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Undergraduate Nursing Students' Professional Competencies Scale: Development, Validity, and Reliability

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ABSTRACT

Objective: To develop and test the validity and reliability of the "Undergraduate Nursing Students' Professional Competencies Scale.

Methods: A 59-item pool was developed from the literature on nursing students' competencies and education standards and reviewed by 26 nursing education experts. The item-content validity ratio was calculated using the "Lawshe Technique". Face validity was performed through a pilot study with 10 final-year nursing students. Following expert feedback, one item was removed and four were added, resulting ina 62-item draft scale. The scale was administered online to 320 fourth-year nursing students. Exploratory and confirmatory factor analyses (EFA and CFA), along with reliability testing, were conducted. Reporting followed the STROBE checklist.

Results: Expert panel members scored an initial item pool with 59 items. One item with a low content validity ratio was removed, and four items were added to the questionnaire. The draft tool consisted of 62 items. The item-total correlation value of each item was adequate. Kaiser-Meyer-Olkin and Bartlett's sphericity tests showed that the sample size was sufficient. EFA removed 12 items with low factor loadings, leaving 50 items across five factors: management and organization (20), nursing care (12), research (8), communication and collaboration (6), and leadership (4). The CFA confirmed this five-factor structure with the applicable chi-square/degrees-of-freedom value, fit indices, RMSEA and SRMR values. Cronbach's alpha ranged from 0.891 to 0.967 across the factors and was 0.976 for the overall scale.

Conclusion: The scale was valid and reliable for evaluating professional competencies in nursing education. Further studies with larger samples are recommended.

Keywords: Nursing Education, Professional Competency, Scale Development, Validity, Reliability

INTRODUCTION

It is imperative that health professionals, regardless of discipline, receive a qualified education that equips them with the competencies the new era demands.[1] In recent years, healthcare settings have changed rapidly and become more complex. These complex settings have placed high demands on nursing graduates, who must effectively assume new professional roles and demonstrate a range of competencies.[2] It is expected that these competencies will be added to the education curriculum and gained by students until graduation.[3,4]

A competency-based assessment creates continuity of standards across academic programs and supports the development of practice-ready graduates. It is also used to measure learning and assess whether students can demonstrate behaviours consistent with competency attainment.[5] Nursing competency encompasses various components, including theoretical knowledge, professional judgment, a combination of skills, and moral and ethical values. Nurses must apply the knowledge and skills they have gained to each nursing situation and adapt them to different conditions.[6] Professional nursing organizations advocate competency-based assessment to promote optimal workforce preparation for a complex and modern healthcare environment.[7,8] "Guideline on Core Competencies in Nursing" was prepared for the first time in 2021 to draw the framework of the core competencies expected from nurses responsible for general care in health

service delivery and make these competencies a national standard in Türkiye. The core competencies in the guideline are Professionalism, Effective Communication, Evidence-Based Practice, Care Management, Quality Improvement, Teamwork and Collaboration, and Professional Leadership.[9]

The duration of nursing education in Türkiye covers at least 4 years or 4600 hours of undergraduate level theoretical and clinical education in accordance with the European Economic Community Directives of the Council of European Union and the Higher Education Council (YÖK) regulation on determining the minimum educational conditions for health disciplines (Regulation on determining the minimum educational conditions for medical, nursing, midwifery, dentistry, veterinary, pharmacy and architecture education programs). The duration of theoretical education is at least one-third of the total, and the duration of clinical education is half of the total.[10,11]

Nursing education aims to ensure that students graduate with the knowledge, attitudes and skills necessary to provide quality care in all countries and to prepare them for the future. Professional competence is essential to ensure the nursing goal of enhancing patients' quality of care and safety. Nursing students should develop sufficient professional competence through their theoretical and practical nursing education to provide holistic, high-quality care.[12] Nilsson et al.[13] assessed and compared nursing education and self-reported professional competence among nursing students graduating with a bachelor's degree from higher education institutions in Europe. They found the highest measured mean scores in the competence areas 'Value-based nursing care' and 'Medical, technical care' and the lowest in 'Legislation in nursing and safety planning' and 'Education and supervision of staff and students'.[13] Both theoretical education and clinical practice environment should be considered when determining the competencies that students are expected to have. Clinical learning environments are critical for nursing students to acquire professional competencies. In this respect, it is also vital to consider how the competencies aimed to be developed in students through theoretical and practical training will be evaluated.[14] The final year of nursing education is the transition period of the student to professional life. At the end of this year, the senior student is expected to have gained the necessary knowledge and skills for nursing practice. Therefore, the final year of nursing education is an excellent time to evaluate the student's professional competencies.

Nurses are likely to work in any country in the world after graduation. For this reason, the assessment of nursing students' competencies is also globally critical. In Türkiye, several instruments are available to assess nursing competence; however, a closer examination reveals important limitations. First, most of the competency scales adapted into Turkish were originally developed for professional nurses rather than nursing students, which may limit their suitability for assessing competencies in undergraduate education.[15] Seconds, some Turkish versions of competency scales primarily emphasise clinical and technical skills, while offering limited evaluation of professional values, ethical sensitivity, reflective practice, and self-directed learning—key outcomes of contemporary nursing education.[15-17] Third, existing instruments often lack a comprehensive, student-centred framework that reflects the developmental nature of competence acquisition in nursing students.[18] Competency development in nursing students differs substantially from that of professional nurses, as students are in a formative stage of professional identity development and are expected to integrate theoretical knowledge with clinical practice progressively.[19] Therefore, instruments designed for evaluating professional nurses may not adequately capture the educational, cognitive, and professional growth processes specific to nursing students. Assessing nursing students' competencies requires multidimensional, developmentally appropriate measurement tools grounded in nursing education theory rather than solely in clinical performance outcomes.[20] Despite the existence of several Turkish competency-related scales, there remains a lack of a comprehensive, psychometrically sound instrument specifically developed to measure professional competencies of nursing students within the Turkish cultural and educational context. This gap highlights the need for a scale that reflects contemporary nursing competency frameworks and aligns with outcomes in undergraduate nursing education.

In this context, there is a need to develop a consensus-based, accepted evaluation tool by engaging a large group of experts across Türkiye to identify the competencies that senior nursing students are expected to acquire during their theoretical and practical education.

AIM

The study aimed to develop and test the validity and reliability of the "Undergraduate Nursing Students' Professional Competencies Scale."

Research questions

• Is the Undergraduate Nursing Students' Professional Competencies Scale a valid tool for measuring senior nursing students?

• Is the Undergraduate Nursing Students' Professional Competencies Scale a reliable tool for measuring senior nursing students?

METHODS

Research Design

This study was a methodological study. The manuscript was written following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) protocol and the recommendations by Streiner and Kottne for reporting the results of studies of instrument and scale development and testing.[21]

Procedure

Figure 1 exhibits the study procedure. The study team performed the essential steps in scale development, in accordance with the International Test Commission (ITC).[22] The initial phase of the study comprised deriving an item pool and assessing content validity. Then, item-total score correlations for the statements were calculated, and exploratory factor analysis (EFA), a must for scale development studies, was performed.[23] Then the confirmatory factor analysis (CFA) was also performed on the same sample. The researchers measured the internal consistency coefficients. In conclusion, the test-retest method was implemented to evaluate the scale.

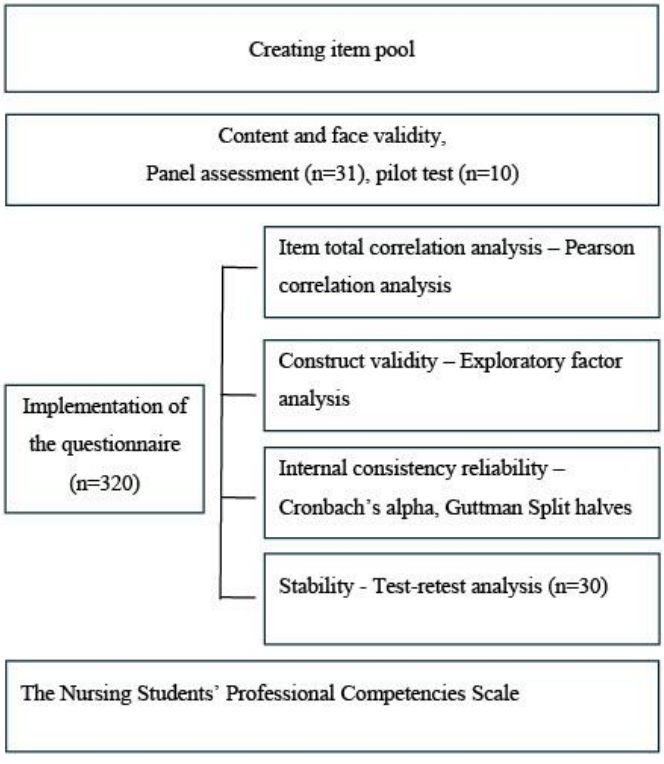

Figure 1. The study procedure

Sample and Data Collection

The sample consisted of fourth-year undergraduate nursing students studying in public and non-profit private universities in Türkiye at the time of data collection. Since the draft tool consisted of 62 items, a sample size of nearly 5 to 10 times the number of items in the draft scale was used.[24] It is also stated that a sample size of at least 200 people is sufficient for factor analyses, while samples of 300 or more are considered good.[25,26]

In this direction, the target was to reach a sample of at least 5 times the number of items (n=310). Responses were received from 330 students. 10 forms were excluded from the sample due to incomplete responses and were not included in the statistical evaluation. Finally, the research population consisted of 320 nursing students. Data were collected by an online survey in the spring term of the 2022-2023 academic year. The inclusion criteria were being a senior nursing program student over 18 years old and clicking informed consent in the online survey. Participant nursing students were mainly women (84.4%) and from public universities (76.6%). The mean age was 22.63 (Standard deviation (SD): 1.1).

An additional group of 30 senior nursing students from a private, non-profit university provided data for the stability test. Data from these 30 students were not included in the primary study and were used only to analyse stability.

Creating Item Pool

Previous studies have examined the required competencies for undergraduate nursing students.[27] The standards and concepts for undergraduate nursing education, which were listed by the national and international undergraduate nursing education accreditation organizations were also considered.[7,8] After sharing relevant studies and standard documents, researchers created item pools independently. They sent all items to the six researchers. These six researchers combined all the items, removed the, indicated duplicates and identified similar ones. Lastly, the researchers gathered online and negotiated to finalize each item before sending them to the expert panel. The item pool, consisting of 59 statements, took its final form.

Content and Face Validity

Fifty-five experts were invited to the expert panel by phone to review the questionnaire. Twenty-six of them accepted to participate. The study received 26 experts' opinions, including board members of the Nursing Education Association (HEMED) and the Nursing Education Programs Evaluation and Accreditation Association (HEPDAK), as well as experts in nursing education from various disciplines, i.e., medical-surgical nursing, women's health nursing,

fundamentals of nursing, public health nursing, and management in nursing for over 10 years.

The questionnaire, comprising 59 initial items, was sent by email to the panel members. All experts reviewed and sent their opinions on whether the initial item appropriately queried the “competencies of nursing students” and whether any expressions were complex to understand. The item-content validity ratio for the data obtained from expert feedback was calculated using the "Lawshe Technique". This technique is based on how experts evaluate each item, and the ratio calculated from it indicates whether there is a "consensus" among experts. A Content validity ratio (CVR) is considered acceptable if there is a high level of agreement among panellists on an item. The experts evaluated their opinions as “necessary/appropriate”, “partially necessary/can be corrected”, and “not necessary/not appropriate”. For an item to be included in the scale, more than 50% of experts must say it is “appropriate” or “necessary”. It ranges from -1 (absolute rejection) to +1 (absolute acceptance). If all experts rate any item on the scale as “appropriate”, the CVR value of that item is 1. Suppose less than half of the experts mark an item as "appropriate"; items with a minus sign are removed. If 50% of the experts say "appropriate" for an item, the CVR is zero.

For an item to be included in the scale, more than 50% of experts must rate it as "appropriate" or "necessary"[28] The item remains when the CVR value is greater than this. Otherwise, it is removed.[29,30] Experts were also invited to provide comments and suggestions for additional items. The researchers analysed quantitative and qualitative data collected from the experts. The item CVR was calculated for each item, and the scale-content validity index (S-CVI) was calculated for the total scale.

Face validity is a subjective assessment of the relevance, formatting, readability, clarity, and appropriateness of a questionnaire for the intended audience.[31] Seven researchers evaluated face validity. As part of face validity, a pilot test was conducted with 10 senior nursing students who were not included in the study but shared characteristics with the participating students.

Measures

The questionnaire was designed as an online survey comprising three parts. The first part was an informed consent form that provided candidate participants with information about the research's aim, scope, and ethical considerations. The second part was an information form with questions about age, gender, and university type. The third part was a draft, "The Undergraduate Nursing Students' Professional Competencies Scale."

Data Analysis

The study used SPSS (IBM v.29) to analyse the collected data. The Content Validity Ratio (CVR) and the scale Content Validity Index (S-CVI) were calculated to assess content validity. Item-total score correlations were calculated using Pearson correlation analysis. Exploratory factor analysis (EFA; extraction method: maximum likelihood; rotation method: direct oblimin) was performed to test the construct validity of the form. The internal consistency of the tool was evaluated using Cronbach's alpha. The stability of the scale was tested via test-retest analysis. The top and bottom 27% scores were used to evaluate the discrimination analysis.

Ethical Considerations

The ethics committee approved the study (Koç University Ethics Committee, Approval number: 2022.470.IRB3.208, Date: 29.12.2022). Online questionnaire links were sent to university administrations that agreed to participate in the study, distributed, and the administrations were instructed to distribute them to students. The surveys were administered to graduating students at the end of the semester to avoid disrupting their coursework and grading processes. Only participants who clicked and checked the online consent form could access the information form questions and draft scale items.

RESULTS

Content and Face Validity

Twenty-six expert panel members scored items, then CVR and S-CVI were calculated (Table 1). The CVR ranged from 0.44 to 1.00, and the S-CVI was 0.840. Only one item with CVR < 0.50 was removed, and finally, S-CVI was 0.847. The expert panel evaluation identified four items to add to the questionnaire. As part of face validity, the pilot test with 10 fourth-year nursing students showed that all items were clearly understood and readable, with no need to change. Finally, the draft tool consisted of 62 items after content validity testing, with one item removed and four added.

Table 1. Item-Content Validity Index and Scale-Content Validity Index results of the draft questionnaire (n=26)

Number of Item	n	n/2	CVR	Decision
Item 1	26	13	1.00	Accepted
Item 2	24	13	0.85	Accepted
Item 3	26	13	1.00	Accepted
Item 4	25	13	0.92	Accepted
Item 5	26	13	1.00	Accepted
Item 6	**18**	**12.5**	**0.44**	**Rejected**
Item 7	23	13	0.77	Accepted
Item 8	20	13	0.54	Accepted
Item 9	24	13	0.85	Accepted
Item 10	25	13	0.92	Accepted
Item 11	25	13	0.92	Accepted
Item 12	25	13	0.92	Accepted

Table 1. Continued

Number of Item	n	n/2	CVR	Decision
Item 13	24	13	0.85	Accepted
Item 14	25	13	0.92	Accepted
Item 15	24	13	0.85	Accepted
Item 16	24	13	0.85	Accepted
Item 17	23	13	0.77	Accepted
Item 18	24	13	0.85	Accepted
Item 19	26	13	1.00	Accepted
Item 20	25	13	0.92	Accepted
Item 21	26	13	1.00	Accepted
Item 22	25	13	0.92	Accepted
Item 23	26	13	1.00	Accepted
Item 24	26	13	1.00	Accepted
Item 25	24	12.5	0.92	Accepted
Item 26	24	13	0.85	Accepted
Item 27	21	12.5	0.68	Accepted
Item 28	26	13	1.00	Accepted
Item 29	20	13	0.54	Accepted
Item 30	25	13	0.92	Accepted
Item 31	25	13	0.92	Accepted
Item 32	22	13	0.69	Accepted
Item 33	26	13	1.00	Accepted
Item 34	21	13	0.62	Accepted
Item 35	23	13	0.77	Accepted
Item 36	24	13	0.85	Accepted
Item 37	22	13	0.69	Accepted
Item 38	23	13	0.77	Accepted
Item 39	26	13	1.00	Accepted
Item 40	26	13	1.00	Accepted
Item 41	22	13	0.69	Accepted
Item 42	24	13	0.85	Accepted
Item 43	24	13	0.85	Accepted
Item 44	22	13	0.69	Accepted
Item 45	26	13	1.00	Accepted
Item 46	24	13	0.85	Accepted
Item 47	22	13	0.69	Accepted
Item 48	22	13	0.69	Accepted
Item 49	23	13	0.77	Accepted
Item 50	24	13	0.85	Accepted
Item 51	25	13	0.92	Accepted
Item 52	23	13	0.77	Accepted
Item 53	25	13	0.92	Accepted
Item 54	22	13	0.69	Accepted
Item 55	25	13	0.92	Accepted
Item 56	22	13	0.69	Accepted
Item 57	24	13	0.85	Accepted
Item 58	23	13	0.77	Accepted
Item 59	24	13	0.85	Accepted
			49.578462	49.1538462
		S-CVI	0.8403129	0.84748011 *

CVR: Item-Content Validity Ratio; S-CVI: Scale-Content Validity Index; * Final S-CVI after removing Item 6.

Construct Validity

Before performing the EFA, the sample adequacy was tested using Kaiser-Meyer-Olkin (KMO) and Bartlett's sphericity tests. The results concluded that the sample size was adequate (KMO = 0.967, approximate chi-square value = 19757.275, df = 1891, $P < .001$).

Considering the results of exploratory factor analysis, 12 items with factor loading values lower than 0.40 were removed from the draft scale, and the remaining 50 items were distributed into five factors that explained 60.568% of the total variance (Table 2). Table 3 presents the pattern matrix, and the factor loads of the remaining items.

In this phase, considering the structure that emerged at the end of the EFA, the researchers performed the CFA and tested the five-factor, 50-item structure on the same sample using JAMOVI open statistical software. The Chi Square value was 3486 and the degree of freedom value was 1116 and Chi square / degree of freedom value was calculated as 3.124. Comparative fit indices (CFI-TLI) were 0.903 and 0.902 respectively. Root Mean Square Error of Approximation (RMSEA) value was 0.0815 and Standardized-Root Mean Square Residual (SRMR) value was 0.0626 (Figure 1, Figure 2, Table 2).

Reliability

Internal Consistency: Three methods (Cronbach's Alpha (α) internal consistency test, split halves test, and Guttman internal consistency analysis) were used to test reliability. The Undergraduate Nursing Students' Professional Competencies Scale (50 items) demonstrated excellent internal consistency (α = 0.976), with high split-half reliability (Spearman-Brown = 0.900; Guttman = 0.893).

Analysis of the subdomains revealed that *Management & Organization* had the highest reliability (α = 0.967), followed by *Nursing Care* (α = 0.943) and *Research* (α = 0.926). *Communication & Collaboration* (α = 0.892) and *Leadership* (α = 0.891) showed acceptable reliability, with slightly lower values likely due to fewer items in these subscales. The entire scale was 0.976. Spearman-Brown split-half test results varied between 0.815 and 0.900, and the entire scale was 0.953. Lastly, considering Guttman's analysis, the minimum lambda value ranged from 0.668 to 0.919, with 0.893 for the scale (Table 4).

Test – retest: The test-retest evaluated the stability of the final form (Table 4). Test-retest reliability was examined with a subsample of 30 students. The correlation between two measurements was low and not statistically significant (r = 0.137, $P = .505$), with mean scores increasing from 219.69 to 235.19, and there was no significant difference ($P > .05$). These findings suggest that while the scale is highly reliable for cross-sectional assessment of nursing students' competencies, its longitudinal stability requires further investigation.

Item Analysis: Table 5 shows the item-total correlation for each item. The correlation values of the items ranged from 0.550 (I participate in professional research as an assistant

Table 2. Exploratory and Confirmatory Factor Analysis Results (n=320)

Exploratory factor analysis results

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total
1	30.012	48.406	48.406	29.616	47.768	47.768	22.901
2	4.144	6.684	55.090	3.735	6.024	53.792	15.019
3	2.201	3.550	58.640	1.838	2.965	56.757	19.862
4	1.651	2.662	61.302	1.285	2.073	58.830	18.867
5	***1.356***	***2.187***	***63.490***	***1.078***	***1.738***	***60.568***	***13.582***
6	1.302	2.101	65.590				
7	1.059	1.709	67.299				
8	0.993	1.602	68.901				
9	0.930	1.499	70.400				
10	0.851	1.372	71.772				
61	0.087	0.141	99.870				
62	0.081	0.130	100.000				

Confirmatory factor analysis results

X^2	df	X^2/df		CFI-TLI	SRMR	RMSEA
3486	1116	3.124	*P*<**.001**	0.903-0.902	0.0626	0.0815

CFI-TLI, Comparative Fit Index-Tucker-Lewis Index; df, Degrees of Freedom; RMSEA, Root Mean Square Error of Approximation; SRMR, Standardized Root Mean Square Residual; X^2, Chi-Square

Table 3. Pattern matrix results (n=320)

Factor 1		Factor 2		Factor 3		Factor 4		Factor 5	
Item 21	0.533	Item 33	0.742	Item 10	0.612	Item 1	0.738	Item 31	0.424
Item 22	0.660	Item 34	0.783	Item 11	0.451	Item 2	0.846	Item 32	0.442
Item 23	0.630	Item 35	0.961	Item 12	0.690	Item 3	0.824	Item 50	0.615
Item 26	0.436	Item 36	0.995	Item 13	0.617	Item 4	0.814	Item 51	0.702
Item 27	0.581	Item 37	0.784	Item 14	0.740	Item 5	0.595		
Item 29	0.409	Item 38	0.585	Item 15	0.718	Item 8	0.408		
Item 30	0.453	Item 54	0.421	Item 16	0.634				
Item 39	0.470	Item 62	0.478	Item 17	0.495				
Item 41	0.696			Item 18	0.617				
Item 42	0.505			Item 19	0.505				
Item 43	0.539			Item 23	0.460				
Item 45	0.764			Item 24	0.407				
Item 46	0.709								
Item 47	0.693								
Item 48	0.796								
Item 49	0.665								
Item 56	0.404								
Item 59	0.541								
Item 60	0.482								
Item 61	0.454								

Table 4. Scale scores, internal consistency coefficients and stability results

Scale and subdomains (n=320)		Number of items	Min-Max	Mean± SD	Cronbach's Alpha	Spearman-Brown	Guttman
	Undergraduate Nursing Students' Professional Competencies Scale	50	50-250	208.52± 26.14	0.976	0.900	0.893
Subdomains	*Management & Organization*	20	20-100	87.49±10.88	0.967	0.953	0.919
	Research	8	8-40	25.79±6.39	0.926	0.900	0.811
	Nursing care	12	12-60	52.21±6.55	0.943	0.905	0.864
	Communication & collaboration	6	6-30	26±3.41	0.892	0.882	0.743
	Leadership	4	4-20	17.03±2.71	0.891	0.815	0.668

Stability Test Results (n=30)	**Mean± SD**	**Correlation**	***P***
Measurement 1	219.69±20.13	0.137	.505
Measurement 2	235.19±18.24		

Table 5. Content validity ratios and item total correlation coefficients. (n=320) *

Item	Content validity ratios of items	Item total correlations	Item	Content validity ratios of items	Item total correlations
Item 1	1	0.653	Item 33	1	0.656
Item 2	0.91	0.605	Item 34	1	0.591
Item 3	1	0.671	Item 35	0.91	0.550
Item 4	0.91	0.682	Item 36	1	0.633
Item 5	0.82	0.652	Item 37	1	0.655
Item 7	0.82	0.659	Item 38	1	0.753
Item 8	0.91	0.719	Item 39	1	0.630
Item 9	1	0.640	Item 40	1	0.735
Item 10	0.91	0.670	Item 41	0.91	0.735
Item 11	1	0.665	Item 42	1	0.721
Item 12	0.91	0.673	Item 43	1	0.615
Item 13	1	0.667	Item 44	1	0.672
Item 14	1	0.731	Item 45	0.91	0.737
Item 15	1	0.648	Item 46	1	0.719
Item 16	0.91	0.649	Item 47	1	0.656
Item 17	1	0.678	Item 48	0.91	0.761
Item 18	1	0.726	Item 49	1	0.677
Item 19	0.82	0.652	Item 50	1	0.604
Item 20	0.82	0.697	Item 51	1	0.612
Item 21	1	0.705	Item 52	1	0.553
Item 22	1	0.733	Item 53	1	0.733
Item 23	0.91	0.691	Item 54	1	0.717
Item 24	0.91	0.702	Item 55	1	0.663
Item 25	1	0.809	Item 56	1	0.729
Item 26	1	0.741	Item 57	1	0.756
Item 27	1	0.707	Item 58	1	0.750
Item 28	1	0.787	Item 59	1	0.612
Item 29	1	0.713	Item 60	0.91	0.471
Item 30	1	0.758	Item 61	1	0.679
Item 31	1	0.686	Item 62	1	0.711
Item 32	1	0.575	Item 63	0.91	0.748

* Item 6 is not available because it was removed due to low CVR and four items (items 60, 61, 62, 63) were added as a result of content validity, finally draft questionnaire included 62 items.

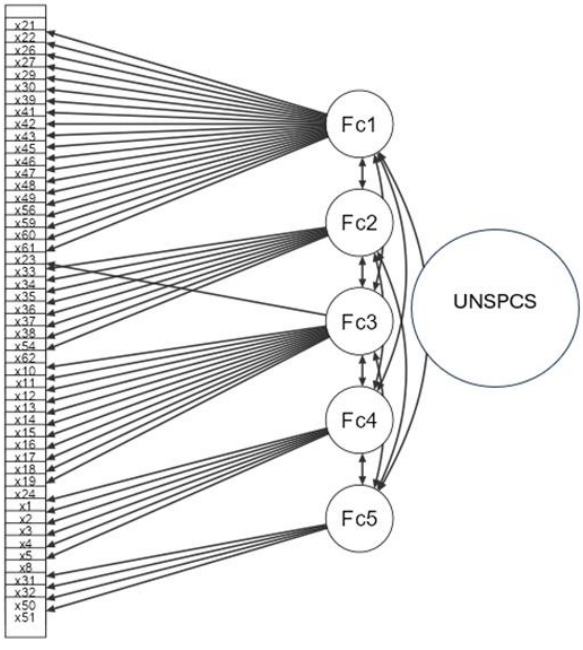

Figure 2. The path diagram of CFA

researcher) to 0.808 (I recognise individuals' varying care needs). Since all items had higher correlation values, no item was removed from the draft tool at this phase.

DISCUSSION

The discussion was addressed within the scope of the scale development process in this study, which was carried out with the participation of 320 non-profit private universities, using a methodological design to develop the Undergraduate Nursing Students' Professional Competencies Scale.

Content validity indicates the extent to which the scale items reflect the structure intended to be measured. In this context, the items in the item pool are evaluated by experts regarding suitability.[32,33]

According to Lawshe's technique, used for content validity, the CVR ranged from 0.44 to 1.00, and the S-CVI was 0.840.[30] The expert panel evaluation offered four items to be added to the questionnaire. Acceptable content validity

was defined as CVR ≥ 0.50 and S-CVI≥ 0.80 if the number of experts was at least five or greater.[29] At that point, the researchers removed item 6, with a CVR of 0.44, from the draft questionnaire. Finally, S-CVI was calculated as 0.847. Four items were added to the draft questionnaire according to recommendations from expert panel members. In the pilot study with 10 students to test the face validity of the scale items, all items were found to be understandable, and the items reflected the intended structure to be measured.

Item analysis is performed in scale development studies to identify consistent items and eliminate those that are unrelated. Here, the aim is to obtain items that are highly related to each other and contribute to the structure to be measured; for this purpose, item-total score correlations are examined, and low-value items are removed.[34] When the item-total score correlations of the 62-item scale draft in this study were examined (Table 5), the correlations ranged from 0.550 to 0.809 and were very high. Therefore, no items were removed from the draft scale.

Construct validity; EFA is usually performed first to separate the items in the scale draft into meaningful factors and to identify items that do not measure a single factor or measure more than one factor. Swanson and Holton[35] states that, in addition to exploratory factor analysis, researchers may further test the structure through confirmatory factor analysis if the study sample is large enough, because it requires testing on a separate sample. Although the methodological literature recommends avoiding applying both EFA and CFA to the same dataset in order to prevent data-driven bias and overfitting; the authors performed CFA on the same data set and reported that as a limitation.

It is stated that the factor loading should be above 0.40 in exploratory factor analysis.[35,36] To test the suitability of the research data set for factor analysis, the KMO coefficient and Bartlett's sphericity tests are performed, and it is considerable acceptable if the value is above 0.60, with values approaching 1.00 indicating greater adequacy.[31] In this study, the KMO value was found to be perfect, with a value of 0.967, and exploratory factor analysis was performed on the dataset (Table 2). Considering the results, the researchers removed 12 items with factor loadings below 0.40 and concluded on a 5-subfactor structure. The CFA results also confirmed the same structure with exhibiting applicable chi-square / degree of freedom value, fit indices, RMSEA and SRMR values. [37]

Stability analysis means that similar results can be obtained and repeated across repeated measurements of the tool under identical conditions, and it shows the stability of the values obtained from the measurements.[38] For stability analysis, test-retest reliability is usually examined, and the scale is applied twice with an interval of two to four weeks on a group of at least 30 people, and the correlation or difference between the two applications is examined to demonstrate the invariance over time.[39] In this study, the scale was applied to a sample of 30 senior nursing students at an interval of four weeks, and in the correlation analysis. Unfortunately, there was no statistically significant correlation between the measurements ($P > .05$). (Table 4) Although this result was not the expected one, it might be related to several factors. Competency is a dynamic construct that continuously evolves through education and practice. During the four-week period between the first and second tests, students may have continued with clinical practice or gained new clinical experiences. This process may have altered their self-assessment of their competence. Conversely, a student who rated their self-competence highly on the first test may have identified shortcomings after a clinical practice during the intervening period and given a more realistic (perhaps lower) score on the second test. While this statistically reduces temporal stability, it demonstrates the scale's sensitivity to the student's changing self-perception.

To test the reliability of the scale, internal consistency analysis is performed to assess whether the items consistently measure the intended construct. High internal consistency indicates that the scale is reliable. For this purpose, Cronbach's alpha coefficient is calculated for each item in the scale, the scale sub-dimensions, and the entire scale.[31] A Cronbach's alpha coefficient between 0.61-0.80 is considered moderate reliability, and 0.81-1.00 is considered high reliability.[30] In this study, the Cronbach's alpha values of the scale divided into five-factor structures varied between 0.891 and 0.967, while the total scale was highly reliable at 0.976.

The scale, consisting of 50 items, aims to comprehensively assess nursing competencies (clinical skills, ethics, communication, leadership, etc.). A high alpha coefficient ($\alpha > 0.90$) indicates that the items exhibit strong internal coherence under the overarching concept of nursing competency. In large scales like 50 items, a mathematically higher alpha coefficient is expected, reflecting the breadth and integrity of the area being measured rather than item redundancy.[36,38]

The validity and reliability analysis of the scale indicated that it is a valid and reliable instrument for assessing nursing students' professional competencies. The increases in the scale, scale sub-factor, and total score averages are evaluated as indicating a high level of competence. It was

determined that the subfactors in which the students were most competent were management and care, but they were weaker than the other factors in the study.

The findings of this study provide meaningful insights into nursing students' professional competencies. The highest competence levels were observed in management and nursing care, suggesting that students are more confident in clinical and organizational tasks. Conversely, lower scores in communication-collaboration, leadership, and research indicate areas where educational interventions may be needed.

This scale contributes to the literature by providing a comprehensive tool specifically designed to measure nursing students' professional competencies across five distinct domains. Unlike previous instruments, it captures both clinical and non-clinical skills, enabling educators and researchers to identify strengths and weaknesses in training programs (Supplementary file 1).

The high internal consistency, acceptable content validity, and clear factor structure support the scale's reliability and construct validity. Therefore, this instrument can guide curriculum development, competency assessment, and targeted interventions to enhance students' readiness for professional practice.

Limitations

Main limitations of this study include not performing convergent and discriminant validity, and aggregability analyses could not be conducted at this stage. The second important limitation of the study is performing EFA and CFA on the same dataset although it is not recommended to perform on the same data set. While EFA, CFA and reliability tests were performed, these additional analyses are recommended in future studies with larger, more diverse samples to further confirm the scale's factor structure and psychometric properties. Additionally, given that a large number of items may increase the likelihood of redundancy, this risk should be assessed in future studies.

This study tested the psychometrics of the 62-item draft. Undergraduate Nursing Students' Professional Competencies Scale among nursing students. The analysis concluded that the valid and reliable scale consisted of 50 items under five sub-dimensions. The scale, which included *competency in management and organization*, *competency in research*, *competency in nursing care*, *competency in communication and collaboration*, and *competency in leadership*, met the required criteria for validity and reliability. The study concluded that the Undergraduate Nursing Students' Professional Competencies Scale (UNSPCS) is valid and reliable. The valid and reliable scale and its sub-dimensions may be practical for assessing the competencies of senior nursing students. They also help evaluate the efficiency of undergraduate nursing education programs. Administrators and educators of undergraduate nursing programs may use the scale to improve program quality. Convergent validity studies, using this scale against another scale that performs similar measurements, will provide additional information about the scale's measurement power and adequacy.

Ethics Committee Approval: Ethics committee approval was obtained from Koc University Ethics Committee (Date:29.12.2022, Number: 2022.470.IRB3.208)
Informed Consent: Online questionnaire started with the informed consent form that provided information about the research's aim, scope, and ethical considerations.
Peer-review: Externally peer-reviewed.
Author Contributions: Concept - SO., KE, UB, NHS, ZB; Design-SO, DB ; Supervision- SO, KE, UB; Resources- SO, KE, UB, NHS, ZG, AKHS, DB Data Collection and/or Processing- SO., KE, UB, NHS, ZG, AKHS, DB; Analysis and/or Interpretation- AKHS, UB; Literature Search- SO, KE, DB; Writing Manuscript- AKHS, ZG, UB, SO, KE; Critical Review- SO, KE, AKHS, ZG, UB, NHS, DB.
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REFERENCES

1. World Health Organization (WHO). Global Competency Framework for Universal Health Coverage. 2022. https://iris.who.int/bitstream/handle/10665/352710/9789240034686-eng.pdf
2. Theander K, Wilde-Larsson B, Carlsson M, et al. Adjusting to future demands in healthcare: curriculum changes and nursing students' self-reported professional competence. *Nurse Educ Today.* 2016;37:178–183. https://doi.org/10.1016/j.nedt.2015.11.012
3. Mendoza W, Ramírez GM, González C,Moreira F. Assessment of curriculum design by learning outcomes (LO). *Educ. Sci.* 2022;*12*(8):541. https://doi.org/10.3390/educsci12080541
4. Nainggolan S. Students' competence needs analysis in the curriculum for facing 21st-century education. *Al-Ishlah: Jurnal Pendidikan*. 2022;*14*(2):2099-2106. https://doi.org/10.35445/alishlah.v14i2.1997
5. Ainslie M, Pintz C, Nye C, et al. Evaluating person-centered competencies: the nurse practitioner student competency assessment (NPSCA). *J Nurse Pract.* 2024;20(2):104886. https://doi.org/10.1016/j.nurpra.2023.104886
6. Grande RAN, Berdida DJE, Susanto T, Khan A, et al. Nursing Competency Inventory and Professional Competence of Graduating Students in Six Asian Countries: A Cross-Sectional Study. *Nurse Educ Today.* 2022;116:105-470. https://doi.org/10.1016/j.nedt.2022.105470
7. Accreditation for International Programs. 2024. Accessed May 17, 2025. https://www.acenursing.org/accreditation/accreditation-

for-international-programs
8. HEPDAK. Association for Evaluation and Accreditation of Nursing Education Programs: Self-assessment report preparation guide. 2024. (Version:5.1–31.03.2021). Accessed May 17, 2025. https://www.hepdak.org.tr/doc/b4_v5_1.pdf
9. Republic of Turkiye Ministry of Health. Hemşirelikte Temel Yetkinlikler Kilavuzu, 2021. [In English: Basic competencies in Nursing Guide]. 1. Ed., Ankara, Türkiye. https://ekutuphane.saglik.gov.tr/Yayin/587
10. The Commission of European Union. The mutual recognition of diplomas, certificates and other evidence of the formal qualifications of nurses responsible for general care, including measures to facilitate the effective exercise of the right of establishment and freedom to provide services. 2007. (Directives, 77/452/EEC; 77/453/EEC; 89/595/EEC), Accessed April 1 l, 2025. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:01977L0452-20070101
11. High Education Council. Yükseköğretim Kurulu, YÖK. Doktorluk, Hemşirelik, Ebelik, Diş Hekimliği, Veterinerlik, Eczacılık ve Mimarlık Eğitim Programlarının Asgari Eğitim Koşullarının Belirlenmesine Dair Yönetmelik, 2008. Accessed April 1, 2025. https://www.resmigazete.gov.tr/eskiler/2008/02/20080202-9.htm
12. Van de Mortel TF, Nilsson J, Lepp M. Validating the nurse professional competence scale with Australian baccalaureate nursing students. *Collegian.* 2021;28:244–251. https://doi.org/10.1016/j.colegn.2020.06.010
13. Nilsson J, Mischo-Kelling M, Thiekoetter A, et al. Nurse Professional Competence (NPC) Assessed Among Newly Graduated Nurses in Higher Educational Institutions in Europe. Nord. *J Nurs Res.* 2019;39(3):159–167. https://doi.org/10.1177/2057158519845321
14. Pitkänen S, Kääriäinen M, Oikarainen A, et al. Healthcare students' evaluation of the clinical learning environment and supervision–a cross-sectional study. *Nurse Educ Today.* 2018;62:143-149. https://doi.org/10.1016/j.nedt.2018.01.005
15. Basaran-Acil S, Kuruca-Ozdemir E, Erdat Y. Turkish Adaptation and Psychometric Characteristics of the Nurse Professional Competence Scale-Short Version Among Nursing Students: Methodological Study. *Nurs Open.* 2025;12(12):e70344. https://doi.org/10.002/nop2.70344
16. Cakar M, Açıl A, İlaslan N, Şişman N. Turkish Adaptation of Nursing Students Competence Instrument. Clin *Exp Health Sci.* 2023;13:348-355. https://doi.org/10.33808/clinexphealthsci.1115288
17. Yaqoob Mohammed Al Jabri F, Kvist T, Azimirad M, Turunen H. A systematic review of healthcare professionals' core competency instruments. *Nurs Health Sci.* 2021;*23*(1):87-102. https://doi.org/10.1111/nhs.12804
18. Berg E, Lepp M. The meaning and application of student-centered learning in nursing education: An integrative review of the literature. *Nurse Educ Prac.* 2023;*69*:103622. https://doi.org/10.1016/j.nepr.2023.103622
19. Amin SM, El-Ashry AM, Karim NAHA, et al. Shaping competence through identity: The mediating role of professional identity in the relationship between clinical learning environment and nursing competence among nursing students. *Nurse Educ. Today*. 2026;157:106905. https://doi.org/10.1016/j.nedt.2025.106905
20. Wang L, Chen J, Talib O. Core dimensions and measurement characteristics of multidimensional nursing competency assessment instruments: A systematic review. *J Prof Nurs.* 2025;61:96-104. https://doi.org/10.1016/j.profnurs.2025.09.013
21. Streiner DL, Kottne J. Recommendations for reporting the results of studies of instrument and scale development and testing. *J Adv Nurs.* 2014;70(9):1970–1979. https://doi.org/10.1111/jan.12402
22. Hernández A, Hidalgo MD, Hambleton RK, Gómez Benito J. International test commission guidelines for test adaptation: A criterion checklist. *Psicothema.* 2020;2(3):390–398. https://doi.org/10.7334/psicothema2019.306
23. Orçan F. Exploratory and confirmatory factor analysis: which one to use first? *J Meas Eval Educ Psychol.* 2018;9(4):414-421. https://doi.org/10.21031/epod.394323
24. Anthoine E, Moret L, Regnault A. Sample size used to validate a scale: a review of publications on newly-developed patient reported outcomes measures. *Health Qual. Life Outcomes*. 2014;12(2):176. https://doi.org/10.1186/s12955-014-0176-2.
25. Comrey AL, Lee HB. A first course in factor analysis, (2nd Edition). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc. 1992.
26. Tabachnick BG, Fidell LS. Using Multivariate Statistics. (7th ed.). New Jersey, USA: Pearson Education. 2013.
27. Purabdollah M, Zamanzadeh V, Ghahramanian A, et al. Competencies expected of undergraduate nursing students: A Scoping review. *Nurs Open.* 2023;10(12):7487-7508. https://doi.org/10.1002/nop2.2020
28. Tristán-López A. Modificación al modelo de lawshe para el dictamen cuantitativo de la validez de contenido de un instrumento objetivo. [In English: Modification of the Lawshe model for the quantitative assessment of the content validity of an objective instrument]. *Adv Medición.* 2008;6:37–48.
29. Ayre C, Scally AJ. Critical values for Lawshe's content validity ratio: revisiting the original methods of calculation. *Meas Eval Couns Dev.* 2014;47(1):79-86. https://doi.org/10.1177/0748175613513808
30. Lawshe CH. A Quantitative approach to content validity. *Pers Psychol.* 1975;28(4):563-575. https://doi.org/10.1111/j.1744-6570.1975.tb01393.x
31. Ranganathan P, Caduff C, Frampton CMA. Designing and validating a research questionnaire - Part 2. *Perspect Clin Res.* 2024;15(1):42-45. https://doi.org/10.4103/picr.picr_318_23
32. Johnson RL, Morgan GB. Survey scales a guide to development, analysis, and reporting. 2016. New York: The Guilford Press.
33. Yurdugül H. Ölçek geliştirme çalışmalarında kapsam geçerliği

için kapsam geçerlik indekslerinin kullanılması. [In English: Using content validity indices for content validity in scale development studies.] XIV. Ulusal Eğitim Bilimleri Kongresi, 2005;1: 771-774. https://yunus.hacettepe.edu.tr/~yurdugul/3/indir/PamukkaleBildiri.pdf
34. DeVellis RF. *Scale development: Theory and applications*. 2021. (Vol 26) Sage Publications. ISBN: 978-1-4129-8044-9
35. Swanson RA, Holton EF. Scale development principles and practices. *Research in organizations: Foundations and methods of inquiry*. Berrett-Koehler Publisher, Inc. 2009. ISBN: 978-1-60509-333-8
36. Brown TA. *Confirmatory factor analysis for applied research*. Guilford Publications. 2015. ISBN: 978-1-4625-1779-437.
Ximénez C, Maydeu-Olivares A, Shi D, Revuelta J. Assessing cutoff values of SEM fit indices: Advantages of the unbiased SRMR index and its cutoff criterion based on communality. *Struc Equ Model: A Multidisciplinary Journal*. 2022;29(3):368-380. https://doi.org/10.1080/10705511.2021.1992596
37. Kilic S. Cronbach'ın Alfa Güvenirlik Katsayısı. [In English: Cronbach's alpha reliability coefficient.] *J Mood Disord.* 2016;6(1):47-48. https://doi.org//10.5455/jmood.20160307122823
38. Cam MO, Baysan Arabaci L. Qualitative and quantitative steps on attitude scale construction. *J Res Dev Nurs.* 2010;12(2):59-71.

Supplementary File 1.

Undergraduate Nursing Students' Professional Competencies Scale					
	Very insufficient	Insufficient	Somewhat sufficient	Quite sufficient	Very sufficient
Competency in management and organization					
1. Reporting damaged or missing materials					
2. I behave in accordance with the general security precautions of the institution.					
3. I have the consciousness of accountability in the tasks I undertake.					
4. I behave sensitively towards social problems.					
5. I use the resources in the unit appropriately.					
6. I convey my suggestions regarding the solution of the problems to the relevant person.					
7. I provide care by observing patient safety principles.					
8. I take into consideration the safety of other healthcare professionals in my practices.					
9. I observe universal human rights in my practices.					
10. I improve myself according to the feedback I receive.					
11. I struggle against problems.					
12. I take precautions to ensure my safety while providing care.					
13. I strive to realize my professional ideals.					
14. I make good use of lifelong learning opportunities.					
15. I inform the relevant person about the problems experienced in the unit I work in.					
16. I encourage my peers to improve themselves.					
17. I support the adaptation of new students to the unit.					
18. I recognize the changing care needs of individuals.					
19. I provide education tailored to the needs of the individual and family.					
20. I have health literacy knowledge and skills.					
Competency in research					
21. I participate in professional research as a co-researcher.					
22. I conduct research projects by receiving consultancy.					
23. I take part in joint research planned with other team members.					
24. I take part in educational activities for the community.					
25. I participate in scientific activities (courses, symposiums, congresses, etc.).					
26. I criticize research articles.					
27. I take part in professional and social organizations.					
28. I use my foreign language skills for my individual and professional development.					
Competency in nursing care					
29. I provide holistic care.					
30. I evaluate the results of the care I provide.					
31. I implement nursing interventions by prioritizing them.					
32. I keep records related to care on time.					
33. I make appropriate decisions in unexpected situations related to care.					
34. I provide evidence-based care.					
35. I plan the care appropriate to the needs of the individual.					
36. I use the necessary tools and equipment for care appropriately.					
37. I keep complete records related to care.					
38. I make my patient's discharge plan.					
39. I provide care by observing professional values and ethical principles.					
40. I use care and information technologies.					

Competency in affective communication					
41. I communicate effectively with the patient's family.					
42. I communicate effectively with my colleagues.					
43. I communicate effectively with other members of the healthcare team.					
44. I communicate effectively with healthy and sick individuals.					
45. I communicate effectively with managers.					
46. I appropriately collect data regarding the individual I will care for.					
Competency in leadership					
47. I develop my leadership skills.					
48. I take on natural leadership when necessary.					
49. I guide (guide/mentor) nursing students.					
50. I am a role model for my peers.					

The scale has been translated into English to provide information to the readers. Researchers who want to use it in their studies should contact the authors.