



Research article

Self-perceived clinical leadership among European nursing students: A six-country cross-sectional study

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ABSTRACT

Aim: To compare self-perceived leadership competencies among undergraduate nursing students in six European countries and examine whether between-country differences persist after adjustment for key demographic and educational characteristics.

Background: Leadership is essential for team effectiveness, quality of care, and patient safety. Although newly qualified nurses are expected to demonstrate leadership, it remains unclear whether leadership development opportunities are consistent across European educational and clinical contexts.

Design: Cross-sectional survey.

Methods: A convenience sample of 1195 undergraduate nursing students from Ireland ($N = 65$), Italy ($N = 100$), Poland ($N = 151$), Portugal ($N = 656$), Slovakia ($N = 129$), and England ($N = 94$) completed the validated EL-SALI instrument, which measures Strategic Thinking, Emotional Intelligence, Impact/Influence, and Teamwork Skills. Analyses included a one-way ANOVA with post hoc comparisons and a multivariable linear regression controlling for age, gender, and year of study.

Results: Significant between-country differences were found in total scores and in all four leadership dimensions. Variations were most pronounced in Emotional Intelligence and Teamwork Skills. For Impact/Influence, England scored significantly higher than all other countries, which clustered closely together. In adjusted analyses, country remained a significant predictor of total scores; England retained higher scores than Portugal, whereas Italy scored lower. Slovakia showed a non-significant trend toward higher adjusted scores.

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Conclusion: Differences in self-perceived leadership competencies among European nursing students suggest variation in how leadership development is embedded within undergraduate programs. Given existing regulatory frameworks, these findings underscore the need for systematic evaluation and greater curriculum alignment to ensure consistent integration of leadership development across academic and clinical training environments, thereby strengthening future practitioners' preparedness.

Limitations: This study's cross-sectional design, convenience sampling, and reliance on self-report measures limit causal inference and generalizability, leaving it vulnerable to cultural reporting biases. Additionally, cross-national demographic imbalances and the absence of formal measurement invariance testing necessitate cautious interpretation of comparative leadership scores.

1. Introduction

Traditionally, nursing education has focused primarily on the development of clinical skills, such as patient assessment and medication administration; yet as the profession has transitioned from an auxiliary role to an autonomous, and in many countries graduate-entry, discipline requiring independent decision-making and full accountability for clinical outcomes, contemporary curricula continue to place disproportionately low emphasis on the systematic development of leadership and management competencies (Miles and Scott, 2019). This gap is particularly consequential because leadership competencies are indispensable not only to the effectiveness of therapeutic teams but also to maintaining high-quality medical care and patient safety (Abdul-Rahim et al., 2025; Jaworski et al., 2022; Smith and Johnson, 2018). The conceptualization of leadership in nursing has itself undergone a paradigm shift: whereas earlier literature framed leadership as the exclusive domain of formal executives and managers (Al-Dossary, 2017), the modern perspective on clinical leadership asserts that every nurse, regardless of position, acts as a leader at the bedside, demanding a synthesis of clinical proficiency, responsibility, and independent action (Abdul-Rahim et al., 2025; Jaworski et al., 2022). Leadership is thus no longer a peripheral skill reserved for management; it is an essential, day-to-day competency for all practitioners, from students to seasoned professionals, encompassing the coordination of complex care, advocacy for patient safety, and influence over multidisciplinary team decisions (Guibert-Lacasa and Vázquez-Calatayud, 2022; Huston, 2020).

This expanded, universal conception of nursing leadership is echoed by global health organizations such as the World Health Organization (WHO, 2021) and the International Council of Nurses (ICN, 2021), both of which emphasize the strategic importance of investing in leadership capacity to enhance workforce sustainability and system responsiveness; accordingly, educational frameworks worldwide have begun integrating leadership training into national curricula and competency guidelines for pre-registration nursing students (Aydogdu, 2023; Guibert-Lacasa and Vázquez-Calatayud, 2022). However, this normative and institutional consensus has not been matched by adequate educational preparation: empirical evidence points to a persistent gap between what the profession now expects of nurses as leaders and what nursing education actually delivers, with many students reporting that they feel underprepared for leadership roles, citing a lack of confidence, insufficient experience, and an unclear understanding of how clinical leadership is applied in practice (Alilyani et al., 2024; Fontenot et al., 2024). It is precisely this gap between the leadership expected of every nurse and the leadership nursing education currently equips students to enact that motivates the present study.

The development of leadership competencies is further shaped by sociocultural, organizational, and pedagogical factors that vary across international contexts and influence team dynamics and clinical decision-making (Abdul-Rahim et al., 2025; Chauhan et al., 2020). A large-scale study across ten European countries found significant geographical variation in the perceived professional competence of graduating students, with the highest scores in Iceland and the lowest in Lithuania; key predictors of higher competence included older age, prior healthcare work experience, high academic achievement, and

satisfaction with the degree program (Kajander-Unkuri et al., 2021). More recently, a cross-sectional comparison of nursing students in Israel and England revealed significant differences in leadership dimensions, including emotional intelligence and influence (Baron et al., 2024), while a review of eleven national nursing regulators confirmed discrepancies in how leadership competencies are integrated into undergraduate curricula and called for regulators to harmonize language and research through intercountry collaboration (Frazer et al., 2025). Together, these findings underscore that leadership development cannot be assumed to generalize across educational systems, reinforcing the need for context-sensitive, comparative research that reflects local healthcare realities (Aagard et al., 2023; Dabas et al., 2023; Kim et al., 2022; Sharkiya and Irit, 2024).

To foster leadership skills among future clinical nurses, nursing education has employed diverse pedagogical strategies, including formal coursework, mentorship, simulation training, and transformational leadership models in which educators model desired professional behaviors, alongside active involvement in nursing organizations and research activities to support a holistic understanding of management (Costa et al., 2025; Krouse et al., 2024; Patterson et al., 2022; Stubin et al., 2024; Symenuk and Godbersen, 2018). Leadership potential appears to be shaped by clinical exposure, personality traits, and self-efficacy, factors that correlate strongly with higher leadership aspirations (D'Anna et al., 2024; Fardellone et al., 2014; Sharkiya and Irit, 2024; Zeid et al., 2022); contemporary conceptualizations of clinical leadership accordingly draw on transformational leadership theory and emotionally intelligent leadership models that emphasize relational influence, reflective practice, and collaborative team engagement, aligning with the EL-SALI dimensions of emotional intelligence, teamwork, strategic thinking, and influence used in the present study (Baron et al., 2024; Scammell et al., 2020).

Despite this growing body of research, important gaps remain. Much of the literature focuses narrowly on either early-year or senior students, failing to capture the continuous evolution of leadership competencies across the nursing curriculum (Patterson et al., 2022). Building on Baron et al. (2024), there is a critical need to extend this inquiry to a broader international context in order to uncover both shared patterns and culturally specific influences on leadership development (Frazer et al., 2025). This is vital because, while leadership is now a core nursing competency, the reported lack of student preparedness poses a risk to patient safety and quality of care (Abdul-Rahim et al., 2025; Leal et al., 2022). By examining and comparing self-perceived clinical leadership behaviors among undergraduate nursing students across six European countries, this study seeks to provide evidence to inform the development of longitudinal, context-sensitive educational strategies. These insights are intended to contribute to the global discourse on nursing education and to inform evidence-based curricular innovations that better prepare the next generation of nurse leaders.

1.1. Aim of the study

This study aimed to compare self-perceived leadership competencies among undergraduate nursing students in six European countries and examine whether between-country differences persist after adjustment

for key demographic and educational characteristics.

2. Methods

2.1. Design

A multicountry, cross-sectional, quantitative survey design was adopted to examine and compare self-perceived clinical leadership behaviors among undergraduate nursing students across six European countries. This study followed the STROBE guidelines for reporting cross-sectional studies.

2.2. Settings and nursing education context

Data were collected between November 2024 and July 2025 from pre-registration undergraduate nursing students registered to degree programs in six European countries: England, Ireland, Italy, Poland, Portugal, and Slovakia. Nursing degree programs differed in duration, structure, and the extent to which leadership competencies were formally embedded within the curriculum:

- **Ireland:** four-year honours bachelor's degree, with clinical leadership competencies integrated longitudinally in accordance with Nursing and Midwifery Board of Ireland standards (Nursing and Midwifery Board of Ireland, 2022).
- **Italy:** three-year Bachelor's degree, in which leadership and management content is predominantly delivered in Years 2 and 3 (Ministerial Decree 739/1994 and subsequent reforms).
- **Poland:** mostly a three-year bachelor's degree (not less than 3 semesters), characterized by limited, largely theoretical leadership education (MNSW, Dz.U. 2024, poz. 1514).
- **Portugal:** four-year bachelor's degree, with leadership and management content generally introduced in the later stages of studies. Professional competency frameworks also include expectations related to care management and leadership competencies in nursing practice (Ordem dos Enfermeiros, 2015).
- **Slovakia:** three-year bachelor's degree that primarily addresses leadership through management-oriented courses, with varying integration into clinical practice.
- **England:** three-year honours degree in England aligned with the Nursing and Midwifery Council's *Standards of Proficiency for Registered Nurses* (Nursing & Midwifery Council, 2018). The leadership related contents is embedded as a longitudinal theme throughout the program across academic and practice-based components of the programme.

Across all six countries, formal leadership content was addressed predominantly in nursing management teaching, delivered in different years and through different curricula, with no common leadership model shared across programs. In addition, clinical/bedside leadership was developed through experiential learning during clinical placements. The balance and timing of these two components differed between countries.

2.3. Recruitment, participants, and sampling

A convenience sample comprising 1195 (pre-registration undergraduate nursing students were recruited from one university across each participating country (Ireland, $n = 65$; Italy, $n = 100$; Poland, $n = 151$; Slovakia, $n = 129$; England, $n = 94$) except for Portugal, where participants were recruited from 2 nursing campuses ($n = 656$). All students registered in a pre-registration undergraduate nursing degree program were eligible, irrespective of year of study. The resulting sample spanned Years 1–4 in Ireland, Portugal, and Slovakia, and Years 1–3 in England and Poland; in Italy, all participants were first-year students. Participation was voluntary, responses were collected

anonymously, and the study received ethical approval from the appropriate institutional review boards or research ethics committees at each participating university; at one institution, formal ethical review was not required under national regulations.

2.4. Instrument

Self-perceived clinical leadership was measured using the English-language Student Assessment of Leadership Inventory EL-SALI (Baron et al., 2024). This tool was previously validated and tested for reliability. In a previous study (Baron et al., 2024), the internal consistency of the EL-SALI was 0.95. The EL-SALI comprises 40 items distributed across four theoretically derived dimensions: Strategic Thinking (11 items), Emotional Intelligence (8 items), Impact and Influence (7 items), and Teamwork Skills (14 items). Responses are documented on a 5-point Likert scale, with 0 indicating “I do not typically behave that way” and 4 indicating “I almost always behave that way.” Subscale scores are computed as the unweighted mean of constituent items; the total leadership score is the mean of all 40 items (range 0–4), with higher scores indicating stronger self-perceived leadership competence.

For countries participating in the study and in which English is not the first language (Italy, Poland, Portugal, and Slovakia), the validated English version underwent independent forward translation by an academic translator and a second translator, blinded to the original. Discrepancies were resolved by expert bilingual nursing academics, ensuring that the meaning and real-world relevance of each item remained consistent across all versions. This was followed by pilot testing the translated version in each country with nursing student samples to assess the questionnaire's clarity and linguistic appropriateness.

Internal consistency in the present multi-country sample was high across all dimensions (Table 1). At the global level, Cronbach's alpha was 0.947 for the total scale, with subscale values ranging from 0.801 (Impact and Influence) to 0.886 (Teamwork Skills). These results are consistent with those reported in previous validations of the instrument (Baron et al., 2024; Fuster Linares et al., 2020).

Given the multi-country design, internal consistency was further examined across countries using McDonald's omega. Reliability estimates were generally acceptable to excellent across dimensions and countries, although some variability was observed. Lower omega values were identified in the England subsample for Emotional Intelligence and Impact and Influence, while other countries showed more stable reliability profiles.

Item-level analysis based on omega if item deleted indicated that removing individual items did not lead to meaningful improvements in reliability coefficients across any dimension, supporting the scale's internal consistency and stability (see Table 1).

2.5. Data collection

A standardized protocol was implemented to maximize comparability while respecting local institutional practices. Local principal investigators in each university across the six countries distributed a uniform recruitment email containing a participant information leaflet (PIL), privacy notice, and a single survey link (Google Forms or institutionally approved platforms – Qualtrics/Online Surveys) to all nursing students registered to an undergraduate degree program. The online landing page reiterated study details from the PIL and required active electronic informed consent before granting access to the questionnaire. Responses were anonymous from the point of capture; no IP addresses, email addresses, or identifiable metadata were recorded. The survey could be completed on any internet-enabled device. Weekly reminders were permitted at the discretion of local investigators, with a maximum of two follow-up emails permitted per site. The data collection periods varied slightly by country to accommodate academic calendars (Portugal: November 2024–February 2025; Poland and Slovakia:

Table 1

Internal consistency of the EL-SALI by country and dimension.

Dimension	Ireland	Italy	Poland	Portugal	Slovakia	England	Global (α)	Global (ω)	ω if item deleted (min–max)
Strategic Thinking (ST)	0.880	0.813	0.816	0.851	0.853	0.770	0.824	0.827	0.803–0.825
Emotional Intelligence (EI)	0.934	0.768	0.851	0.822	0.868	0.661	0.822	0.824	0.809–0.828
Impact and Influence (II)	0.902	0.726	0.835	0.791	0.895	0.665	0.801	0.803	0.788–0.806
Teamwork Skills (TS)	0.946	0.854	0.860	0.892	0.930	0.822	0.886	0.888	0.872–0.889
Total	0.970	0.940	0.936	0.951	0.957	0.922	0.947	0.947	0.944–0.947

Values are presented as McDonald's omega for each country and Cronbach's alpha (α) and McDonald's omega (ω) for the total sample. Cronbach's alpha is reported at the global level for comparability with previous studies, whereas McDonald's omega is presented as a more robust estimate of internal consistency; Item-level analysis (omega if item deleted) showed that no individual item meaningfully increased reliability when removed, indicating that all items contributed adequately to their respective dimensions. In Ireland, Poland and Slovakia, the Strategic Thinking dimension was administered with 10 of 11 items ("Predict the consequences of your decisions" omitted); reliability estimates for these subsamples were computed on the available items.

February–March 2025; Ireland: June–July 2025; Italy and England: May–July 2025), and all surveys used identical item wording and response options.

2.6. Data analysis

Statistical analyses were performed using IBM SPSS Statistics version 30 (IBM Corp., Armonk, NY). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise the sociodemographic and academic characteristics of participants across the six countries, including age group, gender, and year of study. Chi-square tests were conducted to examine differences across countries. Post hoc pairwise comparisons with the Bonferroni adjustment were used to control for Type I error and identify specific inter-country differences. Missing data were minimal. Owing to a formatting error, one item of the Strategic Thinking dimension ("Predict the consequences of your decisions") was inadvertently omitted from the version of the instrument administered in three countries (Ireland, Poland, and Slovakia). As subscale and total scores were defined as the unweighted mean of their constituent items (Section 2.4), scores for the affected respondents were computed from the available items (10 of the 11 Strategic Thinking items), preserving the common 0–4 scoring metric; no case-wise deletion was required. No further missing data were present.

To address the primary research questions, the mean scores for self-perceived clinical leadership behaviors were compared across countries using a One-Way Analysis of Variance (ANOVA). Prior to these analyses, the assumptions of normality and homogeneity of variance (Levene's test) were assessed. If significant differences were identified, appropriate post hoc tests (e.g., Tukey's HSD or Games-Howell) were performed to determine the specific nature of the differences between the student cohorts.

Finally, adjusted linear regression models were constructed to further investigate the relationship between the country of study and total leadership scores. The models enabled assessment of the unique contribution of the geographical/cultural context while controlling for potential confounding variables, including age, gender, and academic year. All statistical tests were two-tailed, and a p -value of less than 0.05 were considered statistically significant.

2.7. Ethical considerations

This multi-country study was conducted in accordance with ethical principles for research involving human participants and with the regulatory requirements of each of the six participating institutions. Before data collection, the local principal investigator obtained ethical approval from the relevant institutional review board or equivalent ethics committee in each university where such approval was required. In one institution, formal ethical approval was not required for an anonymous survey involving current students; however, the same ethical safeguards were applied throughout the study.

Participation was voluntary, and informed consent was obtained

electronically before access to the survey. All recruitment materials included a participant information leaflet in the relevant country language, outlining the aims of the study, the voluntary nature of participation, the right to withdraw at any time without penalty or detriment to academic or professional standing, the minimal risks and anticipated benefits, the procedures for confidentiality and anonymity, and the contact details of the local principal investigator and relevant ethics body.

Strict measures were adopted to protect privacy and ensure confidentiality. No personally identifiable information, including names, email addresses, or IP addresses, was collected through the survey platform. Only demographic data necessary for analysis were obtained and reported in aggregate form to minimize the risk of identification. Electronic data were stored on secure, password-protected institutional servers and were accessible only to the named principal investigators. Data will be retained for five years in accordance with institutional policies and securely destroyed thereafter.

The study was considered to involve minimal risk, as it used a standardized survey and did not collect sensitive personal information. Nevertheless, participants were provided with contact details for the local principal investigator and information about relevant institutional support.

3. Results

Significant differences were observed in the distribution of age groups across countries ($\chi^2 = 564.9$, $df = 15$, $p < .001$). Portugal had a higher proportion of younger participants, with 84.6% aged 18–21, significantly higher than in all other countries (Table 2).

In contrast, Slovak students were older, with 58.1% aged 32 or older, significantly higher than among participants from Ireland, Italy, Poland, Portugal, and England (Table 2). England showed a more heterogeneous age distribution, differing from both Portugal's younger-skewed profile and Slovakia's older-skewed pattern. Ireland and Poland exhibited relatively similar age compositions in the younger age groups (18–21 and 22–26), with no statistically significant differences between the two countries in these brackets.

Gender distribution also varied significantly by country ($\chi^2 = 40.36$, $df = 10$, $p < .001$). Poland had the highest proportion of female participants (90.1%), compared to Italy (76.0%). A higher proportion of females participated from Slovakia (93.0%) and England (92.6%). A higher percentage of male students participated in Italy (22%) and Ireland (18.5%) than in the remaining four countries. Significant between-country differences were also found in the distribution of school year ($\chi^2 = 334.75$, $df = 15$, $p < .001$). Italy was distinctive in that all participants were enrolled in Year 1 (100%), which clearly differentiated it from other countries. England, although weighted toward Year 1, showed a more heterogeneous distribution across Years 1–3 and therefore differed from Italy while partially overlapping with Ireland and Poland. Portugal and Poland displayed broader distributions across Years 1 and 2. In contrast, Slovakia showed a more even distribution across Years 1–3, diverging from Italy and partially overlapping with

Table 2
Sample characteristics by country.

Variable	Ireland n (%)	Italy n (%)	Poland n (%)	Portugal n (%)	Slovakia n (%)	England n (%)
Age group						
18–21	27 (41.5) ^{ab}	72 (72.0) ^c	84 (55.6) ^{ac}	555 (84.6) ^d	20 (15.5) ^e	32 (34.0) ^b
22–26	21 (32.3) ^{ab}	19 (19.0) ^{ac}	65 (43.0) ^b	60 (9.1) ^c	20 (15.5) ^{ac}	14 (14.9) ^{ac}
27–31	5 (7.7) ^{ab}	4 (4.0) ^{ab}	2 (1.3) ^a	14 (2.1) ^a	14 (10.9) ^b	15 (16.0) ^b
≥32	12 (18.5) ^{ab}	5 (5.0) ^{ab}	0 (0.0) ^c	27 (4.1) ^c	75 (58.1) ^d	33 (35.1) ^b
Gender						
Female	53 (81.5) ^{ab}	76 (76.0) ^b	136 (90.1) ^a	557 (84.9) ^{ab}	120 (93.0) ^a	87 (92.6) ^a
Male	12 (18.5) ^{ab}	22 (22.0) ^b	9 (6.0) ^a	95 (14.5) ^{ab}	9 (7.0) ^a	6 (6.4) ^a
Other	0 (0.0) ^{ab}	2 (2.0) ^{ab}	6 (4.0) ^b	4 (0.6) ^a	0 (0.0) ^a	1 (1.1) ^a
School year						
Year 1	19 (29.2) ^{ab}	100 (100.0) ^c	50 (33.1) ^a	197 (30.0) ^b	19 (14.7) ^b	37 (39.4) ^a
Year 2	15 (23.1) ^a	0 (0.0) ^b	50 (33.1) ^a	259 (39.5) ^a	53 (41.1) ^a	26 (27.7) ^a
Year 3	18 (27.7) ^{ab}	0 (0.0) ^c	51 (33.8) ^a	95 (14.5) ^b	53 (41.1) ^a	31 (33.0) ^a
Year 4	13 (20.0) ^a	0 (0.0) ^b	0 (0.0) ^b	105 (16.0) ^a	4 (3.1) ^b	0 (0.0) ^b

Note: Values are presented as *n* (%), with column percentages calculated within each country. Post hoc pairwise comparisons of proportions were performed using the Bonferroni correction. Within each row category, countries sharing at least one superscript letter do not differ significantly ($p \geq .05$); countries with no letters in standard differ significantly ($p < .05$).

Portugal and Poland in earlier years.

Table 3 presents country-level statistics for the four dimensions of the EL-SALI: Strategic Thinking, Emotional Intelligence, Impact & Influence, and Teamwork Skills, as well as an EL-SALI Total score.

For Strategic Thinking, mean scores ranged from 2.90 (Italy) to 3.18 (England). Levene's test did not indicate a violation of the homogeneity of variances assumption ($p = .358$), supporting the use of a standard one-way ANOVA. A statistically significant country effect was observed ($F(5, 1189) = 6.04, p < .001$), with a small effect size ($\eta^2 = 0.025$). Bonferroni-adjusted post hoc comparisons showed that Italy scored significantly lower than Slovakia ($p = .006$) and England ($p = .002$), and that Portugal also scored significantly lower than both Slovakia ($p = .007$) and England ($p = .002$). No statistically significant differences were observed among Ireland, Poland, Slovakia, and England beyond these contrasts, indicating partial overlap among countries with

Table 3
EL-SALI by country.

Dimension	Ireland Mean (SD)	Italy Mean (SD)	Poland Mean (SD)	Portugal Mean (SD)	Slovakia Mean (SD)	England Mean (SD)
Strategic Thinking ^a	3.09 (0.63)	2.90 (0.54) ^{5,8}	3.03 (0.51)	2.97 (0.52) ^{7,10}	3.14 (0.53) ^{5,7}	3.18 (0.44) ^{8,10}
Emotional Intelligence ^b	3.64 (0.59) ^{1,2,3}	3.10 (0.50) ^{1,4,5,8}	3.25 (0.60) ^{2,6,9}	3.32 (0.49) ^{3,4,7,10}	3.56 (0.48) ^{5,6,7}	3.44 (0.37) ^{8,9,10}
Impact & Influence ^b	2.89 (0.77)	2.75 (0.52) ⁸	2.79 (0.64) ⁹	2.90 (0.58) ¹⁰	2.90 (0.78) ¹¹	3.18 (0.44) ^{8,9,10,11}
Teamwork Skills ^a	3.25 (0.70) ^{1,2}	2.85 (0.53) ^{1,4,5,8}	2.99 (0.53) ^{2,6,9}	3.10 (0.53) ⁴	3.25 (0.62) ^{5,6}	3.21 (0.44) ^{8,9}
EL-SALI Total ^a	3.22 (0.60) ¹	2.90 (0.48) ^{1,4,5,8}	3.02 (0.47) ^{6,9}	3.07 (0.48) ^{3,4,10}	3.22 (0.52) ^{5,6,7}	3.25 (0.39) ^{8,9,10}

Note: Values are presented as mean (SD). Superscript numbers indicate statistically significant pairwise contrasts (adjusted $p < .05$) and appear in both countries involved in each comparison.

Legend of significant contrasts (adjusted $p < .05$): 1 = Ireland > Italy; 2 = Ireland > Poland; 3 = Ireland > Portugal; 4 = Portugal > Italy; 5 = Slovakia > Italy; 6 = Slovakia > Poland; 7 = Slovakia > Portugal; 8 = England > Italy; 9 = England > Poland; 10 = England > Portugal; 11 = England > Slovakia.

^a ANOVA with Bonferroni adjustment.

^b Welch ANOVA with Games–Howell post hoc test.

intermediate scores.

For Emotional Intelligence, the assumption of homogeneity of variances was violated (Levene's $p = .002$), and Welch's ANOVA was therefore applied. A statistically significant country effect was identified ($F(5, 271.06) = 15.24, p < .001$), with a small-to-moderate effect size ($\eta^2 \approx 0.062$). Games–Howell post hoc comparisons indicated that Ireland scored significantly higher than Italy, Poland, and Portugal (all $p < .001$). Slovakia also scored significantly higher than Italy, Poland, and Portugal (all $p < .001$). England scored significantly higher than Italy, Poland, and Portugal, although differences relative to Ireland and Slovakia were not statistically significant. Italy consistently exhibited the lowest scores on this dimension.

For Impact & Influence, variance heterogeneity was again detected (Levene's $p < .001$), and Welch's ANOVA revealed a statistically significant country effect ($F(5, 269.37) = 9.92, p < .001$; $\eta^2 \approx 0.025$). Post hoc comparisons using the Games–Howell procedure showed that England scored significantly higher than all other countries (Italy, Poland, Portugal, and Slovakia; all $p \leq .012$). No statistically significant differences were observed among the remaining countries, which formed a homogeneous cluster with mean scores ranging from 2.75 to 2.90.

For Teamwork Skills, Levene's test did not reject the assumption of homogeneity of variances ($p = .075$), and a standard ANOVA was applied. A statistically significant country effect was observed ($F(5, 1189) = 9.12, p < .001$), with a small-to-moderate effect size ($\eta^2 \approx 0.037$). Bonferroni-adjusted comparisons indicated that Italy scored significantly lower than Ireland, Portugal, Slovakia, and England (all $p \leq .001$). Poland also scored significantly lower than Slovakia ($p = .002$) and England ($p = .039$). Ireland and Slovakia did not differ significantly and ranked in the upper range of scores on this dimension.

For the EL-SALI Total score, the assumption of homogeneity of variances was met (Levene's $p = .255$), and a one-way ANOVA revealed a statistically significant country effect ($F(5, 1189) = 8.86, p < .001$), with a small-to-moderate effect size ($\eta^2 \approx 0.036$). Bonferroni-adjusted post hoc analyses showed that Italy scored significantly lower than all other countries (all $p \leq .010$). In addition, Slovakia and England scored significantly higher than Poland and Portugal, while no statistically significant differences were observed between Ireland and Slovakia or between Ireland and England. These results indicate moderate differentiation between countries, with Italy consistently ranking lowest and Slovakia and England reporting higher overall EL-SALI scores.

Overall, statistically significant between-country differences were observed across all EL-SALI dimensions, with Italy consistently scoring lower and England consistently higher, particularly in Impact & Influence and the EL-SALI Total. Differences among the remaining countries were dimension-specific and of small to moderate magnitude. Although statistically significant, the observed effect sizes were small to moderate, suggesting that leadership competencies are broadly comparable across contexts but shaped by subtle educational and cultural influences.

Given these marked between-country imbalances in sample

composition (Table 2), an adjusted analysis was conducted to examine whether cross-national differences in leadership self-assessment persisted independently of age group, gender, and year of study. A linear model was fitted with the EL-SALI total score as the outcome, country as the main predictor, and age group, gender, and year of study as covariates, with robust standard errors (HC3) to ensure conservative inference. As shown in Table 4, the country remained a significant predictor of EL-SALI total after adjustment. Compared with Portugal, England and Slovakia retained higher adjusted scores, while Italy remained significantly lower, although this difference for Italy was marginal under robust estimation, and its cohort comprised only first-year students. The higher scores observed for Ireland in the unadjusted analyses were attenuated after adjustment and no longer remained statistically robust. However, this effect was marginal under robust estimation, whereas the difference observed for Ireland in unadjusted analyses was attenuated and no longer statistically significant after adjustment. Age group, gender, and year of study were not independently associated with EL-SALI total in the adjusted model.

4. Discussion

This multinational study examined undergraduate nursing students' self-perceived clinical leadership across six European countries using the EL-SALI, a culturally adapted and linguistically validated instrument (Baron et al., 2024). Overall, students reported moderate scores on the leadership dimensions. However, competencies were unevenly distributed across contexts, with statistically significant between-country differences in Strategic Thinking, Emotional Intelligence, Teamwork Skills, and the total leadership score. In contrast, Impact & Influence showed a more clustered pattern for most countries, with England reporting higher scores (Baron et al., 2024). Taken together, the findings reinforce the view that leadership development in undergraduate nursing is context-sensitive and may vary across educational and clinical learning settings (Costa et al., 2025; Baron et al., 2024) and are consistent with previous reporting on national regulatory requirements (Frazer et al., 2025).

Cross-national comparisons require careful consideration of sample composition, which differed substantially across participating countries (Kajander-Unkuri et al., 2021). Portugal included a predominance of younger students, concentrated in earlier program years; Slovakia comprised an older cohort distributed more evenly across years; and Italy was represented exclusively by first-year students. Given evidence that competence and professional confidence develop cumulatively during education, it is plausible that differences in study progression and prior experience contributed to variation in leadership self-evaluations (Kajander-Unkuri et al., 2021). Notably, the persistence of between-country differences after statistical adjustment suggests that demographic composition alone is unlikely to explain the findings and that broader contextual influences linked to educational and clinical learning environments may also be relevant (Costa et al., 2025).

These results raise a key educational question: which features of undergraduate education and clinical learning experiences may support leadership development? Although curriculum structure and placement characteristics were not directly measured, European evidence suggests substantial variability in how leadership is positioned and developed

across programs (Frazer et al., 2025; Costa et al., 2025). Therefore, between-country differences may reflect variation in the extent to which leadership expectations are made explicit, practiced repeatedly, and aligned with clinical learning opportunities (Miles and Scott, 2019). Students' perspectives further indicate that leadership learning is strongly shaped by inclusion in team processes and by the development of responsibility during clinical learning (Symenuk and Godberson, 2018). In this sense, the observed cross-national variability is consistent with the need for sustained leadership development that is visible and integrated across both academic and clinical components (Frazer et al., 2025; Baron et al., 2024; Costa et al., 2025; Miles and Scott, 2019).

Dimension-level findings add nuance. Strategic Thinking showed moderate but significant cross-national variation. This domain encompasses systems-level understanding, quality improvement, and organizational dynamics—competencies widely recognized as important in contemporary nursing but not always embedded in applied learning opportunities (Huston, 2020; World Health Organization [WHO], 2021). Programs that incorporate systems thinking through structured problem-solving, improvement-oriented activities, coaching approaches, and applied leadership learning may better support development of this domain (Patterson et al., 2022; Miles and Scott, 2019).

Emotional Intelligence and Teamwork Skills report the largest cross-national disparities. In terms of relational competencies, these domains are likely sensitive to communication norms, psychological safety, and the quality of supervision and role modelling during clinical learning (Costa et al., 2025). Empirical evidence also links emotional intelligence and stress among nursing students, supporting the importance of supportive learning climates for leadership-relevant relational development (Xu et al., 2023). Educational strategies that combine structured reflective practice with repeated supported opportunities for teamwork and communication—through simulation and supervised clinical learning—may therefore be particularly relevant (Langan et al., 2025; Stubin et al., 2024; Sharkiya and Irit, 2024).

Impact & Influence showed the least inconsistency, with England reporting higher scores, and is consistent with previous evidence (Baron et al., 2024). This pattern may reflect structural constraints common to student roles: students often have limited authority and restricted access to decision-making processes, which limits opportunities to exert influence in clinical settings. This interpretation aligns with student accounts that leadership opportunities can be constrained by role positioning and learning culture (Symenuk and Godberson, 2018), and with evidence that clinical leadership in hospital settings is shaped by organizational context and team structures (Guibert-Lacasa and Vázquez-Calatayud, 2022). Higher Impact/Influence scores among participants from England may be consistent with frameworks that emphasize leadership and contribution as professional expectations, although the mechanisms underlying this difference cannot be verified within the present dataset (International Council of Nurses [ICN], 2021; WHO, 2021).

Finally, the profile observed in older, more educationally diverse cohorts highlights that leadership development may occur through multiple pathways beyond formal curricular exposure. Psychological resources such as self-efficacy and psychological capital have been associated with leadership competencies and may shape students' confidence in assuming responsibility and engaging in teamwork (Jaworski et al., 2022; Zeid et al., 2022). This supports the value of educational approaches that intentionally foster agency and confidence alongside formal leadership knowledge and skills (Costa et al., 2025).

4.1. Limitations and implications for research

Several limitations should be considered. The cross-sectional design precludes causal inference about the influence of curricula, placements, or national frameworks. Self-report measures may be influenced by social desirability and cultural norms of self-presentation, and cross-national comparison remains vulnerable to residual confounding

Table 4
Adjusted mean EL-SALI total scores by country (linear model adjusted for age group, gender, and year of study).

Country	Adjusted Mean	SE	95% CI (Lower)	95% CI (Upper)
Portugal	3.07	0.07	2.94	3.20
Ireland	3.20	0.09	3.01	3.38
Italy	2.88	0.08	2.72	3.04
Poland	3.04	0.07	2.90	3.18
Slovakia	3.19	0.08	3.04	3.34
England	3.22	0.07	3.08	3.35

despite statistical adjustment (Costa et al., 2025). Convenience sampling from a single university in each country, along with differences in demographic characteristics and sample sizes across countries, may limit the representativeness of the findings and reduce the comparability of cross-national analyses. The Portuguese sample was substantially larger than those from other countries due to differences in institutional recruitment capacity, which may have affected statistical power and the precision of between-country comparisons. Consequently, findings for countries with relatively small sample sizes should be interpreted with caution. Furthermore, response rates were not systematically recorded across all participating institutions; therefore, the potential for non-response bias cannot be excluded. The students recruited from Italy represented exclusively a first-year cohort, which may have affected their mean scores on the EL-SALI and constitutes a potential confounding factor when comparing results across countries. Although the EL-SALI underwent translation and pilot testing procedures, formal testing of cross-cultural measurement invariance was beyond the scope of the present study. Therefore, differences in leadership scores should be interpreted cautiously, as cultural response patterns may partially influence self-assessment. In addition, one Strategic Thinking item ("Predict the consequences of your decisions") was omitted from the instrument in Ireland, Poland, and Slovakia. Because this omission was structural rather than random, affecting all respondents in these three countries, the Strategic Thinking subscale was derived from a slightly different item set in these samples (10 of 11 items) than in Italy, Portugal, and England (11 items). Although prorated mean scoring preserved a common metric, these affected between-country contrasts on this dimension, where Italy and Portugal scored significantly lower than Slovakia and England, should be interpreted with particular caution, as they rest partly on non-identical item content.

Future studies should adopt longitudinal designs to track leadership development across program progression and into early professional practice. Mixed-methods research would be particularly valuable for exploring how leadership is understood and enacted across contexts and for identifying pedagogical and clinical learning mechanisms associated with stronger Emotional Intelligence and Teamwork Skills (Costa et al., 2025).

4.2. Implications for nursing education and policymakers

For educators, the findings support leadership development that is explicit and sustained across theoretical and clinical components, rather than confined to isolated management-focused content (Costa et al., 2025; Miles and Scott, 2019). Given the cross-national variability in Emotional Intelligence and Teamwork Skills, programs should prioritize repeated, supported practice in relational and collaborative competencies, integrated with reflective approaches and simulation-based learning (Langan et al., 2025; Stubin et al., 2024; Sharkiya and Irit, 2024). In addition, intentionally supporting students' agency and self-efficacy may strengthen leadership readiness, particularly where opportunities for influence are structurally constrained (Jaworski et al., 2022; Zeid et al., 2022).

At the policy level, cross-national variation is consistent with the value of clear expectations for leadership competencies at the point of registration, supported by accreditation standards and investment in clinical learning environments that enable meaningful student participation in teams (Frazer et al., 2025; ICN, 2021; WHO, 2021). This is fully consistent with the International Council of Nurses (ICN, 2021) Strategic Plan 2021–2025, which positions the development of clinical leadership as a global priority for workforce sustainability and system responsiveness, and with the World Health Organization's (WHO, 2021) Global Strategic Directions for Nursing and Midwifery 2021–2025, which explicitly calls for the systematic integration of leadership competencies into all pre-registration nursing curricula. Overall, preparing students as emerging leaders requires strategies that address not only technical competence but also relational and collaborative leadership

competencies (Costa et al., 2025). Concretely, national accrediting bodies could consider adopting a shared minimum leadership-competency benchmark at the point of registration, in line with Frazer et al.'s (2025) call for regulatory harmonization. These expectations could be informed by the four dimensions examined in this study, including emotional intelligence, teamwork, strategic thinking, and influence. National accrediting bodies could reference this when reviewing pre-registration curricula and embedding a mandatory minimum threshold of structured leadership practice within clinical placements, such as supervised team-coordination or shift-leading experience, as an accreditation criterion. Validated instruments, such as the EL-SALI, could support the formative evaluation of students' self-perceived leadership competency development, which would help to translate the strategic priorities of the ICN (2021) and WHO (2021) into more measurable and comparable educational outcomes across countries.

5. Conclusion

Embedding leadership development across theoretical and clinical nursing undergraduate education is essential to preparing future safety-critical professionals, given the current evidence base, variance reported across Europe in this study, and persistent workforce challenges. Inconsistencies in leadership competence may be contributing to recruitment and retention issues worldwide. Yet, despite leadership demands, little attention has been paid to how this subject is shaped in current nursing curricula. Shared learning and opportunities for engagement with peers globally can support the dissemination of positive practices. Preparation of future nursing professionals requires systemic leadership development at both national and global levels to equip them to be strategic practitioners, policymakers, and advocates for health equity and person-centered care.

CRedit authorship contribution statement

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