PATIENT SAFETY IN INITIAL NURSING EDUCATION: ATTITUDES, PROFILES, AND IMPLICATIONS FOR TEACHING

SEGURANÇA DO PACIENTE NA FORMAÇÃO INICIAL EM ENFERMAGEM: ATITUDES, PERFIS E IMPLICAÇÕES PARA O ENSINO

SEGURIDAD DEL PACIENTE EN LA FORMACIÓN INICIAL EN ENFERMERÍA: ACTITUDES, PERFILES E IMPLICACIONES PARA LA ENSEÑANZA

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ABSTRACT

This chapter presents an expanded analysis of the profile, attitudes, and perceptions of incoming nursing students regarding patient safety, grounded in the findings of the master's dissertation. Based on the investigation of four consecutive cohorts (2021–2024), the study reveals that students begin their undergraduate training with heterogeneous beliefs, often shaped by idealized notions of care and individual attributions of error. The results highlight weaknesses related to confidence in error reporting, understanding of the inevitability of human fallibility, and recognition of systemic causes underlying adverse events. Significant differences between cohorts suggest that external factors—such as the pandemic context, social narratives, and generational changes—directly influence initial safety attitudes. Psychometric analysis demonstrated that the 30-item APSQ-3 version offers greater robustness for assessing these perceptions, capturing essential nuances for health-care education. Findings reinforce the importance of early pedagogical strategies, integrated curricula, and learning approaches that promote psychological safety, just culture, and systemic understanding of care. By identifying attitudinal patterns prior to clinical exposure, this chapter contributes to designing educational interventions capable of strengthening the patient safety culture from the beginning of nursing education.

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Keywords: Health Education. Nursing Students. Knowledge. Attitude and Practice in Health. Professionalism. Patient Safety.

RESUMO

ste capítulo apresenta uma análise ampliada do perfil, das atitudes e das percepções de estudantes ingressantes em Enfermagem em relação à segurança do paciente, fundamentada nos achados da dissertação de mestrado. Com base na investigação de quatro coortes consecutivas (2021–2024), o estudo revela que os estudantes iniciam a graduação com crenças heterogêneas, frequentemente moldadas por noções idealizadas de cuidado e por atribuições individuais de erro. Os resultados evidenciam fragilidades relacionadas à confiança na notificação de erros, à compreensão da inevitabilidade da falibilidade humana e ao reconhecimento das causas sistêmicas subjacentes aos eventos adversos. Diferenças significativas entre as coortes sugerem que fatores externos — como o contexto pandêmico, narrativas sociais e mudanças geracionais — influenciam diretamente as atitudes iniciais sobre segurança. A análise psicométrica demonstrou que a versão de 30 itens do APSQ-3 oferece maior robustez para avaliar essas percepções, captando nuances essenciais para a formação em saúde. Os achados reforçam a importância de estratégias pedagógicas precoces, currículos integrados e abordagens de aprendizagem que promovam segurança psicológica, cultura justa e compreensão sistêmica do cuidado. Ao identificar padrões atitudinais antes da exposição clínica, este capítulo contribui para o delineamento de intervenções educacionais capazes de fortalecer a cultura de segurança do paciente desde o início da formação em Enfermagem.

Palavras-chave: Educação em Saúde. Estudantes de Enfermagem. Conhecimento. Atitude e Prática em Saúde. Profissionalismo. Segurança do Paciente.

RESUMEN

Este capítulo presenta un análisis ampliado del perfil, las actitudes y las percepciones de estudiantes ingresantes de Enfermería en relación con la seguridad del paciente, fundamentado en los hallazgos de la tesis de maestría. Con base en la investigación de cuatro cohortes consecutivas (2021–2024), el estudio revela que los estudiantes inician su formación de grado con creencias heterogéneas, frecuentemente moldeadas por nociones idealizadas del cuidado y por atribuciones individuales del error. Los resultados evidencian debilidades relacionadas con la confianza en la notificación de errores, la comprensión de la inevitabilidad de la falibilidad humana y el reconocimiento de las causas sistémicas subyacentes a los eventos adversos. Diferencias significativas entre cohortes sugieren que factores externos — como el contexto pandémico, las narrativas sociales y los cambios generacionales — influyen directamente en las actitudes iniciales sobre seguridad. El análisis psicométrico demostró que la versión de 30 ítems del APSQ-3 ofrece mayor solidez para evaluar estas percepciones, captando matices esenciales para la educación en salud. Los hallazgos refuerzan la importancia de estrategias pedagógicas tempranas, currículos integrados y enfoques de aprendizaje que promuevan la seguridad psicológica, la cultura justa y la comprensión sistémica del cuidado. Al identificar patrones actitudinales antes de la exposición clínica, este capítulo contribuye al diseño de intervenciones educativas capaces de fortalecer la cultura de seguridad del paciente desde el inicio de la formación en Enfermería.

Palabras clave: Educación en Salud. Estudiantes de Enfermería. Conocimiento. Actitud y Práctica en Salud. Profesionalismo. Seguridad del Paciente.

1 INTRODUCTION

Patient safety has become consolidated, over recent decades, as one of the fundamental pillars for enhancing the quality of health systems, representing a field of practices, knowledge, and policies aimed at preventing avoidable harm and promoting more reliable, ethical, and sustainable care (Nora; Junges, 2021). Its development has accompanied profound transformations in management models, organizational culture, and the training of health professionals, who have come to recognize error not as an individual moral failure, but as an expression of complex systems subject to multiple human, structural, and organizational factors (WHO, 2021).

Although the contemporary discussion on patient safety gained global visibility following initiatives such as the To Err is Human report, published by the Institute of Medicine in 1999, its historical roots trace back to the work of Florence Nightingale, whose practices in the context of the Crimean War underscored the importance of environmental and organizational conditions for harm prevention. These milestones transformed how error came to be understood in healthcare, shifting from invisibility or punitive treatment to becoming an object of systematic monitoring and institutional learning (Rocha et al., 2024).

The consolidation of national and international policies has helped to anchor this agenda. Notable initiatives include the World Alliance for Patient Safety, established by the World Health Organization, and, in Brazil, the National Patient Safety Program, which standardized practices, protocols, and guidelines aimed at preventing adverse events (Gabriel, 2023). More recently, the Global Patient Safety Action Plan 2021–2030 reaffirmed the global commitment to safer and more resilient health systems, reinforcing the strategic role of education in driving the cultural change required to address patient safety challenges (WHO, 2021).

Within this context, the training of health professionals assumes a central role. The literature shows that, despite regulatory advances, patient safety education remains fragmented, insufficiently integrated into curricula, and often diluted within technical or discipline-specific content. Undergraduate programs—particularly in nursing, the field that accounts for the largest share of the healthcare workforce—tend to address the topic superficially or in a disconnected manner, hindering the development of essential competencies for safe care (Bezerril et al., 2023; Garzin et al., 2021; Matos et al., 2022; Silva, 2021; Uchôa et al., 2023; Zugno et al., 2022).

National studies indicate that patient safety, when present in curricula, appears diffusely, lacking robust pedagogical articulation and exhibiting limited formative intentionality. This gap compromises students' understanding of systemic factors, the

inevitability of human error, and the importance of a just culture—elements essential for incident reporting, prevention, and risk management (Bezerril et al., 2023; Garzin et al., 2021; Matos et al., 2022; Silva, 2021; Uchôa et al., 2023; Zugno et al., 2022).

Considering that incoming students arrive at university with perceptions, beliefs, and expectations already shaped by their educational and social trajectories, it becomes essential to understand which attitudes and knowledge constitute this initial repertoire. This is particularly relevant because such perceptions may directly influence how these future professionals will interpret risk situations, respond to errors, and engage in safe practices.

Against this backdrop, this chapter presents a comprehensive analysis of the knowledge and attitudes regarding patient safety among first-year nursing students at a public institution, drawing on the theoretical-methodological foundations of the master's dissertation available in its original document. The aim is to offer a reflection adapted to the book format, expanding understanding of the role of initial training in building a safety culture and contributing to the academic debate on educational strategies capable of strengthening safe care from the outset of professional formation.

2 OBJECTIVES

The clear definition of a study's objectives is essential for delineating the scope of the investigation, guiding the methodological trajectory, and structuring the interpretation of results. In the context of patient safety—a field characterized by multiple conceptual, behavioral, and systemic dimensions—understanding the attitudes of incoming students makes it possible to identify initial vulnerabilities, guide pedagogical practices, and inform more effective curricular interventions.

This chapter, grounded in the original dissertation, is based on the premise that understanding students' initial formative repertoire is indispensable for strengthening a safety culture from the very beginning of their academic trajectory. To this end, the following objectives are established.

2.1 GENERAL OBJECTIVE

To assess the levels and patterns of knowledge and attitudes regarding patient safety among incoming students of the Nursing program at a public higher education institution, belonging to the cohorts of 2021, 2022, 2023, and 2024, identifying differences and trends in the dimensions evaluated by the Attitudes to Patient Safety Questionnaire – Version 3 (APSQ-3) developed by Carruthers et al. (2009).

2.2 SPECIFIC OBJECTIVES

a) To characterize the sociodemographic profile of incoming students, encompassing relevant individual and contextual variables such as age, biological sex, gender identity, sexual orientation, marital status, income, religion, educational background, and modality of entry into the institution;
b) To analyze the factor structure and psychometric reliability of the 30-item version of the APSQ-3, comparing it with the reduced 26-item model and verifying the adequacy of internal consistency indexes and model fit quality;
c) To describe the distribution of scores across the nine theoretical dimensions of the APSQ-3, assessing statistical aspects such as skewness, kurtosis, normality, and dispersion, in order to support qualitative and inferential interpretations;
d) To compare attitudes regarding patient safety across different cohorts, identifying significant intergroup variations and interpreting temporal or generational trends that may influence initial training;
e) To estimate the effect sizes of the identified differences, thereby qualifying the magnitude of variations between groups and strengthening the pedagogical and managerial interpretation of the findings.

3 METHODS

Understanding the attitudes and knowledge regarding patient safety among incoming students requires a methodological design capable of capturing initial perceptions, conceptual patterns, and variations between groups, as well as ensuring the psychometric robustness of the instruments used. This section therefore describes the methodological pathway of the original research, reorganized and adapted to the book chapter format, with emphasis on expository clarity and the applicability of the findings to the educational context.

3.1 STUDY DESIGN

This is a cross-sectional, descriptive study with a quantitative approach, designed to assess attitudes and knowledge regarding patient safety among incoming Nursing students. As an observational investigation, the cross-sectional design enables the capture of perceptions from different cohorts at a single point in time, facilitating group comparisons and generating hypotheses related to historical and educational contexts.

The writing and methodological conduct followed the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE), widely

recognized as a reference for ensuring transparency, completeness, and quality in the reporting of observational studies (Ghaferi; Schwartz; Pawlik, 2021).

3.2 STUDY SETTING

The study was conducted at the Faculdade de Medicina de São José do Rio Preto (FAMERP), a public higher education institution recognized for its excellence in training health professionals and its long-standing tradition in scientific research. The Nursing program at FAMERP integrates theoretical, practical, and extension activities, playing a strategic role in the training of nurses in the northwestern region of the state of São Paulo.

A escolha desse cenário se justifica por três razões principais:

1. The regional and national relevance of the institution, which trains a significant portion of nurses working in the public and private health systems;
2. The heterogeneity of the analyzed cohorts, entering during years marked by distinct contexts—pandemic, post-pandemic, and sociopolitical changes;
3. The strong teaching–service integration environment, which allows the assessment of initial attitudes prior to in-depth contact with clinical training.

3.3 POPULATION AND SAMPLE

The target population of this study comprised first-year incoming Nursing students from the 2021, 2022, 2023, and 2024 cohorts. Included were students who were regularly enrolled, aged 18 years or older, and who provided voluntary consent through the electronic consent form. Conversely, incomplete questionnaires or those deemed infeasible for statistical analysis were excluded.

3.4 DATA COLLECTION INSTRUMENTS

Data collection was carried out using two self-administered electronic instruments, structured into distinct sections. The first consisted of a sociodemographic and academic questionnaire developed by the author, which included variables such as age, biological sex, gender identity, sexual orientation, marital status, personal income, and religion. Additionally, information was collected on students' educational trajectory in elementary and high school, parental education, admission pathway, and employment status, allowing the characterization of the incoming profile and the identification of factors influencing perceptions.

The second instrument was the Attitudes to Patient Safety Questionnaire – Version 3 (APSQ-3), developed by Carruthers et al. (2009), used to measure attitudes and knowledge regarding patient safety. Comprising 30 items on a seven-point Likert scale ranging from "strongly disagree" to "strongly agree," the questionnaire evaluates nine dimensions: training, confidence in reporting errors, working hours as a cause of failures, inevitability of error, professional incompetence, disclosure responsibility, teamwork functioning, patient involvement, and the importance of the topic in the curriculum. Although a Brazilian version was validated in 2025, it was employed solely for psychometric comparison (Menezes et al., 2025).

3.5 DATA COLLECTION PROCEDURES

Data collection occurred annually between 2021 and 2024, using electronic forms sent to students in the initial weeks of the program. In the initial contact, participants were informed of the study's objectives, risks, and benefits, formalizing their participation through a digital Informed Consent Form (ICF). Completion took place in a virtual environment, anonymously and voluntarily, ensuring data security and offering flexibility for synchronous or asynchronous participation. The choice of an electronic format ensured process standardization and minimized information loss.

3.6 DATA PROCESSING AND ANALYSIS

Statistical analysis was divided into three stages and conducted using R software (version 4.4.1; R Core Team, 2025), with support from the ggplot2 package (Wickham, 2016). Confirmatory factor analyses and the computation of factor scores were performed using the lavaan package, version 0.6-8 (Rosseel, 2012). Reliability indices were calculated using the semTools package (Jorgensen et al., 2020).

3.6.1 Descriptive Analysis

Absolute and relative frequencies were calculated for categorical variables, and mean, median, minimum, maximum, and standard deviation for numerical variables. Normality was assessed using the Shapiro–Wilk test, complemented by the analysis of skewness and kurtosis.

3.6.2 Psychometric Analysis (CFA and Reliability)

Given the ordinal nature of the items, Confirmatory Factor Analysis (CFA) was performed using a polychoric correlation matrix and the WLSMV estimator (Weighted Least

Squares Mean and Variance Adjusted). Two models were compared: the original 30-item model and the reduced 26-item model (DiStefano et al., 2019; Savalei, 2021).

The fit indices analyzed included the CFI (Comparative Fit Index), TLI (Tucker–Lewis Index), and RMSEA (Root Mean Square Error of Approximation) (Kline, 2016). Factor reliability was assessed using Cronbach's Alpha (α), McDonald's Omega (ω), and Composite Reliability (CR).

In addition, an adapted Wright Map (Item–Person Map), based on Item Response Theory (IRT), was applied to identify the relative difficulty of each item within its respective dimension (Skrondal, 2004).

3.6.3 Inferential Analysis

To compare the mean scores of the nine APSQ-3 dimensions across the entry years (2021 to 2024), a one-way Analysis of Variance (ANOVA) was used.

The assumptions of ANOVA were verified beforehand: residual normality was assessed using skewness and kurtosis tests ($|z| < 1.96$) and visual inspection (Q–Q plot), while homogeneity of variances was examined through Levene's test. When normality was violated, data transformations (e.g., OrderNorm, Yeo–Johnson) were applied using the bestNormalize function (Peterson, 2021).

Effect size was estimated using Partial Eta Squared (η^2_p). For dimensions with statistically significant differences ($p < 0.05$), post-hoc contrast tests with Bonferroni correction were performed to identify which groups differed from one another (Lenth, 2016).

3.7 ETHICAL ASPECTS

The study was conducted in accordance with Resolution No. 466/2012 of the National Health Council and was approved by the Research Ethics Committee (CEP/FAMERP) under opinion No. 4.543.158.

Participation was voluntary, upon acceptance of the electronic ICF, ensuring confidentiality, anonymity, data protection, and respect for the autonomy of participants..

4 RESULTS

The presentation of results was organized into four analytical axes:

(a) sociodemographic and academic characterization of participants;

(b) psychometric validation of the APSQ-3;

(c) descriptive distribution of scores across the nine dimensions;

(d) comparison of attitudes according to year of entry (2021–2024).

This structure aims to facilitate the understanding of the patterns identified in the study and their connection to the educational context of patient safety.

4.1 SOCIODEMOGRAPHIC AND ACADEMIC CHARACTERIZATION

The total sample comprised 176 incoming Nursing students, with a predominance of female participants (87.5%) and those identifying as women (88.07%). Most students were up to 20 years old (72.16%) and self-identified as single (95.45%). Approximately 52% reported a personal income above R$ 3,000.00.

Regarding educational trajectory, 69.89% had completed high school in private institutions, and 95.45% had done so in the regular modality. Concerning parental education, a higher proportion of mothers and fathers had completed or partially completed higher education, indicating an elevated family educational profile.

More than 89% were financially dependent on their families, and 91.43% were not engaged in paid work at the time of data collection.

Below is the sample characterization table, reformatted according to editorial requirements.

Table 1

Sociodemographic and Academic Characteristics of Incoming Nursing Students

Variable	Category	n	%
Year of Entry	2021	63	35,80
	2022	45	25,57
	2023	32	18,18
	2024	36	20,45
Biological Sex	Female	154	87,50
	Male	22	12,50
Age Group	0 a 20 years	127	72,16
	21 a 30 years	46	26,14
	31 a 40 years	3	1,70
Monthly Income	≤ R$ 1.000,00	12	6,82
	R$ 1.001,00 a R$ 3.000,00	72	40,91
	≥ R$ 3.000,00	92	52,27
High School Background	Public	53	30,11
	Private	123	69,89
Institutional Admission Pathway	Open competition	139	78,98
	PIMESP (Public School)	31	17,61
	PIMESP (Black/Brown/Indigenous)	6	3,41
Employment Status	Does not work	160	91,43
	Works (non-health area)	12	6,86
	Works (health-related area)	3	1,71

Source: Research data (Author), 2026.

4.2 PSYCHOMETRIC VALIDATION OF THE APSQ-3

To assess the construct validity of the Attitudes to Patient Safety Questionnaire (APSQ-3), two models were tested using Confirmatory Factor Analysis (CFA): the original 30-item model and a reduced 26-item version. The analysis was conducted using a polychoric correlation matrix and the Weighted Least Squares Mean and Variance Adjusted (WLSMV) estimator, appropriate for ordinal data.

Both models presented acceptable fit indices according to classical criteria (CFI > 0.95 and RMSEA < 0.08). The 30-item model achieved a classical CFI of 0.967 and a classical RMSEA of 0.059. The 26-item model showed a classical CFI of 0.979 and a classical RMSEA of 0.050. However, when robust criteria were considered, both models were rejected, revealing discrepancies between classical and robust metrics—an effect described in the literature for categorical data with a limited number of response categories.

The decision to retain the 30-item model was based on the analysis of latent variable reliability. As shown in Table 2, the 26-item model presented composite reliability and Cronbach's Alpha values below the 0.60 cutoff for factors F4 (Inevitability of error) and F9 (Importance of patient safety in the curriculum). The 30-item model demonstrated greater consistency, presenting a value below the cutoff only for Cronbach's Alpha in factor F9, while still achieving adequate composite reliability.

Table 2

Reliability indices of the 26-item and 30-item APSQ-3 models by factors

Factors (Dimensions)	26-item Model			30-item Model		
	α	ω	CC	α	ω	CC
F1	.70	.75	.75	.70	.75	.75
F2	.81	.84	.84	.80	.82	.82
F3	.80	.85	.85	.80	.85	.85
F4	.45	.44	.44	.62	.62	.62
F5	.77	.79	.79	.77	.80	.80
F6	.61	.67	.67	.64	.72	.72
F7	.75	.85	.85	.75	.84	.84
F8	.77	.78	.78	.77	.78	.78
F9	.48	.55	.55	.58	.62	.62

Legend. α: Cronbach's Alpha; ω: McDonald's Omega; CR: Composite Reliability; F1: Patient safety training received; F2: Confidence in reporting errors; F3: Working hours as a cause of error; F4: Inevitability of error; F5: Professional incompetence as a cause of error; F6: Disclosure responsibility; F7: Team functioning; F8: Patient involvement in error reduction; F9: Importance of patient safety in the curriculum.

Source: Research data (Author), 2026.

4.3 DISTRIBUTION OF APSQ-3 DIMENSION SCORES

The exploratory analysis of the standardized scores of the nine APSQ-3 dimensions revealed that most variables did not follow a normal distribution, as verified by the Shapiro–Wilk test ($p < 0.05$). Exceptions included the dimensions Confidence in reporting errors ($p = 0.14$), Inevitability of error ($p = 0.06$), and Professional incompetence as a cause of error ($p = 0.51$).

Table 3 presents the measures of central tendency and dispersion for the nine dimensions evaluated.

Table 3

Descriptive analysis of scores for the APSQ-3 dimensions

Factors	N	Mean	SD	W	p-value	Min	P25	P50	P75	Max
F1	176	0.00	0.67	0.98	0.02	-1.62	-0.51	0.04	0.57	1.57
F2	176	0.00	0.88	0.99	0.14	-2.72	-0.53	0.07	0.59	1.75
F3	176	0.00	0.79	0.94	0.00	-2.55	-0.51	0.06	0.70	1.28
F4	176	0.00	0.78	0.98	0.06	-2.34	-0.51	0.09	0.57	1.86
F5	176	0.00	0.64	0.99	0.51	-1.52	-0.46	-0.06	0.46	2.05
F6	176	0.00	0.54	0.97	0.00	-0.93	-0.49	0.02	0.40	1.25
F7	176	0.00	0.79	0.94	0.00	-2.54	-0.52	0.28	0.61	1.14
F8	176	0.00	0.73	0.96	0.00	-1.91	-0.49	0.03	0.57	1.12
F9	176	0.00	0.75	0.98	0.01	-2.63	-0.60	0.03	0.61	1.59

Legend. SD: Standard deviation; W: Shapiro–Wilk test statistic; p-value: p-value of the Shapiro–Wilk test; Min: Minimum; Max: Maximum; P: Percentile; F1: Patient safety training received; F2: Confidence in reporting errors; F3: Working hours as a cause of error; F4: Inevitability of error; F5: Professional incompetence as a cause of error; F6: Disclosure responsibility; F7: Team functioning; F8: Patient involvement in error reduction; F9: Importance of patient safety in the curriculum.
Source: Research data (Author), 2026.

4.3.1 Dynamics of Attitudes: An Analysis Using Item Response Theory (Wright Map)

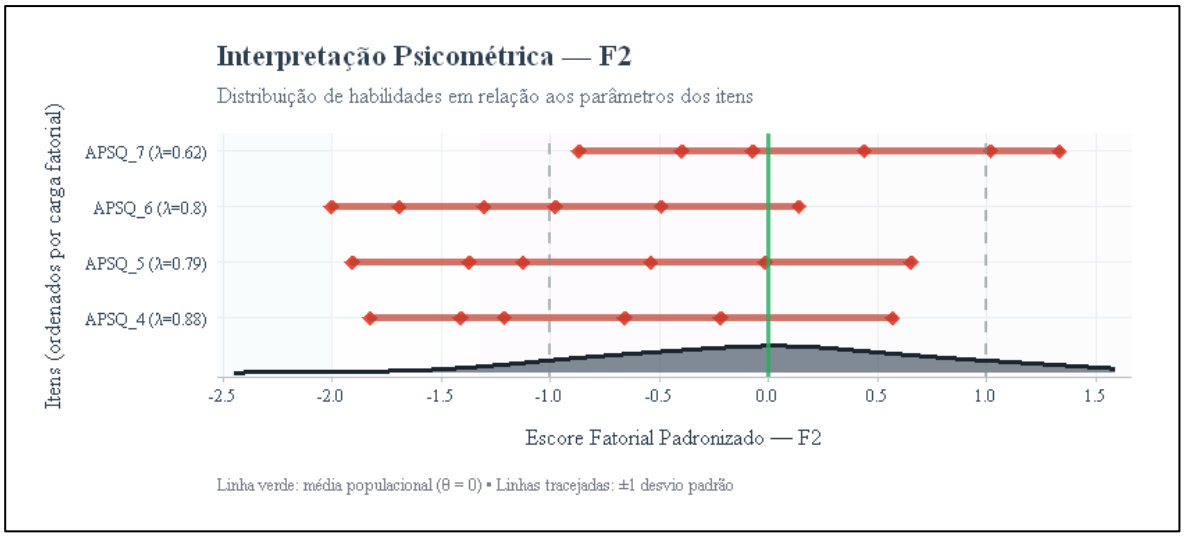
To move beyond descriptive statistical analysis and deepen the understanding of students' attitudes, this study applied Item Response Theory (IRT). Through an adapted Wright Map, it was possible to map the interaction between students' levels of awareness and the "resistance" or difficulty associated with each APSQ-3 statement. Practically, this model visualizes the level of patient safety maturity required for a student to agree with a

given item: the farther to the right an item is positioned, the greater the need for a consolidated and critically grounded perception for it to be endorsed.

When analyzing the dimension Confidence in reporting errors (Factor 2), the data reveal an interesting gradient of psychological maturity, as illustrated in Figure 1. Although incoming students show ease in agreeing with the theoretical importance of reporting failures (Items 4 and 6), the scenario changes markedly in the context of a punitive culture. Item 7—addressing the confidence to report an error without fear of being blamed—emerged as the greatest challenge within this dimension. This suggests that, although students understand the ethical necessity of reporting, the emotional safety required to do so in a potentially punitive environment demands a level of confidence that is still in development.

Figure 1

Adapted Wright Map for the dimension "Confidence in reporting errors" (Factor 2)

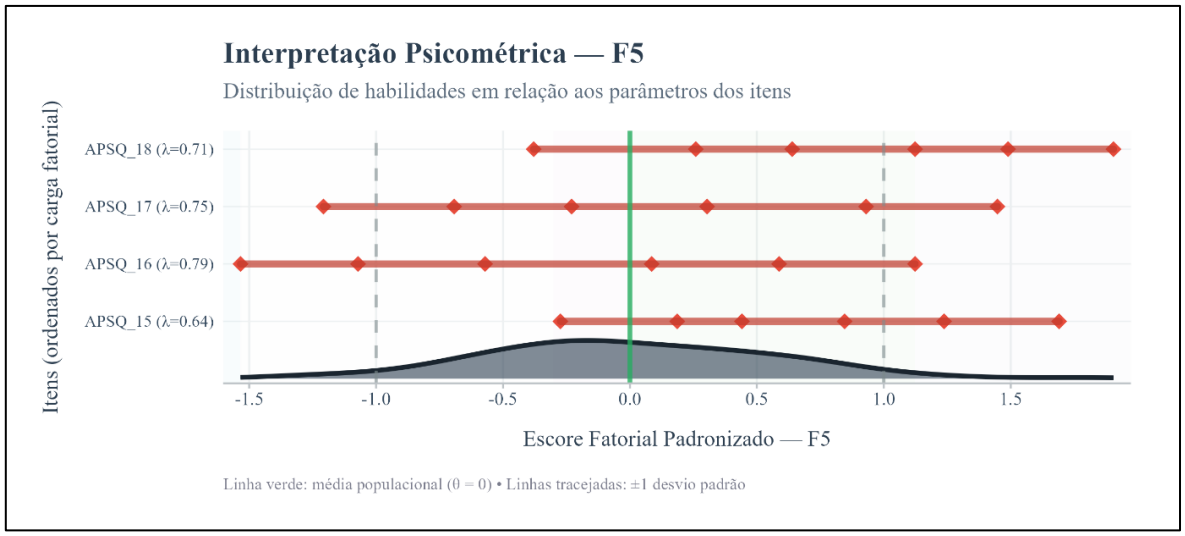


Source: Research data (Author), 2026.

In the dimension that examines Professional incompetence as a cause of error (Factor 5), the Wright Map (Figure 2) highlights a distinction between common-sense reasoning and systemic thinking. While the association of errors with "careless nurses" (Item 15) is easily identified, understanding that errors in healthcare are not merely evidence of technical incompetence (Item 18) requires a substantially higher level of critical recognition. This finding is innovative, as it demonstrates that deconstructing an individualized view of error is one of the most complex stages of academic training.

Figure 2

Adapted Wright Map for the dimension "Professional incompetence as a cause of error" (Factor 5)



Source: Research data (Author), 2026.

The dimension Working hours as a cause of error (Factor 3) also stands out by highlighting the impact of workload burden. Item 10 not only presented the highest factor loading (λ = 0.92) but also emerged as the most discriminative indicator. This means that the perception of how working hours affect safety is a defining threshold: students who endorse this item demonstrably hold a more mature and systemic understanding of care-related risks.

This visual analysis confirms that the APSQ-3 dimensions are not homogeneous. Each factor encompasses a hierarchy of concepts that range from elementary attitudes to highly complex perceptions, reinforcing the need for pedagogical strategies that not only inform but also cultivate and mature a culture of safety throughout undergraduate education.

4.4 COMPARISON OF ATTITUDES ACCORDING TO YEAR OF ENTRY

The analysis of variance (ANOVA) revealed statistically significant differences in four specific dimensions: confidence in reporting errors (p = 0.009), working hours as a cause of error (p = 0.002), inevitability of error (p = 0.007), and professional incompetence as a cause of error (p = 0.002). In the remaining dimensions, no significant variations were observed between cohorts, as detailed in the integrated summary of results presented in Table 4.

Table 4

Dimensions with statistically significant differences between entry years (ANOVA)

Dimension	p (ANOVA)	η^2p	Significant comparisons	Direction of difference
F2 – Confidence	0,009	0,067	2021 vs. 2023	2021 > 2023

F3 – Working hours	0,002	0,083	2021 vs. 2022	2021 < 2022
F4 – Inevitability of error	0,007	0,069	2022 vs. 2024	2022 > 2024
F5 – Professional incompetence	0,002	0,086	2021 vs. 2024	2024 > 2021

Source: Research data (Author), 2026.

5 DISCUSSION: THE GENESIS OF A SAFETY CULTURE IN NURSING EDUCATION

The results of this study reveal a complex and multifaceted scenario in which social, generational, educational, and psychometric elements interact to shape the attitudes of students entering undergraduate Nursing programs. One of the most striking findings is the relatively homogeneous sociodemographic profile of participants—predominantly female, young, and with an educational background linked to private schooling. Although this profile is common in highly competitive programs at public institutions, it carries significant educational implications, especially when considering how these students construct their initial perceptions of patient safety (Castro et al., 2023; Andifes, 2018).

The predominance of students who have not yet had contact with clinical environments or health-related work experiences suggests that their attitudes do not stem from concrete service experiences, but rather from values, school narratives, social expectations, and media portrayals of the profession. This condition, seemingly favorable for initiating critical and emancipatory training, may paradoxically pose an initial barrier: students without prior exposure tend to hold more idealized, individually centered conceptions grounded in notions of perfectionism and personal blame for error—elements the literature identifies as obstacles to the consolidation of a robust safety culture (Nora et al., 2022; Schultz et al., 2023; Wu, 2022).

When examining the psychometric structure of the APSQ-3, particularly the expanded 30-item version, it becomes evident that certain patient safety dimensions are especially fragile and sensitive to prior beliefs. Dimensions such as “inevitability of error,” “confidence in reporting errors,” and “incompetence as a cause of failure” reveal attitudes that often operate in contradictory ways: students partially recognize that error is inherent to human practice, yet simultaneously attribute it to individual failings, reinforcing punitive and moralizing logic. This ambivalence is not accidental; it reflects traditional educational models that value absolute correctness, flawless performance, and individual judgment, without fostering deeper discussions about systems, processes, and human factors.

The psychometric analysis contributes meaningfully to the scientific field. Confirming the superiority of the 30-item APSQ-3 version strengthens national and international literature on the topic, demonstrating that overly simplified approaches or excessive reductions of instruments may compromise the adequate measurement of complex dimensions—

particularly when assessing initial attitudes and structural beliefs. The application of the Wright Map, still uncommon in Brazilian patient safety studies, revealed important nuances regarding the relative difficulty of certain items, showing that some attitudes—such as confidence in reporting errors—require higher levels of maturity and critical understanding.

The way these attitudes vary across cohorts is particularly illuminating. Students entering in 2021, who experienced the direct impact of the COVID-19 pandemic during their final year of schooling, showed greater sensitivity in dealing with error, a higher willingness to report it, and a lower tendency to attribute it exclusively to professional incompetence. This behavior can be understood in light of the extraordinary context of the pandemic, a period in which society witnessed unprecedented visibility of the challenges faced by health professionals, including exhaustion, extended shifts, resource shortages, and emotional overload (Brasil de Fato, 2021; Fiocruz, 2021). This scenario may have fostered a more systemic view of error, contributing to students beginning their degrees with greater empathy and less individualized judgment.

In contrast, the 2023 cohort showed significantly lower levels of confidence in reporting errors. This decline may reflect the progressive return to normality, the reduced public debate on working conditions in health, and the reestablishment of a social culture oriented toward individual performance. From 2022 onward, discussions about excessive workloads and the visibility of nursing professionals gradually softened, possibly leading students from these years to perceive the work environment in a less critical manner and with reduced sensitivity to systemic contributors to error.

The 2024 cohort represents perhaps the most marked generational shift. These students exhibited stricter attitudes, showing lower acceptance of the inevitability of error and a stronger association between error and professional incompetence. This pattern may be related to the recent sociocultural climate, permeated by meritocratic discourse, the hypercompetitiveness amplified by social media, and an educational context increasingly valuing results over processes. This is a generation raised under intense performative pressure and constant social scrutiny, conditions that tend to reinforce moralizing interpretations of error and difficulties in viewing failures as learning opportunities (Turbes; Krebs; Axtell, 2002).

The findings also highlight the urgent need for Nursing programs to adopt pedagogical strategies capable of transforming these initial attitudes. Patient safety education must extend beyond theoretical content, incorporating active methodologies, clinical simulations, case studies, and reflective practices that deconstruct deeply rooted myths about perfection, blame, and infallibility. It is essential to introduce, beginning in the first year, discussions on

Human Error Theory, organizational factors, interprofessional communication, just culture, and psychological safety—concepts often distant from students' prior educational experiences.

In summary, the findings discussed in this chapter demonstrate that the construction of a safety culture does not begin in clinical settings but prior to them—when students first enter educational institutions. The cohorts analyzed carry generational marks that profoundly influence their understanding of error, teamwork, professional responsibility, and the structural factors shaping healthcare practice. This underscores the need for curricula that are sensitive to sociocultural changes and committed to preparing professionals capable of acting within complex systems, addressing risks, and preventing harm with technical competence, critical thinking, and collective responsibility.

More than identifying weaknesses, the findings illuminate pathways for pedagogical interventions that strengthen student protagonism and expand their understanding of patient safety. Recognizing the influence of generational characteristics, entry contexts, and preexisting beliefs is an essential step toward building more effective educational strategies that prepare nurses for safe, collaborative practice grounded in ethical and systemic principles.

6 CONCLUSIONS: THE FUTURE OF SAFETY IN NURSING

This study concludes that incoming students' safety attitudes are positive yet fragile. The innovative use of the Wright Map demonstrated that emotional barriers (fear of blame) outweigh barriers related to technical knowledge. Nursing education thus faces the challenge of educating a generation that enters university with high levels of perfectionism and low tolerance for human fallibility.

The validation of the full APSQ-3 version offers the scientific community a robust tool for diagnosing and intervening in this reality. Ultimately, cultivating a robust safety culture requires recognizing that the academic environment is the first and most important line of defense against punitive culture, transforming future nurses into agents of systemic change.

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