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# DESENVOLVIMENTO DE COMPETÊNCIAS DE LIDERANÇA NO ENSINO DE ENFERMAGEM ATRAVÉS DA PRÁTICA SIMULADA: UM ESTUDO DESCRITIVO-CORRELACIONAL

# DEVELOPMENT OF LEADERSHIP COMPETENCIES IN NURSING EDUCATION THROUGH SIMULATED PRACTICE: A CROSS-SECTIONAL DESCRIPTIVE-CORRELATIONAL STUDY

# DESARROLLO DE COMPETENCIAS DE LIDERAZGO EN LA FORMACIÓN DE ENFERMERÍA A TRAVÉS DE LA PRÁCTICA SIMULADA: UN ESTUDIO DESCRIPTIVO-CORRELACIONAL

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## RESUMO

**Introdução**: Os enfermeiros necessitam aprender e desenvolver competências de liderança para desempenharem um papel relevante no sucesso das organizações de saúde.
**Objetivo**: Descrever as perceções dos estudantes de enfermagem sobre o desenvolvimento de competências de liderança através do treino de simulação, analisar a sua associação com as características sociodemográficas dos estudantes de enfermagem e identificar facilitadores e barreiras.
**Métodos**: Estudo transversal, descritivo-correlacional numa amostra de 74 estudantes de licenciatura e pós-graduação, a frequentar cursos de suporte avançado de vida numa escola de enfermagem em Portugal. A recolha de dados foi efetuada através de uma versão adaptada da escala de perceção de liderança em enfermagem (Frederico & Castilho, 2006). Foram incluídas questões para explorar facilitadores e barreiras. Os dados foram analisados com recurso à estatística descritiva e inferencial.
**Resultados**: Os estudantes revelaram uma perceção muito positiva do desenvolvimento de competências de liderança através do treino em simulação (pontuação média global ≥ 4,42; Likert 1-5) nas dimensões de reconhecimento (M=4,57; DP=0,40), comunicação (M=4,62; DP=0,41), desenvolvimento de equipas (M=4,54; DP=0,41), inovação (M=4,42; DP=0,55) e líder de equipa (M=4,49; DP=0,59). Os principais facilitadores do desenvolvimento da liderança identificados foram o planeamento operacional e reflexão crítica.
**Conclusão**: Este estudo evidenciou a importância da simulação como estratégia pedagógica para o desenvolvimento de competências de liderança. A identificação de facilitadores e barreiras contribui para melhorar a simulação.

**Palavras-chave**: liderança; enfermagem; estudantes de enfermagem; treino por simulação

## ABSTRACT

**Introduction**: Nurses need to learn and develop leadership competencies to play a relevant role in the success of healthcare organizations.
**Objective**: To describe nursing students' perceptions of the development of leadership competencies through simulation training, to analyze their association with nursing students' socio-demographic characteristics, and to identify facilitators and barriers.
**Methods**: Cross-sectional, descriptive-correlational study in a sample of 74 undergraduate and postgraduate students attending advanced life support courses at a nursing school in Portugal. Data were collected using an adapted version of the Nursing Leadership Perception Scale (Frederico & Castilho, 2006). Questions were included to explore facilitators and barriers. Data were analyzed using descriptive and inferential statistics.
**Results**: Students showed a very positive perception of leadership development through simulation training (overall mean score ≥ 4.42; Likert 1-5) in the dimensions of recognition (M=4.57; SD=0.40), communication (M=4.62; SD=0.41), team development (M=4.54; SD=0.41), innovation (M=4.42; SD=0.55) and team leadership (M=4.49; SD=0.59). Operational planning and critical reflection were identified as the main facilitators of leadership development.
**Conclusion**: This study highlights the importance of simulation as a pedagogical strategy for leadership development. The identification of facilitators and barriers contributes to the improvement of simulation.

Keywords: leadership; nursing; nursing student; simulation training

## RESUMEN

**Introducción**: Las enfermeras necesitan aprender y desarrollar habilidades de liderazgo para desempeñar un papel relevante en el éxito de las organizaciones sanitarias.
**Objetivo**: Para describir las percepciones de los estudiantes de enfermería sobre el desarrollo de habilidades de liderazgo a través del entrenamiento con simulación, analizar su asociación con las características sociodemográficas de los estudiantes de enfermería e identificar facilitadores y barreras.
**Métodos**: Estudio transversal, descriptivo-correlacional en una muestra de 74 estudiantes de pregrado y postgrado que asisten a cursos de soporte vital avanzado en una escuela de enfermería en Portugal. Los datos se recogieron utilizando una versión adaptada de la escala de liderazgo percibido en enfermería (Frederico & Castilho, 2006). Se incluyeron preguntas para explorar los facilitadores y las barreras. Los datos se analizaron mediante estadística descriptiva e inferencial.
**Resultados**: Los estudiantes revelaron una percepción muy positiva del desarrollo de habilidades de liderazgo a través del entrenamiento con simulación (puntuación media global ≥ 4,42; Likert 1-5) en las dimensiones de reconocimiento (M=4,57; SD=0,40), comunicación (M=4,62; SD=0,41), desarrollo de equipo (M=4,54; SD=0,41), innovación (M=4,42; SD=0,55) y líder de equipo (M=4,49; SD=0,59). Los principales facilitadores del desarrollo del liderazgo identificados fueron la planificación operativa y la reflexión crítica.
**Conclusión**: Este estudio puso de relieve la importancia de la simulación como estrategia pedagógica para el desarrollo de habilidades de liderazgo. La identificación de facilitadores y barreras contribuye a mejorar la simulación.

**Palabras clave**: liderazgo; enfermeira; estudiantes de enfermeira; entrenamiento simulado

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## INTRODUCTION

Nursing education is evolving to better prepare students for modern healthcare challenges. As nursing education evolves, mastering leadership competencies and incorporating simulation can be critical to preparing the next generation of nurses to provide high-quality, safe patient care (Koukourikos et al., 2021). Leadership competencies are essential for nurse leaders to guide their teams and institutions (Hughes et al., 2022). Simulation-based learning is also becoming increasingly important in nursing curricula due to the possibility of students practicing in a safe environment and practicing clinical skills, decision-making, and teamwork without risking patient harm. Additionally, research shows that simulation enhances students' knowledge, skills, confidence and satisfaction.

This study aimed to characterize nursing students' perceptions of the development of leadership competencies through simulation training in an emergency scenario, to analyze whether these perceptions are associated with nursing students' sociodemographic characteristics (age, gender, and educational level), and to identify facilitators and barriers to the development of leadership competencies through simulation training.

## 1. THEORETICAL FRAMEWORK

Leadership is critical for the success of any organization and has long been of interest to researchers. It is usually defined as a process through which a member of a group or organization influences the interpretation of events, the choice of objectives and strategies, the organization of work activities, the motivation to achieve the objectives, the maintenance of cooperative relationships, the development of competencies and confidence by members (Rego & Pina e Cunha, 2019; Boss, 2022; Dopelt et al., 2023).

Good leaders adapt their leadership to different people and situations. They require a set of competencies and abilities to get things done effectively and usually possess a particular set of attributes and traits, including aspects of personality, temperament, needs, motives, and values (Rego & Pina e Cunha, 2019).

With the growing complexity of healthcare systems, organizations must be prepared to manage crises and train professionals with the competencies necessary to provide a timely and safe response, including leadership competencies (Mota et al., 2022). This problem is even more challenging in health organizations due to the need to manage professionals with a highly technical-scientific differentiation.

The role of leadership in the success of any organization has led today's leaders to learn and develop leadership competencies to optimize their performance. Several learning methodologies and teaching strategies can respond to this need. This study focuses on the potential contributions of simulation training as a pedagogical strategy.

Simulation in nursing education enables students to acquire competencies in a legitimate and authentic environment that closely resembles real-life practice, providing a valuable learning experience. This methodology requires the active participation of the student, allowing the development of instrumental and transversal competencies by recreating complex real-life scenarios, providing students with a high degree of interactivity and realism (Azizi et al., 2022; Baayd et al., 2023).

Studies highlight the role of simulation in the development of leadership competencies such as communication, collaboration, cooperation, time management, decision-making, critical thinking, problem-solving, and delegation (Akselbo et al., 2020).

Despite ample evidence supporting simulation-based learning (SBL) for teaching clinical competencies in healthcare education, its use for teaching leadership competencies is underrepresented in the literature (Boss, 2022).

Leadership competencies encompass both competencies and personal traits crucial for effective leadership. These competencies are fundamental attributes linked to continuous learning. While technical competencies are important, they diminish in significance over a leadership career. Instead, socio-relational competencies and conceptual-strategic abilities become increasingly vital. Personal leadership qualities, such as self-discipline and integrity, complement these competencies. Leaders must acquire a range of competencies throughout their careers, as each is essential for different leadership contexts and levels (Rego & Pina e Cunha, 2019).

Many studies have explored the enhancement of technical competencies via simulation training, yet there remains a lack of data regarding the cultivation of non-technical competencies, such as leadership, among undergraduate and postgraduate nursing students. Moreover, there are no dedicated assessment tools tailored for measuring the progression of leadership competencies through simulation training (Boss, 2022).

## 2. METHODS

This study had an analytical cross-sectional correlational design. It is part of a larger project called SimuCareProCRM® (2018-1-BE01-KA203-038568): Health simulation and crisis resource management to increase the effectiveness of multidisciplinary teams in initial training. This project sought to promote learning procedures through simulation and contribute to the development of transversal competencies for multidisciplinary teamwork in emergency settings focusing on non-technical competencies.

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Simulated scenarios were designed, planned, and validated by simulation researchers/trainers to promote student involvement in their learning based on five characteristics: objectives, problem-solving, fidelity, student support, and debriefing (Feeler, 2019). The STROBE Statement checklist was used to report this study.
Ethical principles inherent to research and the Nurses' Code of Ethics were respected. Institutional authorization was obtained for data collection as well as authorization for adapting the Nursing Leadership Perception Scale, and informed consent was obtained from participants. The Nursing School's Ethics Committee approved this study (No. P566/03-2019).

**2.1 Sample**
The target population of the study consisted of nursing students from a school in central Portugal who attended simulation classes with high-fidelity simulators. The training was offered to 4th-year undergraduate students in the emergency elective course and postgraduate medical-surgical and pediatric nursing students. Nursing students were eligible after giving their consent to complete a simulation training exercise on advanced life support as team leaders, resulting in a sample of 74 students. Data were collected from March to July 2021.

**2.2 Data collection instruments**
The dependent variables were leadership competencies, operationalized into five dimensions: recognition, communication, team development, innovation, and team leader. The independent variables were those expected to change the dependent variables: nursing students' gender (female/male) and educational level (undergraduate/postgraduate).
Considering the objectives of the study and the context of data collection, an adapted version of the Nursing Leadership Perception Scale validated by (Frederico & Castilho, 2006), complemented with a set of questions directed at the competencies of the Team Leader (TL) in the context of simulation training, developed based on preliminary theoretical research. During the adaptation process, face validity was associated with a panel of 5 expert judges in the field of study (Allen et. al, 2023).
Although it was considered a prerequisite for changes to obtain at least 80% agreement (Yes/No) among experts, the proposals to maintain or exclude items from the Nursing Leadership Perception Scale obtained 100% agreement. This process resulted in the instrument called "Leadership Competencies Developed Through Simulation Training in Nursing Education", which was used to measure nursing students' perceptions of leadership competencies developed in an emergency simulated scenario. It comprises 37 items organized into five sections: i) Recognition (12 items; $\alpha$=0.83), ii) Communication (9 items; $\alpha$=0.88), iii) Team Development (8 items; $\alpha$=0.84), iv), Innovation (8 items; $\alpha$=0.85), and v) Team leader (13 items; $\alpha$=0.94). Items are rated on a five-point Likert scale (1 = *Strongly Disagree* to 5 = *Strongly Agree*). Items with negative semantics were reversed so that higher scores indicate a more positive perception of the development of leadership competencies. The scale's internal consistency was very good ($\alpha$=0.95) for the overall scale.
The questionnaire also assesses the importance attributed by nursing students to simulation training as a strategy for acquiring leadership competencies. Students are required to score on a five-point Likert scale (1 = *Not important* to 5 = *Extremely important*). This closed-ended question is followed by two open-ended questions for respondents to describe facilitators and barriers to the development of leadership competencies through simulation training.

**2.3. Statistical analysis**
Data were analyzed using IBM SPSS for Windows, version 25. Descriptive analysis was used for continuous variables (mean and standard deviation) and categorical variables (frequencies and percentages). Items with negative semantics were inverted so that higher mean values corresponded to a more positive perception.
Non-parametrical tests of inferential statistics were used due to the small sample size, non-normal sample distribution, and non-homogeneity population variance (Marôco, 2021).
Cronbach's alpha was used to measure internal consistency, and statistical significance was set at 5% ($p<.05$).
Given the simple and short answers obtained in the two open-ended questions, a frequency analysis was performed. Data were organized based on the principles of descriptive content analysis.

## 3. RESULTS

Of a total of 74 respondents, 62 were female (84%). Most participants were postgraduate nursing students (n=51). Undergraduate nursing students represented 31% of the sample (n=23). The mean age was 33 years (SD=±10.20), ranging from 21 to 58 years. Table 1 shows participants' sociodemographic characteristics.

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**Table 1 -** Sociodemographic characteristics of the sample

| Variables | | Undergraduate (n=23) | Postgraduate (n=51) | Total (n=74) |
|---|---|---|---|---|
| **Gender** | Male, n (%) | 6 (26,09%) | 6 (11.76%) | 12 (16%) |
| | Female, n (%) | 17 (73.91%) | 45 (88.24%) | 62 (84%) |
| **Age** | Mean age (SD) [min-max] | 22.00 (.80) [21-24] | 37.75 (8.54) [22-58] | 33 (10.20) [21-58] |

Note: SD=standard deviation; min=minimum; max= maximum

*Nursing students' perceptions of the development of leadership competencies through simulation training in emergency scenarios*
The descriptive analysis of the different dimensions (Table 2) showed that the mean scores for all dimensions were 4.42 or higher, indicating a very positive perception of the development of leadership competencies through simulation training. The values observed highlight that nursing students' perceptions of the development of leadership competencies were very high in the dimensions communication (M=4.62; SD=±0.41), recognition (M=4.57; SD=±0.40), and team development (M=4.54; SD=±0.41). In these dimensions, the minimum items' response value observed was always greater than 3, indicating that all of them contributed to the development of leadership competencies. The highest mean value (M=4.62; SD= ±0.41) was observed in the communication dimension. Students value being treated with respect and dignity: "Does not treat people with dignity and respect" (inverted M=4.80; SD= ±0.44). They also valorize, in the recognition dimension, follow items: "Operates with integrity demonstrates honesty, keeps commitments, behaves consistently" (M=4.78; SD=0.56) and "Offers to help team members overcome functional barriers and see beyond their function, making them feel 'we are in this together'" (M=4.76; SD= ±0.54).
On the other hand, students show less agreement with the development of leadership competencies through simulation in the following items: "Uses humor appropriately to avoid embarrassing situations" (M=4.11, SD= ±0.93); "Uses the win-win technique to resolve conflicts between team members" (M=4.20; SD= ±0.88) in the recognition dimension and "The team leader secured material resources" (M=4.19; SD=±0.98) in the team leader's dimension.

**Table 2 -** Descriptive statistics of the dimensions of Leadership competencies developed through simulation training in nursing education

| Dimensions | Min. | Max. | M | SD |
|---|---|---|---|---|
| Recognition (12 items) | 3.60 | 5.00 | 4.57 | ±.40 |
| Communication (9 items) | 3.44 | 5.00 | 4.62 | ±.41 |
| Team Development (8 items) | 3.38 | 5.00 | 4.54 | ±.41 |
| Innovation (8 items) | 2.75 | 5.00 | 4.42 | ±.55 |
| Team Leader (13 items) | 1.00 | 5.00 | 4.49 | ±.59 |

Note: SD=standard deviation; Min=minimum; Max=maximum

Assuming nursing students' perceptions of the development of leadership competencies through simulation training in emergency scenarios may differ based on the participants' gender or level of nursing education, the results of the inferential analysis are presented below (Table 3).
The Mann-Whitney U-test for two independent samples allows us to conclude that no statistically significant differences ($p > .05$) were observed between female and male students in the communication, innovation, and team leader dimensions. However, female students had a more positive perception than male students in the recognition dimension (female mean ranks = 39.73; male mean ranks = 26.00; $p = .04$) and team development dimension (female mean ranks = 39.80; male mean ranks = 25.63; $p = .04$).
Table 3 also illustrates that there are no statistically significant differences ($p> .05$) between undergraduate and postgraduate students across dimensions of recognition, team development, innovation, and team leadership. However, in the communication dimension, it is notable that undergraduate students exhibit a more favorable perception regarding the development of leadership competencies through simulation training compared to postgraduate students (undergraduate mean ranks = 44.74; postgraduate mean ranks = 34.24; $p = .05$).
Students reported that simulation is very important (M=4.80; SD=0.40) for leadership development in nursing education. Frequency analysis reveals that students consider simulation training to be highly important for the development of leadership competencies in nursing education, with 80% (n=59) considering that simulation training is extremely important and 20% (n=15) very important.

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**Table 3 -** Mean ranks distribution by dimensions of Leadership Competencies Developed Through Simulation Training in Nursing Education by gender and educational level (Mann-Whitney U-test)

| Dimensions | Variable | *n* (74) | Mean ranks | *p*-value |
|---|---|---|---|---|
| | | ***Gender*** | | |
| Recognition | Female | 62 | 39.73 | **.04** |
| | Male | 12 | 26.00 | |
| Communication | Female | 62 | 38.99 | .17 |
| | Male | 12 | 29.79 | |
| Team Development | Female | 62 | 39.80 | **.04** |
| | Male | 12 | 25.63 | |
| Innovation | Female | 62 | 38.95 | .18 |
| | Male | 12 | 30.00 | |
| Team Leader | Female | 62 | 38.69 | .27 |
| | Male | 12 | 31.33 | |
| | | ***Educational level*** | | |
| Recognition | Undergraduate | 23 | 38.50 | .79 |
| | Postgraduate | 51 | 37.05 | |
| Communication | Undergraduate | 23 | 44.74 | **.05** |
| | Postgraduate | 51 | 34.24 | |
| Team Development | Undergraduate | 23 | 41.87 | .24 |
| | Postgraduate | 51 | 35.53 | |
| Innovation | Undergraduate | 23 | 43.96 | .08 |
| | Postgraduate | 51 | 34.59 | |
| Team leader | Undergraduate | 23 | 43.07 | .13 |
| | Postgraduate | 51 | 34.99 | |

*Facilitators and barriers to the development of leadership competencies through simulation training in emergency scenarios in nursing education*

The results of the analysis of the open-ended questions that explore the facilitators and barriers to the development of leadership competencies through simulation training are presented in Table 4.

The analysis of facilitating factors revealed three main categories: operational planning, critical reflection, and training. According to the students, operational planning enhances decision-making and scenario assessment competencies by allowing task delegation and priority setting during pre-briefing. Critical reflection enables leaders to analyze performance, identify strengths and weaknesses, and develop improvement strategies. Simulation training offers opportunities for personal leadership reflection, adaptation to dynamic environments, and application of knowledge from past experiences. Nursing students also highlighted the benefits of teamwork training, emphasizing its role in conflict management within an environment of trust and respect, with active participation from all team members. Simulation in realistic contexts aids competency development through repetition and enhances adaptability to real-life scenarios. Communication training is essential for feedback provision, information systematization, error reduction, team effectiveness, and safety assurance. Leadership training enhances awareness of leadership competencies, reduces anxiety, and increases confidence among nursing students.

**Table 4-** Facilitators to the development of leadership competencies

| | **FACILITATORS** | |
|---|---|---|
| **Category** | **Subcategory** | **n** |
| **Operational planning** | Delegation | 14 |
| | Priority setting | 8 |
| | Resource management | 4 |
| **Critical reflection** | Simulation training performance | 16 |
| | Limitations felt on the leader role | 11 |
| | Leadership competencies analysis | 10 |
| **Training** | Teamwork | 28 |
| | Real-case simulation training | 22 |
| | Communicational competencies | 24 |
| | Team leader role | 9 |

Table 5 presents the barriers to leadership competencies development through simulated practice. Barriers were categorized into three groups: teaching strategy, individual characteristics, and unfamiliarity. Several students noted their lack of experience or "limited exposure to emergency situations" and "challenges with time management" as hindrances to acquiring leadership competencies through simulation. Some expressed that the simulated nature of the training posed constraints, citing differences in timing ("simulation timings differ from real-life scenarios"), the controlled environment, and the inability to experience genuine emotions.

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Nursing students advocated for more simulation training sessions in the curriculum due to "insufficient time for training" and a desire for "increased simulation training opportunities".
Additionally, students highlighted individual traits that impeded the effectiveness of this educational approach, such as communication difficulties ("lack of communication competencies," "inadequate team feedback," and "excessive noise"). Various personality traits were also identified as barriers to developing leadership competencies, including "failure to recognize contributions from other team members," "lack of initiative," "insecurity," "shyness," and "resistance to criticism."
The unfamiliarity with the simulated practice for leadership competencies training was perceived by students as stressful, leading to "fear of making mistakes," "difficulty coping with unpredictable situations," and "nervousness." Moreover, a lack of knowledge about the scenario and human resources led to "discomfort among participants" and "reluctance to take charge."
Furthermore, frequent rotation of team members hindered the development of leadership competencies during simulation exercises.
Participants emphasized the importance of enhancing prior knowledge about the physical environment, equipment functionality, and the potential of various elements to improve team leadership effectiveness in emergency situations.

**Table 5-** Barriers to the development of leadership competencies

| BARRIERS | | |
|---|---|---|
| **Category** | **Subcategory** | **n** |
| **Teaching strategy** | Inexperience or little experience in emergency | 10 |
| | Non-real context | 14 |
| | Reduced evidence of simulation training on the curricula | 5 |
| **Individual characteristics** | Difficulty taking the lead | 10 |
| | Communication difficulties | 9 |
| | Personality trait | 9 |
| | Anxiety | 15 |
| **Unfamiliarity** | Lack of theoretical knowledge | 9 |
| | Lack of knowledge of human resources | 25 |
| | Lack of knowledge of material resources | 4 |
| | Unfamiliarity with the educational model | 2 |

## 4. DISCUSSION

This pioneering study evaluates nursing students' perceptions of developing leadership competencies through simulation training and identifies influential factors in acquiring these competencies in simulated emergency scenarios in nursing education. As Boss (2022) noted, although there is evidence that simulation training effectively teaches clinical competencies, there is little evidence in the literature on using simulation for developing leadership competencies, particularly in nurses. The questionnaire used demonstrated good internal consistency, and while the need to replicate the study with a larger sample is acknowledged, we believe the conducted research provides preliminary evidence to support further studies on how simulation training can effectively teach advanced leadership competencies.
Results allow describing nursing students' perceptions of nursing students on the use of simulation in the development of leadership competencies. Nursing students exhibited highly positive perceptions of enhanced leadership competencies in simulated emergency environments, highlighting the value of this educational approach, as advocated by several authors (Sobral & Ribeiro, 2018; Boss, 2022; Dopelt et al., 2023). Simulation has been a widely used pedagogical strategy in nursing education, recognized for its advantages in promoting learning without risk to the patient, creating scenarios that prepare students for uncommon situations, allowing for repeated practice as necessary, and providing the opportunity to explore the limits of the technique, which is impossible in real contexts (Azizi et al., 2022; Baayd et al., 2023). Considering the complexity of care delivery contexts and the concern for quality and safety in environments requiring collaborative teamwork, several authors emphasize the contributions of simulation to developing transversal competencies that enhance nurses' leadership, particularly in crisis or less common situations (Tschannen et al., 2018; Murphy et al., 2019; Abildgren et al., 2022; Azizi et al., 2022; Boss, 2022; Baayd et al., 2023).
Simulated emergency scenarios provide resuscitation teams exposure to complex environments that demand rapid, effective, and coordinated responses, requiring the team leader to adequately mobilize all resources and contribute to team development. In the present study, students perceived very positively, with average scores above 4, the exercise of leadership across different dimensions: recognition, communication, team development, innovation, and team leadership. These results indicate that students perceive the opportunity to develop different dimensions of leadership competencies, aligning with the conclusions of the systematic review by Abildgren et al. (2022), which states that, like other human factors, leadership can be learned and trained through simulation practices.

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Findings in various leadership dimensions suggest that simulated scenarios allow leaders to develop a broad set of leadership competencies, aligning with insights from other scholars (Tschannen et al., 2018; Abildgren et al., 2022; Dopelt et al., 2023). In the team development dimension, students positively highlight the exercise of leadership competencies through simulation in items such as guiding and motivating team members in their actions, ensuring shared goals and objectives, identifying activities, and setting priorities. Leadership in team development focused on achieving common goals and performing tasks in a team, as explained by Rego e Pina e Cunha (2019), is particularly relevant in planning and organizing operations, clarifying roles of the team members, monitoring functions, and cultivating technical and socio-relational competencies, such as communication.

In the communication dimension, students emphasize collaborative work, how leaders treat their subordinates, and provide feedback, support, and guidance to the team. Simulation allows nurses to practice clear and assertive communication in high-pressure situations, improving the ability to convey critical information empathetically and accurately, contributing to more efficient leadership, as highlighted in the systematic review by Abildgren et al. (2022). Other studies also emphasize the importance of collaborative communication in decision-making to set team goals, such as strengthening their self-confidence to voice their opinion and convince others, making decisions under conditions of uncertainty, listening more effectively, and more (Murphy et al., 2019; Dopelt et al., 2023).

When exercising leadership, nurses are expected to use their emotional intelligence competencies in every interaction. Emotional intelligence is the ability of an individual to recognize and manage their own emotions and those of others, thereby facilitating relationships and problem-solving. Several studies have demonstrated a positive relationship between emotional intelligence and leader effectiveness (Raeissi et al., 2019; Frias et al., 2021; Yildirim et al., 2021). Leaders with high emotional intelligence are associated with effectively influencing others, actively listening, building empathetic relationships, and communicating clearly. Mansel and Einion (2019) argue that emotional intelligence is a key component in promoting effective and empathetic leadership, which can increase staff engagement and model emotionally intelligent behaviors. In this context, Yildirim et al. (2021), emphasize the importance of nursing students having the opportunity to develop their leadership and emotional intelligence competencies during their nursing training.

Regarding recognition, students express strongly positive opinions about simulation as a strategy for developing the personal, socio-relational, and conceptual competencies of leaders. Integrity, support, and strengthening team cohesion emerge as key aspects emphasized by students. According to Murphy et al. (2019), these elements are particularly crucial in simulated scenarios involving newly formed teams, as is the case with the students who participated in the present study. Students in our research highlight that simulation training allowed them to understand the importance of the leader helping team members overcome functional barriers, see beyond their function, and develop a sense of belonging to the team. Considering that in simulation training, groups are formed at the moment, and students are not used to working together, the leader's role is particularly relevant in guiding the team's work.

In the present study, although with slightly lower agreement values, students also valued the development of leadership competencies in the innovation dimension when the leader promotes shared values in teamwork in pursuit of excellence, clearly communicates delegated responsibilities, and promotes and supports new experiences and innovative ideas. Simulated scenarios expose the team to complex environments that require a rapid and effective response from that group of individuals, expecting a sharing of objectives, knowledge, competencies, attitudes, and continuous monitoring of the work developed, both individually and as a team. Observed results in the team leader dimension, which evaluates some specific aspects of the leader's competencies in simulation training, show that students valued the functions performed by the leader in managing the event, delegating functions, promoting an environment conducive to good performance, recognizing individual efforts, developing frequent evaluations and precise guidance to team members, encouraging decision-making by providing encouragement and material resources. According to Murphy et al. (2019), Abildgren et al. (2022), and Boss (2022), the opportunity to experience leadership in times of crisis strengthens self-confidence and self-reflection, producing lasting learning experiences.

In summary, the results of the descriptive analysis highlighted the importance of the team leader, showing that nursing students perceive simulation training as a very important pedagogical strategy in developing nurses' leadership competencies. As advocated by many authors, this teaching methodology contributes to increased self-confidence, satisfaction, and improvement of technical and non-technical leadership competencies in health professionals (Miranda et al., 2018; Boss, 2022; Dopelt et al., 2023).

In the present study, we included undergraduate students and students attending postgraduate training, assuming that nursing leadership is part of the competencies of general care nurses and specialist nurses and that at both levels of training, leadership competency development is required. As defended by Abildgren et al. (2022), simulation is an effective pedagogical strategy for developing both novice and expert professionals, contributing to training and improving technical and non-technical competencies.

The inferential analysis conducted indicates that nursing students' perceptions of developing leadership competencies are not affected by educational level or gender. Although there are generally no gender differences in most leadership dimensions, females tend to have more positive views on aspects of recognition and team development. This observation may be attributed to intrinsic feminine traits that prioritize interpersonal connections, teamwork, and empathy, as highlighted by Miranda et al. (2018), and Sobral & Ribeiro (2018).

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The responses to open-ended questions provided insights into nursing students' perspectives on facilitators and barriers to developing leadership competencies through simulated scenarios. Facilitators were categorized into operational planning, critical reflection, and training. Operational planning was considered crucial for leaders to analyze situations, organize resources, delegate tasks, and set priorities, aligning with previous studies emphasizing its importance in leadership development (Miranda et al., 2018; Murphy et al., 2019).

Debriefing sessions were valued by students to reflect on performance, identify developed competencies, and promote self-knowledge, critical thinking, and self-confidence, consistent with findings from many authors (Alhaj Ali et al., 2020; Abildgren et al., 2022; Boss, 2022; Dopelt et al., 2023).

Students also appreciated the opportunity to apply theoretical knowledge in realistic simulated scenarios, particularly in teamwork and communication, as observed in studies by Miranda et al. (2018), Akselbo et al. (2020), and Russell et al. (2020).

However, restrictions hindering leadership development were identified. These included issues with the teaching strategy, individual characteristics, and lack of knowledge. Students noted that unrealistic scenarios and limited experience with emergency situations impeded competency development, echoing findings by Akselbo et al. (2020). Additionally, individual characteristics such as communication difficulties and anxiety were identified as barriers, as discussed by Alhaj Ali et al. (2020).

Moreover, students felt limited by inadequate theoretical knowledge, difficulties in assessing team members' competencies due to frequent team changes, and lack of information about scenarios and equipment, consistent with observations by Murphy et al. (2019). These findings underscore the need to address individual characteristics and knowledge gaps when designing simulated scenarios.

The discussion on facilitators and barriers to developing leadership competencies through simulation training demonstrates the need to improve students' prior preparation before practicing in simulated scenarios.

*Limitations and implications*

Results must be interpreted considering research limitations. The small sample size and the fact that it consisted only of nursing students may have limited the data analysis, requiring some caution in interpreting the obtained results. It is essential to note that the study used a self-report tool, which may have introduced reporting bias, leading to either an overestimation or underestimation of the construct. On the other hand, the scarcity of quantitative studies using specific data collection instruments for the assessment of leadership competencies in simulation contexts also hindered the discussion of the results.

Regarding the implications for care practice, this study highlights the potential of simulation in developing leadership competencies in nursing students, with implications for clinical practice, nursing education, and research development.

## CONCLUSION

Leadership plays a crucial role in improving the performance of healthcare organizations, relying on a combination of technical, socio-relational, conceptual, strategic, and personal competencies that can be learned and developed through simulation. The developed questionnaire showed excellent reliability ($\alpha$=0.95), proving to be a useful tool for evaluating nurses' perceptions of the development of leadership competencies through simulation.

This study highlights highly positive perceptions of the development of leadership competencies through simulation training. Students emphasized the promotion of socio-relational competencies, such as effective communication, teamwork, support, and guidance. In terms of recognition, integrity, support, team cohesion, and decision-making support were emphasized. Additionally, in team development, leaders' competencies in guiding, motivating, and prioritizing shared goals were observed. Notably, students' perceptions of leadership development remained consistent across various sociodemographic characteristics, indicating broad relevance. The analysis of facilitators and barriers contributed to improving the design and implementation of simulation scenarios, as well as highlighting the need to enhance students' prior preparation to maximize learning outcomes.

The results of this study highlight the importance of using simulation to develop transversal competencies, particularly leadership competencies, which are essential for teamwork in healthcare institutions. The positive feedback from students and the identification of hindering factors encourage reflection and the adoption of improvements in implementing this pedagogical strategy, thereby contributing to the enhancement of nursing education.

Recognizing the fundamental importance of leadership in the success of healthcare organizations, it is essential to define and implement educational programs in undergraduate and postgraduate nursing curricula that focus on teaching leadership through complex simulated scenarios involving teamwork, with one member assuming the role of the leader. These programs should raise awareness among students and faculty about the crucial importance of developing these competencies from the beginning of academic nursing education, given their relevance to future professional practice.

While the results address the formulated objectives and allow us to conclude that simulated practice is a relevant pedagogical strategy for developing leadership competencies in nursing education, further studies on this topic are necessary, particularly those involving larger samples and multidisciplinary teams. The developed questionnaire demonstrates good internal consistency and has proven useful in recognizing the role of simulation training in developing leadership competencies in nursing students, making it applicable at various educational levels.

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Acknowledging that one of the current challenges is transferring knowledge to clinical practice, future research should prioritize studying how to transfer leadership competencies acquired through simulation to real clinical practice contexts.

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## AUTHOR CONTRIBUTIONS

Conceptualization, A.C., C.T. and R.B.; data curation, A.C. and C.T.; formal analysis, A.C., C.T. and R.B.; funding acquisition, A.C., C.T. and R.B.; investigation, A.C., C.T. and R.B.; methodology A.C., C.T. and R.B.; project administration, A.C. and C.T.; resources, A.C., C.T. and R.B.; software, A.C. and C.T.; supervision, A.C. and R.B.; validation, A.C. and R.B.; visualization, A.C. and R.B.; writing-original draft, C.T.; writing-review and editing, A.C. and R.B.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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