

ORIGINAL RESEARCH

The perception and communication of patient safety concerns among nursing students: A multicenter cross-sectional study

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Received: March 31, 2026

Accepted: July 8, 2026

Online Published: July 23, 2026

DOI: 10.63564/jnep.v16n8p31

URL: https://doi.org/10.63564/jnep.v16n8p31

ABSTRACT

Objective: This study explored how nursing students in Austria perceive and communicate patient safety concerns during clinical internships and which individual and contextual factors influence their willingness to speak up.

Methods: A multicenter cross-sectional survey was conducted between February and June 2024 at twelve universities of applied sciences in Austria. Nursing students completed a validated questionnaire assessing experiences with patient safety concerns, speaking-up behaviour, perceived barriers and enablers, and the clinical speak-up climate. Multivariate analyses were used to examine factors associated with speaking up and remaining silent.

Results: Of 797 complete responses included in the analysis, 79% encountered safety concerns, yet 58% withheld their voice at least once. Fear of negative consequences (62%) and uncertainty about reactions (51%) were the most common barriers. Prior healthcare experience was associated with higher vignette realism ($p = .024$) and lower discomfort ($p = .017$). Concern frequency strongly predicted both speaking up ($OR = 3.54, p < .001$) and withholding voice ($OR = 5.89, p < .001$). Psychological safety and an encouraging environment reduced withholding voice, whereas resignation increased the odds of both behaviors. Specialty effects were modest: students in neurology spoke up less ($OR = 0.50, p = .027$), while those in outpatient and long-term care withheld voice less ($OR = 0.63, p = .038$). Despite recognizing high risk in the vignette, students reported low likelihood of intervening.

Conclusions: Nursing students frequently recognize patient safety risks but often do not act on them. This disconnect highlights the need for early educational interventions that strengthen communication skills, reduce fear, and counter resignation by fostering psychologically safe learning environments.

Key Words: Nursing, Nursing students, Patient safety, Safety climate, Speak up

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1. INTRODUCTION

Speaking up about patient safety concerns is a crucial behaviour in modern clinical care, directly contributing to error prevention, improved teamwork, and a robust safety culture.^[1–3] While the topic has received considerable attention among practicing healthcare professionals, there is a notable lack of research on nursing students, particularly within German-speaking healthcare systems. This population is directly involved in patient care during clinical internships but often lacks the authority or confidence to raise safety concerns.^[4,5] Their unique position, at the intersection of education and frontline care, makes them a particularly relevant group for studying speak-up behaviour.

To date, only one preliminary study has applied the Speaking up about Patient Safety Questionnaire (SUPS-Q) to nursing students in Austria.^[6] Although that work offered initial insights, its limited sample size and scope left key questions unanswered, particularly regarding institutional differences and the impact of prior healthcare experience. The present study builds on that foundation through a large-scale, multicenter cross-sectional survey involving twelve Austrian universities of applied sciences.

The study aimed to examine how Austrian nursing students perceive and communicate patient safety concerns during their most recent clinical internships and to identify key enablers and barriers to speaking up. Furthermore, it sought to assess the influence of prior healthcare experience on the evaluation of a clinical vignette and to apply multivariate logistic regression to explore institutional differences in safety culture, particularly psychological safety and an encouraging environment, as well as the impact of medical specialty on speak-up behaviour. While conducted in Austria, the study addresses universal challenges in nursing education, making its findings relevant for international strategies to promote patient safety and speaking-up behaviours.

1.1 Background

Patient safety is a foundational principle of high-quality healthcare. In complex clinical environments, preventing patient harm requires more than technical expertise alone. It relies on seamless communication, well-coordinated teamwork, and organizational structures that support collaborative practice. Equally essential is a safety culture that actively encourages the early recognition of risks and fosters transparent reporting of safety concerns.^[1,7]

By empowering healthcare professionals to express concerns, speaking up plays a crucial role in identifying risks before they result in harm. Open communication enhances situa-

tional monitoring and supports coordinated decision-making, both of which are essential for safe care delivery.^[8–10] In high-stakes settings such as operating rooms or emergency departments, the ability of team members to voice concerns even in the face of hierarchy can be lifesaving.^[11,12] Moreover, a psychologically safe environment, where individuals feel respected and supported in sharing concerns, is associated with improved outcomes and stronger safety cultures.^[7,13]

Despite its importance, many healthcare professionals remain hesitant to speak up. Common barriers include hierarchical power dynamics, fear of retaliation or negative consequences, lack of confidence, and concerns about how colleagues react.^[12,14,15] These challenges are particularly pronounced among individuals in junior or trainee positions, who may feel especially vulnerable.^[16–18] Addressing these barriers requires a multifaceted approach, including leadership support, policies that protect whistleblowers, and training that builds communication and assertiveness skills.^[3] Cultivating psychological safety and normalizing the expression of concerns are essential steps in fostering a transparent and learning-oriented safety culture.^[19,20]

1.2 Purpose

While the topic of speaking up has been widely studied among licensed healthcare professionals, nursing students remain an understudied population particularly in German-speaking healthcare systems. As learners in clinical environments, they may experience heightened barriers and a limited ability to act despite recognizing safety issues.^[21,22] Understanding their experiences, perceptions, and communication patterns is crucial to developing supportive training environments that foster early engagement with safety culture.

This study examines how nursing students in Austria identify and communicate patient safety concerns during clinical placements. We conducted descriptive analyses of speak-up behaviours, perceived barriers and enablers, and the speak-up climate (psychological safety, encouraging environment, and resignation). Additionally, students evaluated a clinical vignette regarding realism of the situation, potential harm for the patient, likelihood of speaking up, and associated discomfort when doing so. Inferential analyses comprised two approaches. First, group comparisons were conducted to examine whether students with prior healthcare experience evaluated the clinical vignette differently. Second, a multivariate logistic regression assessed the influence of perceived concern frequency, speak-up climate dimensions, and internship specialty on the likelihood of speaking up respectively remaining silent.

2. METHODS

2.1 Design

This study was designed as an exploratory cross-sectional, multicenter survey conducted across all (N = 12) universities of applied sciences offering bachelor's degree nursing studies in Austria. The data collection took place between February and June 2024 and focused on students' most recent clinical internship experiences.

The research and reporting process adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies (see the Appendix), as recommended by the EQUATOR network.^[23]

2.2 Setting

The target population comprised approximately 4,000 nursing students across Austria, regardless of age, gender, or socio-economic background. Eligibility required current enrolment in an undergraduate nursing degree program and completion of at least one clinical internship. Therefore, first semester students were excluded, as they typically had not yet undertaken clinical placements.

Prior to the start of data collection, approval to invite students to participate in the survey was obtained from the heads of all participating nursing degree programs. Students were then informed about the study via email and received a link to the online survey platform (Lime Survey). At some universities of applied sciences, additional promotional efforts were undertaken, including the display of a custom-designed poster encouraging participation. At one institution, a member of the research team was invited to join classes online to personally inform students about the study.

The final sample represents a convenience sample of nursing students who voluntarily participated in the survey after receiving an invitation through their respective universities of applied sciences. Given the exploratory nature of this multicenter survey, no formal a priori power calculation was conducted.

2.3 Data collection

Data were collected using the Speaking up about Patient Safety Questionnaire (SUPS-Q), a validated instrument designed to evaluate healthcare professionals' and students' experiences and behaviours related to speaking up.^[24,25] The questionnaire includes eleven items on three behaviour related subscales: three items on perceived safety concerns, four items on withholding voice, and four items on past speaking up behaviour. These items were rated on a 5-point Likert scale ranging from "never (0 times)" to "very often

(more than 10 times in the last four working weeks)." To facilitate a more straightforward interpretation, responses were dichotomized into two categories: "never" and "at least once."

The perceived speak-up climate is assessed using eleven items scored on a 7-point Likert scale, from "strongly disagree (1)" to "strongly agree (7)". Within three subscales higher scores reflect a greater psychological safety (four items), a more encouraging environment for speaking up (three items), or a higher degree of resignation (three items).

Barriers and facilitators to speaking up were measured using seven predefined reasons for withholding voice and ten key enablers for speaking up. Key enablers were included in the survey for the first time, based on a preliminary literature review and refined through expert consensus, including input from one of the original SUPS-Q authors. The questionnaire also features a hypothetical clinical vignette, depicting a senior physician omitting hand disinfection, to assess the likelihood of speaking up in a realistic scenario. Responses to the vignette were recorded using a 7-point Likert scale rating the realism of the situation, the perceived risk to the patient, the likelihood to speak up and the anticipated discomfort to do so.

Additional items captured demographic and contextual information, including gender, age, current semester, and prior work experience in the healthcare sector. Students were also asked to report the clinical setting of their most recent internship, its duration, and the number of weeks elapsed since its completion. University affiliation was inferred based on the individualized survey access link used by each participant.

2.4 Data analysis

Descriptive statistics were used to summarize absolute and relative frequencies and standard deviations (SD) for the speak-up climate, its subscales, and the vignette, as well as percentage distributions for perceived barriers and enablers to speaking up. Normality of data and residuals was tested using the Shapiro-Wilk test. As distributions deviated from normality, nonparametric procedures were used. Therefore, differences between students with and without prior healthcare experience in their evaluation of the clinical vignette were examined using the Mann-Whitney U test.

To determine the factors influencing speak-up behaviour, we applied multivariate logistic regression to examine (1) the effect of perceived concern frequency and speak-up climate dimensions on the likelihood of frequent speaking up and frequent withholding voice, and (2) the influence of internship specialty on these outcomes while controlling for exposure differences. Logistic regression was selected because both

dependent variables were dichotomized using the sample median to distinguish students reporting comparatively higher versus lower frequencies of speaking up and withholding voice. Moreover, multivariate logistic regression enables simultaneous consideration of multiple predictors, providing adjusted odds ratios that account for confounding and intercorrelations among variables.

Two models were specified: the first adjusted for age, gender, semester, and duration of prior healthcare experience to assess the influence of perceived concern frequency and speak-up climate dimensions (psychological safety, encouraging environment, and resignation). The second model added perceived concern frequency as a covariate to evaluate the effect of internship specialty. To ensure feasibility, some specialty categories were merged (e.g., surgery included cardiac and neurosurgery as well as the recovery room; outpatient services, long-term care, and rehabilitation were combined). Frequent speaking up and frequent withholding voice were defined as reported frequencies equal to or higher than the sample median. Odds ratios (OR) and their 95% confidence intervals (95%CI) were calculated to estimate the effects on frequent speaking up and withholding voice. Prior to model estimation, assumptions relevant to logistic regression were assessed. Model fit was evaluated using the Hosmer-Lemeshow goodness-of-fit test and Nagelkerke's R^2 , and multicollinearity was examined using variance inflation factors. Missing data were handled by listwise deletion to ensure unbiased estimates of means, variances, and regression weights. All analyses were conducted using IBM SPSS Statistics, Version 29, applying a two-sided significance level of $\alpha \leq 0.05$.

2.5 Ethics approval and consent to participate

The study protocol was reviewed and approved by the Ethics Committee of the Medical University of Graz (No. 30-303 ex17/18). All participants received study information and a survey link via email. Additional information was provided through a short video, a poster, and in one instance, a personal explanation by one of the authors. Participation was voluntary, and students were informed that declining to participate would not affect their clinical placement evaluations or academic grades. Completion of the survey was considered implied consent to participate in the study.

2.6 Use of artificial intelligence in manuscript preparation

Artificial intelligence, in the form of a large language model (Microsoft M365 Copilot), was used to support translation and phrasing during manuscript preparation. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article

3. RESULTS

3.1 Characteristics of the sample

Out of an estimated population of 4,000 nursing students, slightly more than 1,000 responses were received. After excluding incomplete responses, 797 complete cases were retained, corresponding to approximately 20% of the estimated target population. Because not all universities of applied sciences disclosed enrolment figures, precise response rates could not be calculated for every institution. Among those that provided data, participation rates varied substantially from about 5% to 40%. The two universities of applied sciences with the highest student participation contributed 46.7% ($n = 372$) of the final sample.

A total of 34.4% ($n = 274$) of responding students reported having prior work experience in the healthcare sector. While some had held multiple roles, the most common positions were paramedic (44.89%; $n = 123$) and nursing assistants (Pflege- & Pflegefachassistenten (26.28%, $n = 72$)). Most respondents with prior experiences worked in healthcare for one to two years before beginning their nursing studies (37.96%, $n = 104$). A total of 38 students (13.87%) reported more than five years of prior work experience in the healthcare sector.

The mean duration of the most recent internship was 5.06 weeks ($SD = 1.53$), and on average, it had taken place 5.18 weeks ($SD = 5.24$) prior to completing the survey. Table 1 provides an overview of the demographic characteristics of the study sample.

3.2 Perceived safety concerns, speak-up behaviours and speak-up climate

Among respondents, 79.4% (633/797) reported encountering at least one specific safety concern during their most recent clinical placement. Additionally, 63.7% (506/797) observed an error with the potential to cause harm, and 69.8% (556/797) noticed colleagues failing to follow rules critical to patient safety. Despite these experiences, many students chose not to speak up: 58% (465/797) did not voice a specific concern at least once, 63.5% (506/797) withheld suggestions for improving patient safety, 40.9% (326/797) remained silent even when they believed their intervention could have reduced patient risk, and 59.1% (471/797) refrained from addressing rule violations by colleagues. Nevertheless, a substantial proportion acted upon their concerns: 64.5% (514/797) reported speaking up about a specific safety concern, 63.7% (508/797) addressed a potentially harmful error, and 55.7% (444/797) confronted colleagues who failed to follow safety rules. Notably, 43.9% (350/797) believed their intervention helped prevent an actual incident (see Table 2).

Table 1. Characteristics of the study sample (N = 797)

		n (%)
Gender	Female	689 (86.4)
	Male	104 (13.0)
	Diverse	3 (0.4)
	Without information	1 (0.12)
Age in years	Span: 35 (min.19, max. 54)	
	Mean (SD): 24.68 (5.78)	
Study term	2nd Semester	203 (25.5)
	3rd Semester	57 (7.2)
	4th Semester	215 (27)
	5th Semester	33 (4.1)
	6th Semester	289 (36.3)
Prior work experience	Yes	274 (34.4)
	No	523 (65.6)
Medical area of last internship	Surgery (incl. Operating Theatre, Recovery Room, Neurosurgery and Cardiac Surgery)	335 (42)
	Long-term care, Outpatient Services & Rehabilitation	172 (21.6)
	Neurology	58 (7.3)
	Gynaecology	47 (5.9)
	Accident & Emergency	43 (5.4)
	Pediatric	37 (4.6)
	Other (incl. Psychiatry and Orthopaedics)	105 (13.2)

Table 2. Absolute(s) and percentage frequencies (%) of reporting perceived concerns, withholding voice and speaking up in the past 4 weeks (N = 797)

In everyday work, it sometimes happens that things go wrong and risks to patients arise. This could be a result of medication error, poor hand hygiene, or missing documentation. Over the last 4 weeks, how frequently.		
	Never	At least once
	n (%)	n (%)
Perceived concerns		
...have you had specific concerns about patient safety?	164 (20.6)	633 (79.4)
...have you observed an error that - if ignored - could be harmful for patients?	289 (36.3)	508 (63.7)
...have you noticed that colleagues consciously or unconsciously did not follow rules that are important for patient safety?	241 (30.2)	556 (69.8)
Withholding voice		
...did you choose not to bring up your specific concerns about patient safety?	335 (42)	462 (58)
...did you keep ideas for improving patient safety to yourself?	291 (36.5)	506 (63.5)
...did you remain silent even though your comments might have reduced a risk to patients?	471 (59.1)	326 (40.9)
...did you not address a colleague when they did not follow rules that are important for patient safety intentionally or unintentionally?	326 (40.9)	471 (59.1)
Speaking up		
... did you bring up specific concerns about patient safety?	283 (35.5)	514 (64.5)
... did you address an error that – if left unaddressed– could be harmful for patients?	289 (36.3)	508 (63.7)
... did you address a colleague when they did not follow rules that are important for patient safety intentionally or unintentionally?	353 (44.3)	444 (55.7)
... did you prevent an incident by raising specific concerns about patient safety?	447 (56.1)	350 (43.9)

Perceptions of the speak-up climate were generally positive. On a 7-point Likert scale, psychological safety (PSS) averaged 5.06 (SD = 1.32), while the encouraging environment (EES) scored 4.08 (SD = 1.78). The resignation subscale (RES) showed a lower mean of 3.30 (SD = 1.44), indicating a moderately supportive environment for speaking up, coupled with some tendency toward resignation (see Table 3).

Table 3. Mean and SD for speak up climate (N = 797)

Items organized in scales [†]	Mean (SD)
Psychological safety for Speaking Up (PSS)	5.06 (1.32)
I can rely on my colleagues when things get difficult at work.	5.49 (1.58)
I can rely on my direct supervisor when things get difficult at work.	5.50 (1.68)
The culture in that ward/department makes it easy to raise concerns about patient safety.	4.74 (1.81)
My colleagues respond appropriately when I share my concerns about patient safety with them.	4.63 (1.70)
My supervisors respond appropriately when I share my concerns about patient safety with them.	4.90 (1.74)
Encouraging environment for Speaking Up (EES)	4.08 (1.77)
I see others raising their concerns about patient safety.	4.08 (1.97)
I am encouraged by colleagues to raise concerns about patient safety.	4.11 (2.10)
I am regularly encouraged by leaders to raise concerns about patient safety.	3.96 (2.20)
Resignation about Speak Up (RES)	3.31 (1.44)
When I have concerns about patient safety, it's difficult to submit them.	3.23 (1.79)
It's frustrating to always have to point out the same safety rules.	3.34 (2.04)
Sometimes I resign because nothing changes when you raise your concerns about patient safety.	3.41 (1.92)

[†]Answer options from 1 (strongly disagree) to 7 (strongly agree)

3.3 Barriers and enablers for speaking up and clinical vignette

The most frequently reported barriers to speaking up were fear of negative consequences (496/797, 62.2%), uncertainty about the reaction of the person involved (408/797, 51.2%), and the belief that speaking up would be ineffective (327/797, 41%). Additional notable barriers included uncertainty about how to phrase concerns (314/797, 39.4%) and doubts about the severity of the situation (222/797, 27.9%). Less frequently reported barriers included the presence of patients or relatives (191/797, 24%) and high workload and lack of time (134/797, 16.8%), while only 9.8% (78/797) reported the absence of any relevant reason for not voicing concerns.

Conversely, the main enablers for speaking up were the desire to protect patients from harm (671/797; 84.2%), a sense of professional duty (589/797, 73.9%), and the intention to avoid personal guilt (423/797, 53.1%). Other important enablers included preventing the person responsible from making a mistake (405/797, 50.8%) and the belief that one's contribution can permanently improve patient safety (266/797, 33.4%). Less frequently stated enablers were encouragement on the ward to immediately voice safety concerns (197/797, 24.7%), observing colleagues consistently voicing concerns as role models (175/797, 22%), existence of clear rules and protocols to refer to (173/797, 21.7%), and knowledge of appropriate communication techniques for critical situations (116/797, 14.6%). Making a positive impression (109/797, 13.7%) and the absence of any relevant reason to voice concerns (25/797, 1.9%) were rarely reported.

Participants evaluated a hypothetical scenario involving a missed hand disinfection by a senior physician. On a 7-point Likert scale, the vignette was rated as highly realistic (M = 5.05, SD = 1.99) and associated with a high perceived risk of

harm if no action was taken (M = 5.79, SD = 1.34). Despite this, the likelihood of speaking up was low (M = 2.78, SD = 1.99), while discomfort associated with raising the concern was high (M = 5.82, SD = 1.73).

Students with prior healthcare experience rated the vignette as significantly more realistic (M = 5.28, SD = 0.11) compared to those without (M = 4.93, SD = 0.09; Z = -2.256, $p = .024$) and reported lower discomfort when considering speaking up (M = 5.61, SD = 0.11 vs. M = 5.92, SD = 0.07; Z = -2.385, $p = .017$). Students without prior healthcare experience rated the risk of harm slightly higher (M = 5.84, SD = 0.06) compared to those with prior experience (M = 5.71, SD = 0.09) yet paradoxically reported a marginally lower likelihood of speaking up (M = 2.72, SD = 0.09 vs. M = 2.91, SD = 0.12). However, these differences were not statistically significant (Z = -1.016, $p = .310$ and Z = -1.266, $p = .205$, respectively). A summary of all group comparisons related to the clinical vignette is presented in Table 4.

3.4 Regression analysis

Two adjusted models were estimated to identify factors associated with frequent speaking up (SUS) and frequent withholding voice (WVS), defined as reporting a frequency equal to or higher than the sample median.

The first model included the frequency of perceived concerns and speak-up climate dimensions (psychological safety, encouraging environment, and resignation) as predictors, adjusted for age, gender, semester, and duration of prior healthcare experience. The model demonstrated good fit (Hosmer-Lemeshow χ^2 11.26, $p = .187$) and explained a meaningful proportion of variance (Nagelkerke $R^2 = 0.22$ for SUS; 0.33 for WVS). After confirming fit, results indicated that perceived concern frequency was the strongest predic-

tor for both outcomes, substantially increasing the odds of speaking up (OR = 3.54, 95%CI [2.77; 4.54], $p < .001$) and withholding voice (OR = 5.89, 95%CI [4.42; 7.84], $p < .001$). Psychological safety was inversely associated with withholding voice (OR = 0.56, 95%CI [0.50; 0.64], $p < .001$) and slightly reduced the likelihood of speaking up (OR = 0.87, 95%CI [0.78; 0.97], $p = .011$). An encouraging environment

did not significantly influence speaking up ($p = .099$) but lowered the odds of withholding voice (OR = 0.70, 95%CI [0.65; 0.77], $p < .001$). Resignation increased the odds for both behaviours, indicating that students who felt resigned were more likely to speak up (OR = 1.27, 95%CI [1.15; 1.41], $p < .001$) and remain silent (OR = 1.69, 95%CI [1.51; 1.89], $p < .001$).

Table 4. Mean and SD for the vignette† total and dichotomized by previous experience (N = 797)

Vignette (n = 797)	Total	No Previous Experience (n = 523)	Previous Experience (n = 274)	p-value‡
	Mean (SD)	Mean (SD)	Mean (SD)	
Realism of the situation	5.05 (1.99)	4.93 (0.09)	5.28 (0.11)	.024
Risk of harm to the patient if no action is taken	5.79 (1.34)	5.84 (0.06)	5.71 (0.09)	.310
Likelihood of Speak up	2.78 (1.99)	2.72 (0.09)	2.91 (0.12)	.205
Discomfort to give a hint	5.82 (1.73)	5.92 (0.07)	5.61 (0.11)	.017

†Answer options from 1 (not at all realistic; very low; very unlikely; not at all unpleasant) to 7 (very realistic; very high; very likely; very unpleasant)

‡Mann-Whitney U test for independent samples, two-sided, $\alpha = 0.05$.

The second model extended the analysis by adding internship specialty as a predictor, aiming to determine whether the medical specialty of the most recent placement influenced speak-up behaviour. To account for the potential confounding effect of exposure to safety concerns, perceived concern frequency was included as an additional predictor alongside the original covariates (age, gender, semester, and duration of prior healthcare experience). Some internship categories were merged as described in the Data Analysis section. Responses that could not be clearly assigned to a specific specialty (n = 105) remained in the category “other.” For all comparisons, the reference category consisted of responses from all wards not belonging to the specialty used

as the predictor. This model demonstrated good fit (Hosmer-Lemeshow $\chi^2 = 10.75$, $p = .217$; Nagelkerke $R^2 = 0.22$ for SUS; 0.33 for WVS). Results indicated that students placed in neurology were significantly less likely to speak up (OR = 0.50, 95%CI [0.28; 0.92], $p = .027$), while those in outpatient, long-term care, and rehabilitation settings were less likely to withhold voice (OR = 0.63, 95%CI [0.41; 0.98], $p = .038$). No other specialties showed significant associations, suggesting that contextual factors exert only modest influence compared to individual perceptions. Results from both models of the multivariate logistic regression are summarized in Table 5.

Table 5. Results of multivariate logistic regression analysis with frequent speak up and frequent withholding voice as outcomes

Variable	Frequent speaking up [§]	p-value [¶]	Frequent withholding voice [§]	p-value [¶]
	OR (95%CI)		OR (95%CI)	
Adjusted Model [†]				
Scales:				
Frequency of perceived concerns	3.54 (2.77; 4.54)	< .001**	5.89 (4.42; 7.84)	< .001**
Psychological safety for Speaking Up (PSS)	0.87 (0.78; 0.97)	.011*	0.56 (0.50; 0.64)	< .001**
Encouraging Environment (EES)	1.07 (0.99; 1.16)	.099	0.70 (0.65; 0.77)	< .001**
Resignation (RES)	1.27 (1.15; 1.41)	< .001**	1.69 (1.51; 1.89)	< .001**
Adjusted Model [‡]				
Kind of Internship (to base: in other internship ward)				
Surgery (n = 335)	0.88 (0.65; 1.21)	.443	1.28 (0.91; 1.79)	.148
Outpatient, long-term care, Rehabilitation (n = 172)	1.38 (0.92; 2.07)	.122	0.63 (0.41; 0.98)	.038*
Neurology (n = 58)	0.50 (0.28; 0.92)	.027*	0.73 (0.39; 1.37)	.329
Gynaecology (n = 47)	1.01 (0.52; 1.96)	.985	0.85 (0.43; 1.70)	.649
Accident & Emergency (n = 43)	1.99 (0.98; 4.06)	.058	1.10 (0.53; 2.27)	.803
Pediatric (n = 37)	1.18 (0.57; 2.40)	.659	1.06 (0.50; 2.27)	.870

†adjusted for covariates age, gender, semester & duration of previous experience; ‡adjusted for covariates age, gender, semester, duration of previous experience & frequency perceived concerns; §Positive outcome defined as frequency equal to or higher than the sample median, to base frequency below sample median ¶Chi² test for independent samples by Group Previous Experience.

4. DISCUSSION

This study provides valuable national-level insights into nursing students' speak-up behaviour and identifies critical targets for educational and organizational strategies to foster a culture of safety. To our knowledge, it is the first multicenter cross-sectional study to comprehensively examine the perception and communication of patient safety concerns among nursing students in Austria. The sample mirrored the national nursing student population in terms of gender and age distribution, supporting the generalizability of findings within Austria.

Although patient safety concerns were frequently encountered during clinical placements, nursing students appeared more likely to withhold concerns than healthcare professionals reported in previous studies.^[26] This underscores that nursing students represent a particularly vulnerable group when confronted with patient safety issues. Although the study was conducted within the Austrian nursing education context, the observed barriers (e.g., fear of negative consequences) and enablers (e.g., psychological safety) mirror challenges documented across diverse health care systems. Accordingly, our findings can inform international efforts to strengthen patient safety education and foster speaking up behaviours among nursing students globally.

Psychological safety and perceptions of an encouraging environment in our sample appear comparable to those reported in a previous study conducted at an Austrian university hospital, while resignation scores were slightly lower in our sample (mean: 3.31 vs. 3.60).^[27] Our findings also align with those from Ibero-American healthcare students, who reported similarly positive perceptions of psychological safety and encouraging environments alongside moderate resignation.^[28] However, the generalizability of these results is limited by the wide range of hospitals and clinical wards included in our nationwide survey.

The most frequently cited barriers to speaking up, fear of negative consequences, uncertainty about the reactions of those involved, and doubts regarding the effectiveness of raising concerns, are consistent with previous research identifying hierarchical structures, fear, and lack of confidence as major obstacles for nursing students and new graduates.^[4, 17, 29–31] Nursing students appear more concerned about potential repercussions for their academic progression and future careers, whereas among experienced healthcare workers, feelings of ineffectiveness and the presence of patients or relatives during critical situations rank among the most frequently cited barriers to speaking up.^[24, 26] These findings further highlight the need for educators and clinical mentors to create environments that not only equip students with the

necessary knowledge and skills to speak up but also foster psychological safety and support for raising concerns during internships. Hierarchical dynamics have been shown to influence the likelihood of speaking up,^[32] and nursing students, positioned at the lower end of clinical hierarchies, may be especially vulnerable to remaining silent in the face of safety risks.

Enablers for speaking up were included in the survey for the first time. The most frequently reported enablers, such as the desire to protect patients from harm and a strong sense of professional responsibility, reflect findings from previous studies^[16, 33] that students are ethically motivated to voice concerns yet remain constrained by contextual and interpersonal factors. Prior research^[34] further highlights authentic learning through practice and reflection, the development of a professional identity and self-confidence as key enablers. Together, these factors underscore that speaking up is influenced not only by ethical commitment but also by experiential and identity-related dimensions.

The influence of experience and identity is further strengthened by the results of the clinical vignette, which revealed notable differences between students with and without prior healthcare experience. Students with prior healthcare experience perceived the vignette as more realistic and reported less discomfort when considering speaking up. This finding suggests that clinical exposure may reduce perceived interpersonal risk and strengthen confidence when addressing patient safety concerns. However, the mechanisms underlying this association warrant further investigation. Importantly, the vignette results underscore a persistent gap between risk recognition and behavioural intention: despite acknowledging the scenario as both realistic and risky, students' self-reported likelihood of speaking up remained low. This discrepancy suggests that awareness alone is insufficient to overcome hesitation, reinforcing the need for targeted interventions that build communication skills and confidence in hierarchical clinical contexts.

Finally, the multivariate models provide valuable insights into the factors shaping nursing students' communication behaviour. Perceived concern frequency emerged as the strongest predictor of both speaking up and withholding voice, suggesting that exposure to safety concerns may simultaneously increase the perceived need to intervene and the psychological burden associated with doing so. Among the climate dimensions, psychological safety and an encouraging environment significantly reduced withholding voice, reinforcing their role as protective factors in promoting open communication. Interestingly, psychological safety slightly decreased the likelihood of speaking up, which may reflect

that students in psychologically safe environments perceive fewer high-risk situations or rely on team norms rather than individual intervention. Resignation was positively associated with both speaking up and withholding voice, a pattern also reported in a Swiss study among healthcare workers.^[35] This finding suggests a complex ambivalence: students who feel that “nothing changes” may speak up occasionally, perhaps as an act of defiance or frustration, while simultaneously disengaging over time.

The second model showed that internship specialty exerted only a modest influence compared to psychological and organisational determinants, reinforcing that individual perceptions play a dominant role in shaping communication behaviour. Nevertheless, the risk level inherent to different specialties cannot be ignored. High-risk environments, such as surgical wards or intensive care units, expose students to more complex and frequent safety challenges than less invasive settings like internal medicine or long-term care.^[36] These contextual differences likely shape the frequency and nature of perceived concerns, which in turn influence communication behaviour. Thus, while specialty alone is not a strong predictor, the interplay between risk exposure and individual perceptions remains critical for understanding speak-up dynamics.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, the use of a convenience sample and voluntary participation may have introduced self-selection bias, potentially favouring students with strong opinions or experiences related to patient safety. Response rates varied considerably across institutions, and two universities of applied sciences accounted for nearly half of all responses (46.7%, $n = 372$), which limits the general representativeness of the findings. Additionally, incomplete enrolment data prevented precise calculation of response rates for some universities of applied sciences.

Second, comparisons across medical specialties should be interpreted cautiously. Within this multicenter design, clinical environments labelled under the same specialty (e.g., neurology) may differ substantially in organizational culture, staffing patterns, and patient acuity. These contextual variations likely influenced both the frequency and type of safety concerns encountered, as well as students’ willingness to speak up.

Third, the interpretation of behaviour-related scales from the SUPS-Q warrants caution. Reported likelihood of speaking up may underestimate actual intent, as students who never raised a concern might not have encountered a situation re-

quiring intervention. Similarly, dichotomizing outcomes based on the sample median, while methodologically justified for logistic regression, may obscure nuanced differences in communication behaviours.

Fourth, the cross-sectional design precludes causal inference and limits understanding of how speak-up behaviour evolves over time. Furthermore, reliance on self-reported data introduces potential recall bias and social desirability bias, particularly for sensitive behaviours such as challenging authority.

Finally, while the regression models demonstrated acceptable fit, unmeasured variables such as ward-level leadership style, team dynamics, and institutional policies may have influenced results. These factors were beyond the scope of this survey.

5. CONCLUSIONS

Nursing students in Austria frequently report encountering potentially hazardous situations during clinical internships but do not always feel empowered to speak up. Fear of negative consequences and uncertainty about how concerns will be received remain key barriers, despite strong internal motivators such as professional responsibility and commitment to patient protection. These findings suggest that speak-up behaviour is influenced by both institutional environments and individual characteristics.

Although the overall speak-up climate was rated as moderately supportive, a significant gap persists between risk recognition and action. To address this gap, nursing education programs should consider prioritizing structured communication training, fostering psychological safety, and strengthening collaboration between academic institutions and clinical settings. Creating educational and clinical environments in which students feel supported when raising patient safety concerns may help reduce barriers to speaking up.

Future research should examine prior healthcare experience in greater depth, as our findings indicate its relevance as a potential enabler of speak-up behaviour, although the underlying mechanisms remain unclear. Longitudinal studies are needed to explore how patient safety competencies and communication skills evolve throughout nursing education and to evaluate the impact of targeted educational interventions over time.

While the regression models demonstrated acceptable fit, unmeasured factors, such as ward-level leadership style, team dynamics, and institutional policies, may have influenced the results. These variables were beyond the scope of the present survey but represent important avenues for future investiga-

tion. A better understanding of how speak-up capabilities develop may help inform curricula aimed at strengthening confidence and resilience and promoting a positive safety culture in clinical practice. Empowering nursing students to voice safety concerns remains a critical step toward preventing patient harm.

ACKNOWLEDGEMENTS

The authors wish to express their gratitude to the Austrian Universities of Applied Sciences for their willingness to grant access to their students and therefore support this study on patient safety issues.

AUTHORS CONTRIBUTIONS

Conceptualization: MS, MH, CMS, DS, GS, WB and GM; Data curation: MS; Formal Analysis: MS, WB, GK and GM; Methodology: MS, MH, CSM, GS, DS, WB, GK and GM; Project Administration: MS, MH and CSM; Supervision: DS, GS, WB, GM and MH; Validation: DS, GS, WB, MH, GK and GM; Visualization: MS; Writing – original draft: MS; Writing – review and editing: MS, MH, CMS, DS, GS, WB, GK and GM.

FUNDING

The authors received no financial support for the research, authorship, and/or publication of this article.

CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest.

INFORMED CONSENT

Obtained.

ETHICS APPROVAL

The Publication Ethics Committee of the Association for Health Sciences and Education. The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

PROVENANCE AND PEER REVIEW

Not commissioned; externally double-blind peer reviewed.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

DATA SHARING STATEMENT

No additional data are available.

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