



The Nursing Student Self-Efficacy in Clinical Skills Scale (NSSE-CS): A development and psychometric validation study

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ABSTRACT

Aim: Develop and validate a scale that measures nursing students' self-efficacy (SE) in performing core clinical skills typically acquired during undergraduate clinical placements.

Background: Student perceptions of SE can enhance motivation, foster improvement and serve as a robust predictor of academic achievement. For nursing students, success relies not only on theoretical knowledge but also on performing core clinical skills, usually acquired during undergraduate clinical placements. Therefore, it is necessary to assess students' SE in clinical skills.

Design: A multicenter, cross-sectional, descriptive, validation study.

Methods: We developed the Nursing Student Self-Efficacy in Clinical Skills Scale (NSSE-CS) and conducted an Exploratory Factor Analysis (EFA) to evaluate its construct validity. An online survey was administered to third-year nursing students at the end of their final clinical placements in October 2024.

Results: Overall, 393 nursing students from five universities across Italy completed the survey. EFA revealed four factors for the 48-item NSSE-CS: "Fundamental care", "Assessment and planning", "Low-complexity care" and "High-complexity care". SE scores were positively correlated with the frequency of practicing core skills during placements. SE was also significantly associated with gender, nationality, university affiliation and completion of the clinical placement examination. The omega composite reliability was good ($\omega = .98$).

Conclusion: The NSSE-CS is a valid and reliable instrument for assessing third-year nursing students' SE in clinical skills. By encouraging students to reflect on their own SE, nurse educators can provide more targeted support and tailored learning opportunities, helping students effectively master core clinical skills.

1. Introduction

Nurse education plays a vital role in tackling the ongoing global nursing shortage. By building students' confidence in their academic

abilities and competence in core clinical skills, nurse education programs can contribute to improved learning outcomes and support both the attraction and retention of individuals in the profession. For nursing students, success relies not only on the acquisition of theoretical

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knowledge but also on the ability to perform core clinical skills, usually acquired during undergraduate clinical placements (Helminen et al., 2016). Mastering these skills is crucial for the development of academic self-efficacy (SE), a construct that has been consistently linked to academic performance (Honicke and Broadbent, 2016; Shane-Simpson et al., 2025). Specifically, high academic SE can enhance motivation, foster improvement and serve as a robust predictor of academic achievement (Bouh et al., 2021; Bulfone et al., 2021; Dogan, 2015; Köseoglu, 2015; Zhang et al., 2015). Students with high levels of academic SE are more inclined to embrace challenging tasks (Matovu, 2020), as they interpret external demands as opportunities for growth (Bandura et al., 1996; Koh et al., 2022) rather than sources of stress or threats (Hu and Yeo, 2020; Manojlovich, 2005). Despite these insights, few validated tools are available to measure SE in clinical skills among nursing students. Therefore, the aim of this study is to develop and validate a scale that measures nursing students' SE in performing core clinical skills typically acquired during undergraduate clinical placements.

2. Background

Self-efficacy (SE)—defined as an individual's belief in their own ability to perform behaviors necessary to achieve specific outcomes—has been extensively studied within the framework of social cognitive theory (Bandura, 1997, 1986, 1977). These self-perceptions critically influence various dimensions of human behavior, including goal-setting, the level of effort invested in achieving those goals and the likelihood of attaining desired performance outcomes (Bandura, 1997, 1986, 1977). In the context of higher education, academic SE refers to students' confidence in their ability to accomplish educational objectives (Bandura, 1977; Zimmerman et al., 1992).

In nursing education, a field characterized by high cognitive and practical demands, developing competence is essential for ensuring safe and effective clinical practice (Reaves et al., 2024). Competence in this context involves the integration of theoretical knowledge and clinical skills to support ethical and evidence-based care (Fukada, 2018; Notarnicola et al., 2016). For instance, when a patient presents with symptoms such as sweating, pallor and altered consciousness, a competent nursing student might suspect hypoglycemia and confirm it by performing a capillary blood glucose test. This illustrates how clinical competence emerges from the integration of cognitive knowledge and psychomotor clinical skills in patient assessment and intervention. This integration is typically developed during undergraduate clinical placements, where students practice and refine their clinical skills in various settings. By the end of their undergraduate clinical placement period, nursing students should be proficient in these clinical skills (Bulfone et al., 2021; Hassona, 2019; Van Horn and Christman, 2017).

Talsma et al. (2018) highlighted a positive and reciprocal relationship between SE and skills development over time, suggesting that high levels of SE significantly enhance the learning of clinical skills among nursing students. While previous research has examined the role of SE in academic performance and clinical decision-making (McLaughlin et al., 2008; Nordhus et al., 2022), less attention has been paid to its role in clinical skill development among nursing students. Moreover, there is a need for valid and reliable tools to measure SE in clinical skills from the perspective of nursing students.

Only a few instruments have been developed to assess SE in clinical skills among nursing students (Arribas-Marín et al., 2024; Bulfone et al., 2016; Oetker-Black et al., 2014). In the USA, Oetker-Black et al. (2016) developed the Revised Clinical Skills Self-Efficacy Scale, a 9-item unidimensional scale. In Spain, Arribas-Marín et al. (2024) introduced the Perceived Self-Efficacy in Nursing Competencies Scale, a 20-item tool including five factors: communication, critical thinking, intervention, knowledge and ethics of care. In Italy, where nursing students complete approximately 1800 hours of unpaid clinical practice over a three-year bachelor's program, Bulfone et al. (2016) developed the Nursing

Self-Efficacy in Psychomotor-Skill Scale (NSE-PS). This 20-item tool assesses SE across three factors: low-complexity SE, middle-complexity SE and high-complexity SE. This scale demonstrated high validity and reliability and was able to detect changes in SE in technical skills over time (Bulfone et al., 2016). Additionally, it appears well-suited for assessing SE in psychomotor skills developed during undergraduate clinical placements among nursing students in the Italian context, given the distinct roles of nurses and the variety of clinical skills across different countries. However, it is important to note that not all clinical skills outlined in the Italian nurse profile are represented in the items of the scale (Italian Health Ministry, 1994). This gap underscores the need for a more comprehensive tool that reflects the full range of clinical skills acquired during undergraduate clinical placements in Italy. Therefore, the purpose of this study was to develop and validate the Self-Efficacy in Clinical Skills Scale (NSSE-CS). Building on the framework established by Bulfone et al. (2016), this scale was designed to reflect core clinical skills relevant to the Italian nursing curriculum. Specifically, we aimed to (1) examine the underlying factor structure of the NSSE-CS by identifying distinct domains of clinical self-efficacy; (2) evaluate the reliability of the scale; (3) investigate the relationship between self-efficacy scores and the frequency of practicing those skills during clinical placements to demonstrate construct validity; and (4) examine associations between self-efficacy scores and student characteristics to identify differences in self-efficacy perceptions.

3. Materials and methods

3.1. Study design

A multicenter, cross-sectional, descriptive, validation study design was used. In the first phase, the questionnaire was developed in accordance with the guidelines of the European Statistical System (Brancato et al., 2006; Furr, 2011). In the second phase, the instrument was administered to nursing students to evaluate its psychometric properties in accordance with the COSMIN guidelines (Terwee et al., 2018).

3.2. Participants and setting

A convenience sample of third-year nursing students was recruited from undergraduate nursing programs at five universities across Italy at the end of their third year. The inclusion criteria were as follows: a) students enrolled at the end of their third year in the nursing degree program for the 2023/2024 academic year, or those who have delayed their studies after the third year; and b) students who have completed all required clinical placement experiences for the third year; and c) students who completed all clinical placements in services affiliated with the participating University or, in the case of transferred students, at least one clinical placement in services affiliated with their current participating university. Students who delayed their studies after the third year were excluded if they completed their final clinical placement more than six months prior to participation. Graduated students were not included.

3.3. Instruments

Self-efficacy in clinical skills was assessed using the Nursing Student Self-Efficacy in Clinical Skills Scale (NSSE-CS). This scale was developed following the framework established by Bulfone et al. (2016) in the Nursing Self-Efficacy for Psychomotor Skill Scale (NSE-PS). The NSE-PS is a self-report questionnaire designed to assess nursing students' self-efficacy regarding their clinical skills, specifically their perceived ability to perform fundamental clinical activities (Bulfone et al., 2016). The instrument consists of 20 items rated on a 5-point Likert scale (1 = not at all confident; 5 = completely confident) and includes three factors: Low-complexity (Cronbach's $\alpha = 0.92$), Middle-complexity (Cronbach's $\alpha = 0.85$) and High-complexity (Cronbach's $\alpha = 0.89$).

The NSE-PS was updated and expanded to include a broader range of core nursing clinical skills through a content validity process, resulting in a new scale, the NSSE-CS, composed of 53 items. The new items were generated based on the clinical skills outlined in the Italian nurse profile (Italian Health Ministry, 1994). Item development and content refinement were guided by a multidisciplinary panel, including nursing faculty, researchers, clinical tutors and degree program coordinators from various universities. The item development process was iterative and collaborative, involving a series of structured group discussions to ensure the inclusion of clinical skills typically acquired during undergraduate placements. Content validity was ensured through expert consensus and is described further below.

Additionally, using the same original items from the NSE-PS, we also developed a scale for students to self-assess how frequently they performed each clinical skill during their clinical placements. Students were asked to indicate how often they had experienced each of the 53 nursing activities on a 5-point Likert scale from 1 (never) to 5 (always). We computed a total mean score; higher scores indicate more frequent practice.

Socio-demographic and academic variables (i.e., gender, age, marital status, nationality, work status, student status [regular or off-track], the university they were enrolled in, whether they had to repeat a clinical placement because they did not pass their evaluation and whether they had taken the third-year clinical placement examination [a practical evaluation linked to ECTS]) were collected using an ad hoc questionnaire.

3.4. Data collection

Third-year nursing students were invited to complete an online questionnaire at the end of their clinical placements, from October 20 to November 20, 2024, prior to their final examinations. At each university, one or more researchers—who were not involved in the clinical placement activities and had no conflicts of interest—explained the purpose of the study to the eligible students. Strategies used to encourage participation included in-person presentations, email invitations, video calls with student representatives and communication through WhatsApp groups. Participants received a link to a 20-minute online survey, which required their informed consent to participate in the study and to allow the processing of personal data before they completed it online. The data were collected in a pseudonymized format and no personally identifiable information—such as names or surnames—was requested or recorded.

3.5. Data analysis

The data analysis consisted of two phases: in the first phase, we evaluated the content validity of the NSSE-CS and in the second, we tested the psychometric properties (validity and reliability) of the instrument.

3.5.1. First phase: content validity of the NSSE-CS

To assess content validity, we followed the standards proposed by the COnsensus-based Standards for the selection of health Measurement Instruments (COSMIN) (Terwee et al., 2018). We aimed to ensure that the NSSE-CS accurately measures the core clinical skills by employing the Content Validity Index (CVI) to evaluate the consensus among experts regarding the relevance of each item. A panel of 10 experts in nursing education, clinical practice and research methodology evaluated the relevance of 61 items using a 4-point ordinal scale ranging from 1 (not relevant) to 4 (highly relevant). Scores of “1” (not relevant) and “2” (poorly relevant) indicated inadequate validity and were coded as “0”, while scores of “3” (relevant) and “4” (highly relevant) signified acceptable validity and were coded as “1”. For each item, the mean of the experts’ responses was calculated to obtain the item-level CVI (I-CVI) and an overall CVI for the NSSE-CS was subsequently derived. A

cut-off value of ≥ 0.78 was used to determine item retention (Polit et al., 2007; Polit and Beck, 2006). Eight items had poor content validity (I-CVI < 0.78) and were excluded. The final 53-item version achieved a scale-level CVI (S-CVI) of 0.94, indicating excellent content validity.

3.5.2. Second phase: psychometric properties

To assess the psychometric properties of the NSSE-CS, we calculated a minimum required sample size of 371 participants, based on a ratio of at least seven subjects per item (Mokkink et al., 2010). Since the NSSE-CS consists of 53 items, recruiting this sample was deemed adequate to ensure the stability of the factorial analysis. All survey items were mandatory, resulting in no missing data. The socio-demographic and academic characteristics of the sample were analyzed using frequencies and percentages for categorical variables, while means and standard deviations were employed for continuous variables. The psychometric testing of the NSSE-CS comprised four steps. First, the normality of the NSSE-CS items, including kurtosis and skewness, was evaluated (Muthén and Kaplan, 1985). In the second step, we evaluated the suitability of the data for factor analysis using the Kaiser-Meyer-Olkin (KMO) index of sampling adequacy (> 0.6) and Bartlett’s test of sphericity ($p < 0.05$) (Tabachnick and Fidell, 2019). We conducted an Exploratory Factor Analysis (EFA) to evaluate the construct validity of the NSSE-CS. We employed the Principal Axis Factoring (PAF) method to identify potential factors in the item pool. An oblique Promax rotation was applied to account for the correlations among the factors. To determine the number of factors to extract, we considered the examination of eigenvalues > 1 , the simplicity of the solution (factor loadings ≥ 0.30 and primary factor loading at least two times greater than the secondary loadings) and the interpretability of the factor structure (Norman and Streiner, 2008). In the third step, the construct validity of the NSSE-CS was assessed through hypothesis testing by examining the correlations between the factorial scores and the frequency of practicing core skills during clinical placements using Pearson’s correlation. Correlation coefficients between 0.10 and 0.29 were interpreted as weak, those between 0.30 and 0.50 as moderate and values greater than 0.50 as strong (Cohen, 1988). Finally, the reliability of the NSSE-CS was tested using McDonald’s omega (ω) composite reliability, which is a more appropriate indicator of reliability for multidimensional scales (Fornell and Larcker, 1981; McDonald, 1999). Values ≥ 0.70 were considered adequate. Differences in SE scores based on participant characteristics were analysed using ANOVA, followed by Tukey’s post-hoc tests where appropriate. To evaluate the unique predictive value of each participant characteristic on SE scores, multiple linear regression analysis was performed. Statistical analyses were performed using SPSS 22 (IBM Corp., Armonk, NY, USA).

3.6. Ethical considerations

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (World Medical Association, 2013) and received approval from the Institutional Review Board of the University of Bologna. Prior to participation, all students received detailed information on the purpose, procedures and voluntary nature of the study. Informed consent was obtained electronically, including explicit consent for the processing of personal data in compliance with privacy regulations. All personal information was kept confidential and used exclusively for research purposes. Access to the data was limited to the research team to ensure data security and participant privacy.

4. Results

4.1. Participants’ characteristics

Overall, 393 nursing students from five universities across Italy completed the survey (53.7 % north, 16.3 % center and 30.0 % south of Italy). They were mainly female ($n = 324$, 82.4 %), with a median age of

23 years (IQR 22–25.5) (Table 1). Most participants were single ($n = 348$, 88.5 %) and of Italian nationality ($n = 373$, 94.9 %). About one in six students were off-track in their academic progress ($n = 67$, 17.0 %) and 34.6 % ($n = 136$) were employed as occasional, part-time, or full-time workers. Only 3.3 % of students ($n = 13$) had repeated one or more clinical placements because they did not pass their evaluation. At the time of data collection, most students ($n = 372$, 94.7 %) had already taken the third-year clinical placement examination. The overall mean frequency of practicing core skills was 3.6 (SD = 0.6), indicating that students performed these skills “often” during their clinical placements.

4.2. Item descriptive statistics

Table 2 reports the mean and SD for each NSSE-CS item. Eight items exhibited skewness and kurtosis values greater than |1|, suggesting a non-normal distribution and a ceiling effect. The data indicated that factor analysis was suitable, as the Bartlett test of sphericity was statistically significant ($p < .001$) and the KMO value was 0.96.

4.3. Dimensionality: EFA

To examine the dimensionality of the 53-item NSSE-CS scale, we performed an EFA extracting four factors based on the scree plot of eigenvalues and the simplicity of the solution. The factors were labeled “Fundamental care”, “Assessment and planning”, “Low-complexity care” and “High-complexity care” (Table 3). We decided to eliminate items 18, 26, 27 and 43 because of poor primary loadings ($\leq .40$) and

Table 1
Students' socio-demographic characteristics ($n = 393$).

	n	%
Sex		
Female	324	82.4
Male	67	17.0
Prefer not to say	2	0.5
Age		
21–22 years	167	42.5
23–24 years	110	28.0
≥25 years	116	29.5
Marital status		
Single	348	88.5
Partnered	45	11.5
Children		
None	374	95.2
1 or more	19	4.8
Nationality		
Italian	373	94.9
Other	20	5.1
Student status		
Regular, ongoing	326	83.0
Irregular, off-track	67	17.0
Work status		
None	257	65.4
Occasional	81	20.6
Full or part-time	55	14.0
University		
Uni 1	163	41.6
Uni 2	93	23.7
Uni 3	64	16.3
Uni 4	48	12.2
Uni 5	24	6.1
Repeat-placement		
No	380	96.7
Yes	13	3.3
CP examination		
Taken	372	94.7
Not yet taken	21	5.3
Clinical practice (M, SD)	3.6	0.6

Note: M = mean; SD = Standard Deviation. CP examination = clinical placement. Repeat-placement refers to students who had to repeat a clinical placement because they did not pass their evaluation.

Table 2

Descriptive statistics of the items of the Nursing Student Self-Efficacy in Clinical Skills Scale (NSSE-CS) ($n = 393$).

	Items	Mean	SD	Skewness	Kurtosis
1	Perform hygiene care in bed	4.13	0.93	−0.85	0.14
2	Ensure the mobilization of a person in or out of bed	3.85	0.86	−0.37	−0.39
3	Ensure proper oral hygiene for individuals who are unable to care for themselves	3.92	0.98	−0.71	−0.09
4	Ensure a person's intimate hygiene	4.13	0.89	−0.82	0.19
5	Administer an evacuative or medicated enema	3.94	0.98	−0.79	0.17
6	Monitor vital signs	4.78	0.50	−2.79	10.48
7	Perform an ECG	4.64	0.67	−2.37	7.26
8	Assist a person who is unable to care for themselves with eating, drinking, or feeding	4.45	0.76	−1.56	2.93
9	Insert a urinary catheter	3.99	0.87	−0.77	0.42
10	Perform a venous blood collection	4.46	0.71	−1.18	1.23
11	Provide oxygen therapy and aerosol therapy	4.26	0.82	−1.02	0.79
12	Perform a basic wound dressing	4.18	0.84	−0.94	0.76
13	Use the appropriate scale to assess the person's symptoms, problems, and risks	3.95	0.85	−0.49	−0.11
14	Manage oral medications	4.49	0.68	−1.24	1.47
15	Manage subcutaneous medications	4.52	0.70	−1.67	3.53
16	Manage rectal medications	3.51	1.19	−0.43	−0.80
17	Manage topical medications	4.34	0.84	−1.36	2.05
18	Collect samples of urine, stool, and sputum	3.92	0.93	−0.58	−0.30
19	Conduct a general nursing assessment of the patient	3.89	0.87	−0.53	0.01
20	Create a personalized care plan for the low-complexity patient	3.73	1.00	−0.53	−0.23
21	Ensure patient safety through effective surveillance and monitoring practices	4.09	0.81	−0.72	0.56
22	Establish a professional relationship with the patient, family members, and healthcare team	3.97	0.88	−0.58	0.06
23	Manage intravenous medications	4.31	0.74	−0.98	1.24
24	Manage intramuscular medications	4.20	0.84	−1.00	0.87
25	Perform an advanced wound dressing	3.23	1.00	−0.05	−0.65
26	Prepare and support the patient during the pre-operative phase	3.73	0.91	−0.29	−0.43
27	Care for a dying person	3.12	1.00	0.04	−0.57
28	Insert a peripheral venous access device	4.19	0.82	−0.78	0.26
29	Manage a central venous access device	3.55	0.93	−0.31	−0.18
30	Manage the process of administering blood products	3.22	1.00	−0.25	−0.40
31	Manage nutrition delivered via nasogastric and gastrostomy tubes	3.62	0.94	−0.34	−0.30
32	Conduct a specific nursing assessment based on the patient's problems	3.54	0.87	−0.17	−0.23
33	Create a personalized care plan for the medium-complexity patient	3.34	0.93	−0.06	−0.30
34	Monitor the surgical patient after the operation	3.75	0.85	−0.31	−0.12
35	Inform/educate a person on how to manage their health condition and their family members (e.g. stoma, insulin pen)	3.67	0.90	−0.28	−0.39

(continued on next page)

Table 2 (continued)

	Items	Mean	SD	Skewness	Kurtosis
36	Detect and monitor the effects of therapeutic treatments	3.73	0.86	-0.22	-0.28
37	Perform a blood culture test	3.90	0.92	-0.70	0.44
38	Manage continuous infusion therapy using infusion pumps (e.g. elastomeric pumps)	3.66	0.95	-0.40	-0.10
39	Manage a tracheostomy and tracheal suctioning	3.16	1.10	0.01	-0.77
40	Monitor the income/expenditure fluid balance	3.94	0.92	-0.64	0.02
41	Insert a nasogastric tube	2.85	1.20	0.18	-0.91
42	Establish a therapeutic relationship with the patient and their family members	3.91	0.89	-0.64	0.43
43	Care for a child or adolescent with common health problems (e.g. fever, seizures)	2.64	1.10	0.33	-0.62
44	Manage a patient on mechanical ventilation (e.g. bronchosuction, monitor parameters)	3.19	1.01	-0.01	-0.65
45	Conduct a multidimensional assessment of an elderly patient	3.44	0.98	-0.21	-0.38
46	Create a personalized care plan for the critical/ high-complexity patient	3.15	1.01	0.05	-0.51
47	Manage clinical nursing risk for the patient (e.g. prevention of medication errors)	3.68	0.90	-0.41	0.10
48	Identify care priorities and their reasons	3.58	0.88	-0.22	-0.11
49	Ensure the safe management of complex medications (e.g. patient with multiple venous accesses)	3.63	0.82	-0.18	-0.32
50	Conduct an arterial blood gas analysis test	3.62	1.03	-0.55	-0.18
51	Promote patient participation in their treatment and adherence to their care, therapeutic, or rehabilitation plans	3.64	0.85	-0.29	-0.02
52	Organize the planned nursing interventions according to the healthcare and organizational priorities	3.62	0.85	-0.36	0.17
53	Support vital functions (e.g. cardiopulmonary resuscitation, airway clearance)	2.91	1.06	0.31	-0.65

Note: SD = Standard deviation. All the items range from 1 (not at all confident) to 5 (completely confident). R = Spearman's correlation. * $p < .001$

substantial cross-loadings. We also decided to eliminate item 8 because of cross-loading. However, we chose to retain a few items that displayed cross-loading (items 8, 16, 21, 34, 37, 40) and assign them to the factor with the highest loading, based on their theoretical relevance. The new solution included 48 items (Table 3, Supplementary file 1). Collectively, the four factors explained 56 % of the total variance: "Fundamental care" (5 items) accounted for 7 %; "Assessment and planning" (17 items) for 22 %; "Low-complexity care" (13 items) for 14 %; and "High-complexity care" (13 items) for 13 %.

4.4. Reliability, scoring and associations

To examine the reliability, we calculated the omega composite reliability, which was good ($\omega = .98$). Among the four dimensions, "High-complexity care" received the lowest mean score ($M = 3.39$, $SD = 0.71$) (Table 4). The correlation between SE and the frequency of practicing core skills during clinical placements was positive and significant for all dimensions ($r > .40$, $p < .001$), demonstrating construct validity. At univariate analysis, significant differences in SE scores emerged across several student characteristics. The regression analysis confirmed that male students reported higher SE in High-complexity care than females

($p = .001$). Students of Italian nationality reported lower SE in Fundamental care than non-Italians ($p = .045$). Students from two specific universities reported lower SE in Fundamental care ($p < .001$), Assessment and planning ($p = .014$) and Low-complexity care ($p = .046$). Students who had already taken the clinical placement examination reported greater SE in Assessment and planning ($p = .001$), Low-complexity care ($p = .037$) and High-complexity care ($p = .016$) (Table 5).

5. Discussion

This study aimed to develop and evaluate the psychometric properties of the NSSE-CS, a self-assessment instrument designed to measure nursing students' SE in performing clinical skills typically acquired during undergraduate clinical placements. Despite the importance of SE in the development of nursing clinical skills (Arribas-Marín et al., 2024), existing tools (Bulfone et al., 2016) do not comprehensively assess the practical abilities acquired during clinical placements. The NSSE-CS addresses this gap by providing a detailed, structured evaluation aligned with the clinical skill set outlined in the Italian nurse profile (Italian Health Ministry, 1994). The scale was developed based on the framework established by Bulfone et al. (2016), increasing the number of items to ensure broader coverage of relevant clinical skills. The involvement of a multidisciplinary panel of nursing education experts during the content validation phase significantly enhanced the quality of the instrument. The final 48-item scale offers a more comprehensive measure of SE in clinical skills and demonstrates good validity and reliability.

In terms of dimensionality, EFA revealed four factors: Fundamental care, Assessment and planning, Low-complexity care and High-complexity care. Each of these factors reflects a key component of the educational continuum of the bachelor's program. This solution diverges from the three-factor structure identified in the NSE-PS, which align with the three levels of complexity corresponding to the three years of the course (Bulfone et al., 2016). In particular, "Fundamental care" and "Assessment and planning" emerged as conceptually distinct dimensions. Together, these two factors explained 29 % of the total variance (out of 56 %), underscoring their foundational role in nursing education.

The first factor is labeled 'Fundamental care' because it includes items that prioritize meeting individuals' basic needs to ensure their physical and social well-being, such as the need for hygiene (Feo et al., 2018). Students reported feeling competent in these clinical skills, which are typically introduced early in the curriculum; however, this factor did not receive a higher score than Low-complexity care, contrary to expectations. One possible explanation is that, during the initial phases of their education and clinical placements, students tend to focus on simple technical procedures, which are often perceived as more congruent with the professional identity of nursing. As a result, they may develop a tendency to deprioritize certain foundational activities, which are frequently among the first to be left unfinished in contexts of understaffing or time constraints (Chiappinotto et al., 2024). This tendency may in turn influence how students perceive and assess their own competence in these essential areas.

The second factor, "Assessment and planning," encompasses skills related to patient assessment (items 13–19–32–45), care planning (items 20–33–46–48–52) and monitoring (items 21–34–36–47). It also includes aspects that involve building relationships and educating the patient and their family (items 22–35–42–51). These activities are central to the nursing process and require integrating technical, relational and cognitive skills (Gordon, 2014). By fostering a meaningful and therapeutic relationship with the patient, the nursing student can effectively identify care needs, develop a personalized care plan that respects the patient's characteristics and preferences and monitor treatment progress while ensuring patient safety (Ambrosi et al., 2021; McCormack and McCance, 2017).

Table 3

First and second solutions at the exploratory factor analysis of the Nursing Student Self-Efficacy in Clinical Skills Scale (NSSE-CS) (n = 393).

Items	F1	F2	F3	F4	F1	F2	F3	F4
1 Perform hygiene care in bed	.90	.04	-.04	-.07	.90	.03	.01	-.09
2 Ensure the mobilization of a person in or out of bed	.72	.07	-.04	.11	.71	.07	-.02	.10
3 Ensure proper oral hygiene for individuals who are unable to care for themselves	.64	-.06	.02	.16	.63	-.07	.04	.15
4 Ensure a person's intimate hygiene	.94	.02	.02	-.12	.94	.02	.06	-.14
5 Administer an evacuative or medicated enema	.67	.07	.04	.05	.65	.09	.07	.02
6 Monitor vital signs	-.01	-.01	.84	-.25	-.01	-.01	.83	-.25
7 Perform an ECG	-.02	-.05	.75	-.09	-.02	-.03	.75	-.11
8 Assist a person who is unable to care for themselves with eating, drinking, or feeding	.46	.04	.45	-.25	-	-	-	-
9 Insert a urinary catheter	.21	-.03	.36	.22	.20	-.01	.36	.20
10 Perform a venous blood collection	.08	-.01	.68	-.01	.08	-.01	.68	-.01
11 Provide oxygen therapy and aerosol therapy	.14	.04	.54	.11	.15	.05	.53	.10
12 Perform a basic wound dressing	-.02	.27	.44	.10	-.01	.27	.43	.10
13 Use the appropriate scale to assess the person's symptoms, problems, and risks	.01	.59	.24	-.03	-.01	.61	.22	-.04
14 Manage oral medications	.01	-.06	.83	-.02	.03	-.07	.82	-.01
15 Manage subcutaneous medications	.01	.02	.74	-.06	.02	.03	.73	-.06
16 Manage rectal medications	.27	-.06	.15	.39	.27	-.05	.16	.36
17 Manage topical medications	.03	.01	.62	.02	.05	.02	.61	.01
18 Collect samples of urine, stool, and sputum	.27	-.05	.26	.34	-	-	-	-
19 Conduct a general nursing assessment of the patient	.02	.70	.15	-.11	.02	.71	.13	-.10
20 Create a personalized care plan for the low-complexity patient	.08	.73	.07	-.10	.08	.75	.05	-.10
21 Ensure patient safety through effective surveillance and monitoring practices	-.09	.59	.42	-.12	-.08	.59	.41	-.12
22 Establish a professional relationship with the patient, family members, and healthcare team	-.04	.77	.15	.12	-.05	.78	.16	-.20
23 Manage intravenous medications	-.12	.09	.72	.12	-.10	.08	.71	.12
24 Manage intramuscular medications	-.04	-.08	.64	.20	-.01	-.09	.65	.17
25 Perform an advanced wound dressing	-.08	.22	.09	.51	-.08	.22	.08	.51
26 Prepare and support the patient during the pre-operative phase	-.03	.24	.21	.30	-	-	-	-
27 Care for a dying person	.02	.40	-.12	.29	-	-	-	-
28 Insert a peripheral venous access device	.03	-.10	.57	.25	.04	-.10	.58	.23
29 Manage a central venous access device	-.14	.03	.14	.65	-.14	.03	.12	.67
30 Manage the process of administering blood products	.01	.06	.03	.65	-.01	.07	.03	.64
31 Manage nutrition delivered via nasogastric and gastrostomy tubes	.04	.10	.09	.56	.04	.09	.07	.59
32 Conduct a specific nursing assessment based on the patient's problems	.10	.83	-.19	.12	.10	.83	-.20	.13
33 Create a personalized care plan for the medium-complexity patient	.06	.76	-.17	.21	.05	.77	-.19	.23
34 Monitor the surgical patient after the operation	-.05	.45	.10	.30	-.04	.45	.09	.28
35 Inform/educate a person on how to manage their health condition and their family members (e. g. stoma, insulin pen)	-.03	.67	.03	.13	-.04	.67	.03	.12
36 Detect and monitor the effects of therapeutic treatments	-.03	.64	.04	.18	-.03	.64	.02	.20
37 Perform a blood culture test	-.04	.01	.36	.42	-.04	.02	.36	.41
38 Manage continuous infusion therapy using infusion pumps (e.g. elastomeric pumps)	-.13	.12	.21	.51	-.12	.12	.20	.53
39 Manage a tracheostomy and tracheal suctioning	.04	-.12	-.12	.85	.05	-.13	-.14	.89
40 Monitor the income/expenditure fluid balance	-.05	.05	.38	.32	-.03	.06	.38	.30
41 Insert a nasogastric tube	.10	-.09	-.13	.78	.10	-.09	-.11	.77
42 Establish a therapeutic relationship with the patient and their family members	-.01	.87	.15	-.28	-.01	.87	.16	-.29
43 Care for a child or adolescent with common health problems (e.g. fever, seizures)	-.05	.34	-.16	.38	-	-	-	-
44 Manage a patient on mechanical ventilation (e.g. broncho-suction, monitor parameters)	.01	-.08	-.08	.84	.01	-.09	-.09	.86
45 Conduct a multidimensional assessment of an elderly patient	.15	.76	-.15	.03	.14	.76	-.13	.01
46 Create a personalized care plan for the critical/ high-complexity patient	-.02	.68	-.24	.36	-.03	.67	-.25	.37
47 Manage clinical nursing risk for the patient (e.g. prevention of medication errors)	-.06	.80	.02	.03	-.06	.80	.01	.03
48 Identify care priorities and their reasons	-.02	.85	-.06	.04	-.02	.85	-.07	.05
49 Ensure the safe management of complex medications (e.g. patient with multiple venous accesses)	-.03	.25	.15	.46	-.03	.25	.15	.46
50 Conduct an arterial blood gas analysis test	.11	.04	.16	.39	.10	.04	.17	.39
51 Promote patient participation in their treatment and adherence to their care, therapeutic, or rehabilitation plans	.01	.81	-.02	.01	.01	.82	-.04	.01
52 Organize the planned nursing interventions according to the healthcare and organizational priorities	.04	.87	-.08	.03	.04	.88	-.09	.03
53 Support vital functions (e.g. cardiopulmonary resuscitation, airway clearance)	-.04	.15	-.06	.62	-.05	.15	-.05	.60

Note: F1 = Fundamental care, F2 = Assessment and planning, F3 = Low-complexity care, F4 = High-complexity care. Primary factor loadings are in bold.

The third and fourth factors pertain to low and high-complexity care. “Low-Complexity Care” refers to the clinical skills that students acquire during their first and second years, whereas “High-Complexity Care” involves clinical skills primarily developed in the third year of the nursing program. This developmental distinction was reflected in the scores: students reported the highest SE in “Low-complexity care” ($M = 4.33$, $SD = 0.54$) and the lowest in “Highly complex care” ($M = 3.39$, $SD = 0.71$). This pattern likely reflects limited exposure to advanced clinical scenarios, which are generally concentrated in the final year of training (Camellini et al., 2021). Students may have limited opportunities to practice high-complexity care, which could affect their SE.

The analysis of individual item scores revealed variability in students' confidence across specific clinical tasks. Lower SE was reported

for activities such as caring for a child/adolescent with common health problems (2.64), inserting a nasogastric tube (2.85) and supporting vital functions (2.91). Students may feel unfamiliar with these skills because they do not always have educational opportunities to practice them during their studies (Roh and Issenberg, 2014). In contrast, higher SE was reported for basic technical skills such as monitoring vital signs (4.78) and performing an ECG (4.64). These tasks are frequently practiced both in clinical placements and during simulated sessions in Skill Labs. Simulation-based training, combined with active and collaborative learning approaches (Rykhoff et al., 2024; Vannini et al., 2025; Zeffiro et al., 2025), appears to enhance student confidence and procedural competence (Núñez et al., 2024). These same items also showed non-normal distribution and ceiling effects, indicating that they are

Table 4

Scores of the NSSE-CS and correlations with the frequency of practicing core skills during clinical placements (n = 393).

	Mean	SD	1	2	3	4	5
1. Fundamental care	4.00	0.78	-				
2. Assessment and planning	3.69	0.70	.49	-			
3. Low-complexity care	4.33	0.54	.54	.65	-		
4. High-complexity care	3.39	0.71	.44	.73	.69	-	
5. Tot SE	3.81	0.57	.64	.91	.85	.89	-
6. Practicing core skills	3.58	0.55	.43	.70	.52	.64	.71

Note: SD = standard deviation; Tot SE = total score of self-efficacy. All correlations are significant at $p < 0.001$. Mean scores of the NSSE-CS range from 1 (not at all confident) to 5 (completely confident). The mean score of practicing core skills during clinical placements ranges from 1 (never) to 5 (always).

widely mastered during the course, from the first clinical placements onward.

The sample's demographic and academic profile aligns with national trends among Italian nursing students (Almalaurea, 2024; Mastrillo et al., 2024). To be eligible, students were required to complete all necessary clinical placement experiences for their third year. However, 17 % reported being off-track in their studies because they had not passed all of their theoretical exams and had remained in the nursing program for at least 4 years. These findings are consistent with national data indicating that only 65 % of nursing students in Italy graduate within the expected timeframe (Almalaurea, 2024). This underscores that maintaining academic progress is particularly challenging for nursing students and demands dedication and passion (Viottini et al., 2024). Furthermore, approximately one-third of students (34.6 %) were employed while studying, reflecting the financial pressures that many nursing students experience (Grant-Smith and de Zwaan, 2019).

Students reported that they often performed core clinical skills during their clinical placements, though not consistently. This variable was positively associated with SE, reaffirming Bandura's theory that mastery experiences are key to building confidence (Bandura, 1997, 1986, 1977). In addition, students who had already taken the third-year clinical placement examination reported higher SE in most areas, emphasizing that practical experience, reinforced through assessment, supports confidence development (Purabdollah et al., 2023). It is likely that successfully passing this examination not only reflects skill acquisition but also reinforces students' belief in their own competence through structured feedback and performance validation. These results support the importance of practical assessments in enhancing students' self-perception of clinical readiness and may inform future curriculum design to ensure sufficient exposure and evaluation in key clinical areas before graduation.

We found other significant associations between SE and students' characteristics that were verified in the regression analysis. For example,

male students reported higher SE in "High-Complexity Care", possibly reflecting a stronger inclination toward critical and intensive care settings. This highlights the potential for incorporating gender-related preferences into professional development pathways (Ragazzi et al., 2024). Students of non-Italian nationality and those from three specific universities reported higher SE in "Fundamental Care". This underscores the potential influence of teaching methods, curriculum design, clinical placement models and cultural beliefs in shaping students' understanding of fundamental care and reinforcing its perceived value in different caregiving settings (Ivziku et al., 2024; Palese et al., 2019). We also found differences at the individual university level in the dimension of "Assessment and planning" and "Low-complexity care", highlighting how specific nursing programs may influence outcomes, likely due to variations in teaching methods and curriculum content.

5.1. Limitations

The findings of this study should be considered considering several limitations. First, the sample may not fully represent the general population of nursing students, as data were collected from only five universities in Italy. Second, because the survey was distributed online, there may have been self-selection bias, meaning that students with a greater interest in the topic were more likely to participate. Additionally, we could not determine the response rates for the survey (Zimba and Gasparyan, 2023). It is also possible that responses may have been influenced by social desirability bias, as participants may have overestimated their perceived competence. Finally, the dimensionality analysis in this study was limited to an EFA. Future studies should further refine the scale and employ Confirmatory Factor Analysis (CFA) to validate the factor structure across diverse populations and educational contexts.

6. Conclusion

The methodological approach used to develop and psychometrically validate the NSSE-CS, in accordance with COSMIN standards, has resulted in a valid and reliable instrument for assessing third-year nursing students' SE in clinical skills. Therefore, the NSSE-CS can be used in future research and educational contexts to assess SE in clinical skills among third-year nursing students, particularly those who have completed their undergraduate clinical placements. The scale provides a structured approach to collecting SE data, which can support students in identifying their learning needs and directing their own skill development—an approach that has been strongly linked to improved clinical competence. By encouraging students to evaluate their own SE, nurse educators could provide tailored education and support, helping students effectively master clinical skills by the conclusion of their training.

Table 5

Regression analyses predicting NSSE-CS scores based on students' characteristics (n = 393).

	Fundamental care			Assessment and planning			Low-complexity care			High-complexity care		
	β	SE	p	β	SE	p	β	SE	p	β	SE	p
1. Sex (F)	.025	.094	.590	-.002	.094	.966	-.071	.071	.173	-.165	.399	.001
2. Age	-.016	.010	.810	-.061	.010	.401	.036	.007	.622	.032	.095	.654
3. Single	-.047	.120	.346	-.023	.120	.682	-.035	.090	.528	.011	.010	.840
4. Italian nationality	-.095	.164	.045	-.038	.164	.470	-.063	.123	.230	-.082	.121	.117
5. Children	-.017	.221	.779	-.022	.221	.746	-.115	.167	.089	-.089	.165	.184
6. On-track	-.048	.098	.325	-.071	.098	.184	-.041	.074	.440	-.096	.223	.072
7. Working	.021	.076	.651	-.049	.076	.349	.004	.057	.939	-.044	.098	.398
8. Universities	-.438	.078	<.001	-.128	.078	.014	-.105	.059	.046	.028	.077	.586
9. Repeat-placement	-.013	.212	.782	-.054	.212	.306	-.059	.160	.274	-.097	.079	.069
10. CP examination	.063	.165	.175	.169	.165	.001	.108	.125	.037	.125	.214	.016
R ²		.225			.053			.041			.058	
F		11.049			2.117			1.612			2.346	
P		<.001			.022			.101			.011	

Note: SE = standard error. CP = clinical placement. Universities 2 and 5 were coded as 1, while Universities 1, 3, and 4 were coded as 0 for geographical reasons.

CRediT authorship contribution statement

Roberto Latina: Writing – review & editing, Investigation. **Daniela Mecugni:** Writing – review & editing, Supervision, Project administration, Investigation, Conceptualization. **Valeria Vannini:** Writing – original draft. **Luisa Sist:** Writing – original draft. **Rocco Mazzotta:** Writing – original draft, Investigation. **Valentina Biagioli:** Writing – original draft, Visualization, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Giampiera Bulfone:** Writing – original draft, Visualization, Project administration, Methodology, Investigation, Formal analysis, Conceptualization.

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Appendix A. Supporting information

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