation requires deliberate and structured scenario design, including clearly defined learning objectives, appropriate levels of fidelity, and careful alignment between activities and intended outcomes. When these elements are insufficiently developed, the educational impact of the simulation may be reduced (40). These findings indicate that neutral evaluations in our study should be understood as opportunities for pedagogical strengthening rather than methodological shortcomings. The evidence suggests that improvements should focus on: (a) standardizing scenario design using institutional templates aligned with the Society for Simulation in Healthcare (41); (b) expanding faculty development in structured debriefing, including the use of video-based reflective tools; (c) tailoring scenario duration and complexity to students' academic level to optimize cognitive load and realism; and (4) implementing systematic processes of review and continuous improvement inspired by successful international programs.

It is important to interpret these neutral ratings within the broader international context. Studies from Europe, the United States, and Latin America consistently report similar challenges when simulation programs lack fully standardized instructional design and continuous faculty training (37, 42). The convergence of our findings with this literature demonstrates that these issues are not unique to one institution but represent a global implementation challenge. In this sense, the present study contributes to both national and international scholarship by providing empirical data from Midwifery education and reinforcing the need to strengthen instructional design and faculty development as essential components of high-quality simulation-based education.

Importantly, our study demonstrated alignment between the students' positive perceptions and the declared learning outcomes of the academic courses where simulation was implemented in CEIS. Courses such as Neonatology II, Pathological Obstetrics, Newborn Clinical Care, Ultrasound Internship, and the final Professional Internships in Obstetrics and Neonatology explicitly target competencies in clinical reasoning, emergency response, patient safety, and interprofessional collaboration. These outcomes correspond directly with our Midwifery graduation profile, particularly competency on biopsychosocial care, competency on neonatal care, competency on community and educational engagement, and competency on clinical and organizational management. Also, the methodology enables the integration of theoretical knowledge with practical application, thereby strengthening the connection between academic instruction and clinical competence.

The moderate inverse association between *academic year* and *perception scores* may reflect rising expectations, increasing academic demands, or greater clinical exposure among advanced students. This suggests the need to adapt simulation scenarios to students' developmental stage by increasing authenticity and complexity. For example, fifth-year students may benefit more from interdisciplinary team simulations or simulations involving ethical decision-making. The implementation of strategies such as peer-assisted learning and structured video-based feedback representing a targeted strategy to address the needs of more advanced learners. In this regard, Dennis et al. (43) reported that peer-assisted simulation-based clinical placements significantly improved students' confidence and perceived learning, particularly among those at advanced stages of training (43). Similarly, Feng et al. (44), in a scoping review of systematic reviews, concluded that peer-assisted learning enhances confidence, knowledge consolidation, and student satisfaction, especially at more senior academic levels (44). Furthermore, a study published in JMIR Medical Education (2021) emphasized that while peer learning is beneficial, effective faculty supervision remains essential to ensure quality learning experiences during clinical simulation (45).

Simulation-based education has been consistently recognized as a valuable instructional strategy that facilitates not only technical skills but also critical thinking, decision-making, and teamwork (30, 46). As observed in our study and corroborated by Janighorban et al. (47), students' positive satisfaction suggests that they feel they are meeting the intended course competencies (47). Simulation should be a structured and permanent element of Midwifery training, with a balance between theory and practice, in line with guidance from the International Confederation of Midwives (ICM). The *Global Standards for Midwifery Education* and their *Companion Guidelines* emphasize that pre-service education must integrate academic coursework alongside supervised clinical and simulation-based experience, embedded within a competency-based curriculum (4).

From a curricular standpoint, the findings here suggest that clinical simulation effectively supports both the specific learning outcomes of individual courses and the overarching graduation competencies of our Midwifery program. Programs may benefit from expanding reflective elements (e.g., video debriefing), offering progressive scenario complexity, and ensuring that instructors receive continuous pedagogical training. The instrument's robust psychometric properties further support its use for ongoing evaluation of simulation-based education.

Although the cross-sectional and self-reported nature of this study introduces inherent limitations, this design is appropriate for research aimed at characterizing subjective perceptions rather than evaluating objective performance. Cross-sectional surveys are widely used in simulation research to establish baseline trends in satisfaction, perceived competence, and instructional quality, particularly in exploratory studies (48-49). However, the use of self-report may introduce social desirability bias, and the absence of objective performance indicators—such as OSCE scores or behavioral checklists—limits the interpretation of simulation's direct impact on skill acquisition (7). This omission reflects curricular constraints rather than a conceptual oversight, as simulation activities at CEIS are integrated in approximately 45% of the Midwifery courses, making it impractical to form comparison groups. Additionally, the study was conducted in a single academic institution and relied on voluntary participation, which may lead to selection bias and restrict generalizability. Nonetheless, the present findings provide a valuable foundation for future longitudinal and mixed-methods studies that could examine changes over time, incorporate objective measures of clinical performance, and strengthen the evidence base for simulation-based education (8). Future research should include longitudinal follow-up, performance-based assessments, and qualitative exploration of subjective learning experiences to complement perception-based findings. Comparisons across academic programs and health professions would further strengthen generalizability, while controlled interventions could help refine aspects of the simulation experience that received more neutral evaluations, such as case duration and audiovisual feedback. Additionally, multicenter studies—including institutions with diverse pedagogical models and technological capacities—would help determine whether the trends observed at CEIS are consistent across educational contexts or reflect unique institutional characteristics.

Recent international literature also emphasizes the importance of incorporating qualitative or mixed-method approaches to capture dimensions of the simulation experience that quantitative surveys cannot fully assess—such as emotional engagement, perceived authenticity, team dynamics, and cognitive load. Qualitative analyses provide deeper insight into how learners interpret simulated scenarios and how these experiences influence It is important to interpret these neutral ratings their professional identity, motivation, and reflective capacity (5, 9). Integrating such approaches in future research is particularly relevant in settings where simulation is expanding rapidly and institutional models vary across programs.

Based on these findings, curriculum development efforts at CEIS could benefit from incorporating progressive scenario complexity, expanding opportunities for structured video-based debriefing, and providing ongoing faculty development in simulation pedagogy (31). These adjustments would help align simulated experiences with students' evolving clinical expectations and ensure that simulation remains a high-value component throughout all stages of Midwifery education (30).

5. Conclusions

- This study provides robust evidence that obstetrics students perceive high-fidelity clinical simulation as a highly valuable and effective educational strategy. Students consistently reported that simulation strengthens critical thinking, decision-making, clinical competence, and confidence, aligning closely with course-level learning outcomes and graduation profile competencies.
- Although overall satisfaction was high, the modest decline observed among senior students highlights the need to tailor scenarios to their developmental stage by incorporating greater complexity, authenticity, and interdisciplinary components.
- The validated perception instrument demonstrated excellent internal consistency, supporting its continued use for evaluating simulation-based education in Midwifery.
- Taken together, these findings reinforce the relevance of integrating high-fidelity simulation as a permanent, competency-based component of health education curricula and underscore the importance of ongoing pedagogical refinement to meet evolving student needs and optimize educational impact.

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