Clinical and Experimental Health Sciences

Turkish Adaptation of Nursing Students Competence Instrument

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ABSTRACT

Objective: The study was conducted to examine the validity and reliability of the Nursing Students Competence Instrument, which was developed in order to evaluate the competences of nursing students, for the Turkish society.

Methods: This methodological study was conducted with the participation of 224 third and fourth-year nursing students studying at a state university in Turkey. Identifying Information Form and Nursing Students Competence Instrument were used for data collection. In order to determine the validity of the scale, linguistic content validity analysis and confirmatory factor analysis were performed. In order to identify the reliability of the scale, test-retest and Cronbach's alpha analysis were used.

Results: In line with the validity and reliability analyses of the scale, it was determined that the model was compatible according to fit indices of confirmatory factor analysis (X^2/sd= 2.42, RMSEA= 0.08, SRMR= 0.07). The Cronbach's alpha coefficient of the scale was determined to be 0.96, and the Cronbach's alpha coefficients of the subscales varied between 0.92 and 0.94.

Conclusion: It was determined that the Turkish adaptation of the "Nursing Students Competence Instrument" was a valid and reliable scale for measuring the competence levels of nursing students. It is recommended to administer the scale to larger samples and to plan interorganizational comparative studies in order to identify nursing students' competences.

Keywords: Validity, reliability, nursing, nursing students, competence.

1. INTRODUCTION

As a result of developments in the fields of science, technology, and medicine, fast developments are also experienced in healthcare services. The use of various therapy methods, widespread use of technological equipment in healthcare, and the increase in patients' awareness and expectations have brought the need for nurses who are experts in their field and have scientific knowledge, skills, and competences (1-3). As Masters (4) stated in her book titled "Nursing Theories", the competences expected from nurses are helping roles, teaching-guiding functions, function of diagnosing and following up the patient, effective management of fast developing situations, managing and monitoring applications and regimens related to the therapy, ensuring and monitoring the quality of healthcare practices, and the role of organizing and working. Nursing education should aim at getting the students to gain these competences and transfer them to their practices (5).

Regarding the studies conducted, in their study, Theisen and Sandau (3) demonstrated that newly graduated nurses felt themselves incompetent in the fields of communication, leadership, organization and management skills, critical thinking, and stress, while Karahan et al (6) determined in their study that nursing students felt themselves incompetent in terms of basic nursing practices. In the study conducted by Berkow et al (7), it was determined that only 10% of manager nurses believed that newly graduated nurses could provide safe and effective nursing care.

Nurses who graduate without attaining the competence at the targeted level during their education experience stress in healthcare, and this situation decreases quality of care and patient satisfaction (8-10). Nursing students need to gain appropriate knowledge and skills in order to adequately prepare for their nursing roles (11). Therefore, it is important to integrate active learning strategies (12-15) into nursing curricula in order to educate nurses in this direction. Also, it

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is necessary to develop valid and reliable assessment tools which will evaluate competences of nursing students.

In our country, there is no assessment tool that will evaluate nursing students' pre-graduation and post-graduation competences in nursing education, which consists of clinical and theoretical dimensions. Accordingly, the present study aimed to adapt the "Nursing Students Competence Instrument" to Turkish language.

2. METHODS

2.1. Study Desing and Aim

The study is methodological research conducted in order to test the validity and reliability of the Nursing Students Competence Instrument for Turkish (NSCI) nursing students.

2.2. Settings and Samples

The population of the study consisted of third – and fourth-year undergraduate students studying at the nursing department of a state university in the fall semester of the 2018-2019 (September-December) academic year (n=432). In studies on scales, it is recommended to include threefold, fourfold or more participants for each scale item (16). Accordingly, the study sample was determined to be over ten times the number of items in the 27-item scale. No sampling method was used in the study. All students, except those who were absent on the days when the application was performed and those who refused to participate in the study, were included in the study (n=224). The first application of the Nursing Students Competence Instrument was performed with 224 students who volunteered to participate in the study, and the second application performed for test-retest three weeks later was completed with the participation of 70 (31%) students.

2.3. Measurement

In the study, Identifying Information Form created by the researchers following the literature review and the Nursing Students Competence Instrument were used as data collection tools.

Identifying Information Form

The form prepared by the researchers in line with the literature consists of 10 questions inquiring about sociodemographic characteristics of the nursing students (2,6).

Nursing Students Competence Instrument

The scale was developed by Lin et al (17). The scale consists of four subscales and 27 items that measure the nursing students' competences. Students are asked to score themselves between 1 and 10 on the scale in terms of competences. The scale's Cronbach's alpha coefficient is 0.96. The minimum and maximum scores to be obtained from the scale are 27 and 270, respectively. A high score obtained from the scale indicates a high level of competence. The subscales of the scale are integrating care abilities (items 1-10), leading humanity concerns (items 11-16), advancing career talents (items 17-23), and dealing with tension (items 24-27).

2.4. Linguistic Equivalence

In analyzing linguistic validity of the scale, back-translation method was used. Firstly, the scale was translated to Turkish by the experts who were competent both in Turkish and English. By comparing the translated forms, the most suitable translation for each item was determined, and the scale items were gathered in one form. Then, the scale was translated back to its original language, i.e. English, by three different experts. After the form translated to English was compared with the original scale form, appropriate English expressions were adopted. The authors who developed the scale were contacted and their opinions were obtained. As a result of the comparisons, the Turkish version of the scale was finalized.

2.5. Cultural Adaptation and Content Validity

After the linguistic equivalence study of the scale, the scale was presented to the opinions of 10 faculty members who had different specialties in nursing (principles of nursing, public health nursing, teaching in nursing) in order for them to evaluate it in terms of content validity. Suitability of the scale items were scored by the experts (1=Not suitable, 2=Suitable to some extent (item needs to be revised), 3=Quite suitable (suitable, but small changes are needed), 4=Very suitable). Content validity was calculated as 0.94 by using Davis technique, and this value shows that the scale is appropriate in terms of content validity (18,19).

2.6. Face Validity

By making necessary arrangements following the expert opinions, a pilot study was performed with the participation of 24 students with similar characteristics. A pilot study was conducted to determine the readability and comprehensibility of scale items, identify areas that respondents did not understand, and determine average response times. The scale items were perceived as understandable by the respondents. Average response time was 15 minutes. The data obtained from these students were not included in the study.

2.7. Confirmatory Factor Analysis

In order to evaluate the adequacy of the sample size, Kaiser-Meyer-Olkin (KMO) and Bartlett test were performed. As a result of these tests, KMO value was found to be 0.95, X^2=5920.31 p< 0.01. In addition, confirmatory factor analysis (CFA) was performed in order to evaluate construct validity. For CFA, the multiple fit indices of Chi-Square Goodness,

Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Normed Fit Index (NFI), Standardized Root Mean Square Residuals (SRMR), and Root Mean Square Error of Approximation (RMSEA) were examined (16).

2.8. Reliability Analysis

For the reliability of the scale, test-retest, the Cronbach alpha (α) internal consistency coefficient, the Spearman-Brown and Guttman Split-Half reliability coefficient, Upper-Lower %27 mean scores and item total correlation were examined.

Test-retest reliability, was examined to determine scale consistency in measurements. The Cronbach alpha, Spearman-Brown and Gutmann Split-Half coefficient, Upper-Lower %27 mean scores are measure of the uniformity of the scale items. A high alpha factor of the scale indicates that the items are consistent. The item-total-score correlation describes the relationship between the score obtained from an item and the total score. A high positive correlation between the item and the total indicates that the items measure similar behaviors. A correlation value of at least 0.20 is recommended (16).

2.9. Statistical Analysis

In the analysis of the data, IBM SPSS V23 software was used. The descriptive values of the data were presented as number, percentage, mean, and standard deviation. In the validity and reliability of the Nursing Students Competence Instrument, Cronbach's alpha coefficient, Spearman Brown and Guttman coefficient, Upper-Lower %27 mean scores, item-total score correlations, test-retest and confirmatory factor fit indices were examined. Within the scope of reliability analysis, and internal consistency were examined. In the test-retest analysis, the students were asked to write their school numbers on data collection tools, and the second application was performed three weeks later. In the evaluation of the data, significance level was accepted as $p< 0.05$.

2.10. Ethical Considerations

Permission for the Turkish validity and reliability study of the Nursing Students Competence scale was obtained through e-mail from Lin et al, who developed the scale. In addition, ethics committee approval was taken from the ethical board of the university where study was conducted (Approval number: 2018/157, Date: 30.07.2018). Official permission was also taken from the institution where the study was conducted. The voluntary participants were informed about the purpose and process of the study. Verbal and written consent of the participants were taken as well.

3. RESULTS

When examining the results of the study, 79.5% of the participating students were female, 47.3% were third year students, and their mean age was 21.57± 0.99. The percentage of the students who willingly chose nursing department was 72.3, and academic score average of the students were found to be 2.97± 0.28 (Table 1.).

Table 1. *Descriptive characteristics of the students (n=224)*

Descriptive Characteristics	n	%
Gender		
Female	178	79.5
Male	46	20.5
Class		
3.class	106	47.3
4.class	118	52.7
Choosing nursing department		
Willingly	162	72.3
Not willingly	62	27.7
Age	x̄±SD= 21.57±0.99	
Academic score average	x̄±SD= 2.97±0.28	

x̄: Mean, SD: Standard Deviation

3.1. Confirmatory Factor Analysis Results

When the model fit indices were examined, X^2/sd (2.42), RMSEA (0.08), SRMR (0.07), NFI (0.87), CFI (0.92), GFI (0.79) and AGFI (0.74) values were found (Table 2).

Table 2. *Confirmatory factor fit indices for the Nursing Students Competence Instrument*

Fit Measure	Acceptable Value	Value	Evaluation
X^2/sd	<3= Perfect fit	2.42	Perfect fit
RMSEA	<0.08= Good fit	0.08	Good fit
SRMR	<0.08= Good fit	0.07	Good fit
NFI	>0.90=Good fit	0.87	Moderate fit
CFI	>0.90=Good fit	0.92	Good fit
GFI	>0.90=Good fit	0.79	Weak fit
AGFI	>0.90=Good fit	0.74	Weak fit

X^2/sd: Chi-square/standard deviation, RMSEA: Root Mean Square Error of Approximation, SRMR: Standardized Root Mean Square Residuals, NFI: Normed Fit Index, CFI: Comparative Fit Index, GFI: Goodness of Fit Index, AGFI: Adjusted Goodness of Fit Index

The standardized solution for the path diagram of the conceptual model is presented in Figure 1 (Figure 1).

Item analysis of the Nursing Students Competence Instrument is presented in Table 3. In this context, it was determined that the scale item score average of the nursing students was high. The total correlation values of the items ranged between 0.60 and 0.90 and the mean scores of the items were between 6.27±2.31 and 8.37±1.59 (Table 3).

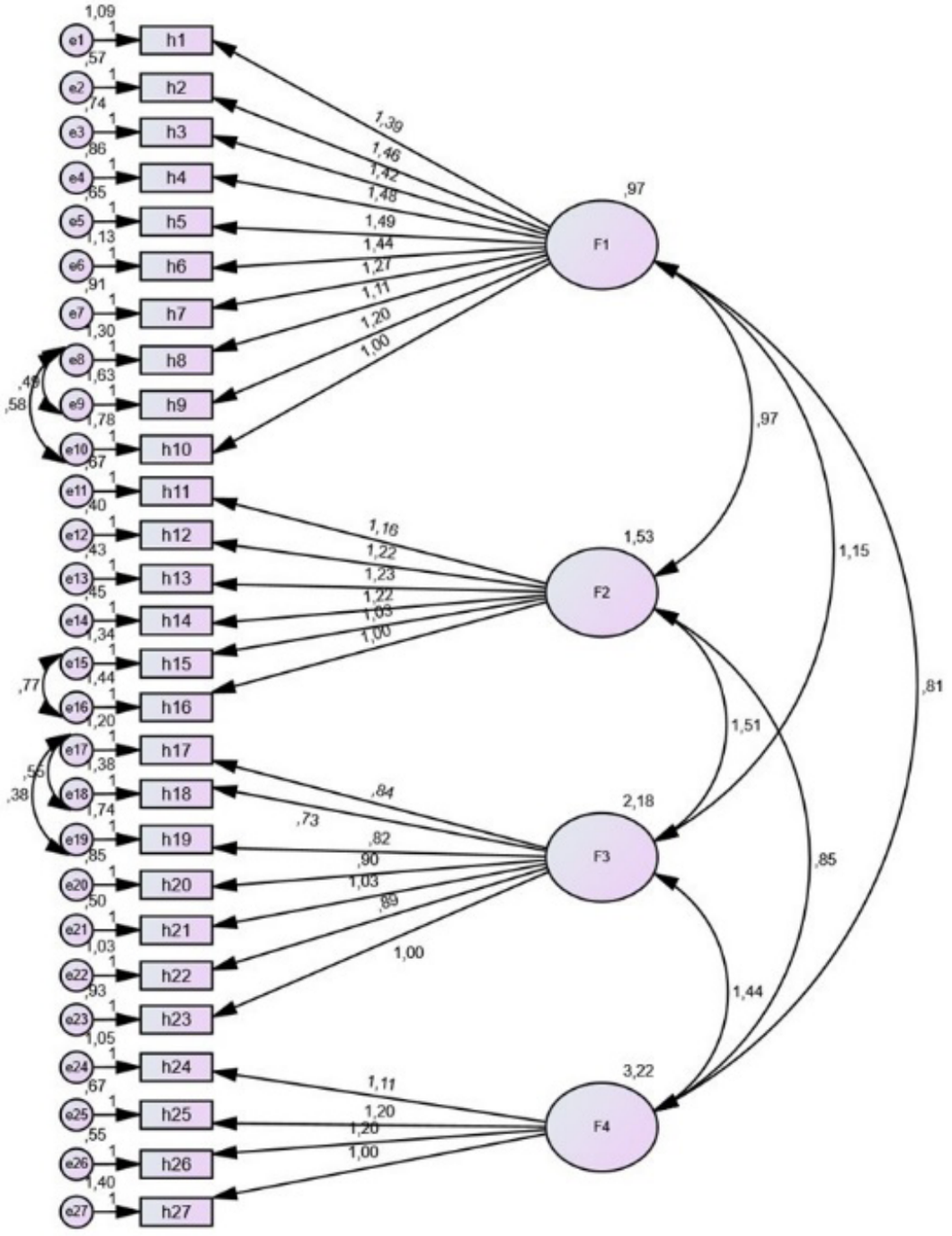

Figure 1. *Path diagram of the confirmatory factor analysis*

3.2. Reliability Analysis Results

Cronbach's alpha coefficient of the Nursing Students Competence Instrument was found as 0.96. When Cronbach's alpha coefficients of the subscales were examined, it was seen that they varied between 0.92-0.94. These values suggest that the Nursing Students Competence Instrument and its subscales were reliable. Test-retest coefficient was found greater than 0.76, so the internal consistency of the scale is very good. Also values the mean of the upper 27% and lower 27% by t-test was found to be positive. (Table 3).

Spearman and Guttmann values were calculated as confidence coefficients. The results close to 1 was obtained (Table 4). The correlations between the NSCI total score and subscale scores are presented in Table 5. A positive and significant correlation was found between NSCI total score and its subscales ($p< 0.01$). In addition, it was determined that there was a positive and significant relationship between the subscales of integrating care abilities, leading humanity concerns, advancing career talents, and dealing with tension (Table 5).

Table 3. *Nursing Students Competence Instrument item analysis and comparisons of Upper-Lower %27 mean scores (n=224)*

Scale items	x̄±SD	Item-Total Correlation	Cronbach's Alpha (α) when the item is removed	X̄		t
				Upper %27	Lower %27	
1.In patient care, I can use the required basic biomedical science and general clinical skills together.	6.47±1.72	0.74	0.28	6.51	6.43	56.06
2.I can holistically evaluate and analyze health problems of the patient and the underlying factors.	6.74±1.62	0.83	0.28	6.78	6.70	62.04
3.I can use my diagnosis skills while providing care to the patient in the clinic.	6.96±1.64	0.80	0.28	7.00	6.93	63.33
4.I can analyze a suspicious case and evaluate all probabilities related to the situation.	6.56±1.73	0.80	0.28	6.60	6.52	56.74
5.I can use integrative nursing care in patient care.	7.00±1.68	0.83	0.28	7.03	6.96	62.33
6.While examining a clinical case, I can apply conceptual mapping.	6.34±1.77	0.75	0.28	6.38	6.30	53.41
7.I can be aware of the roles and functions of the nurse in patient care.	7.66±1.57	0.79	0.28	7.70	7.62	72.79
8.I can exchange ideas with others on the health status of the patient.	8.09±1.61	0.71	0.28	8.13	8.05	75.17
9.I can analyze clinical cases in detail and show personal interest for the improvement of the patient's health status.	7.51±1.74	0.69	0.28	7.55	7.47	64.39
10.I can distinguish between the roles of the nurses and other healthcare professionals.	8.14±1.66	0.60	0.28	8.18	8.10	73.24
11.I can show general care behaviors to my peers.	7.69±1.66	0.80	0.28	7.73	7.65	69.28
12.I can display professional care behaviors to my patients.	7.83±1.64	0.87	0.28	7.87	7.80	71.39
13.I can show my general care behaviors to my peers.	7.76±1.65	0.87	0.28	7.80	7.72	70.11
14.I can evaluate my general care behaviors towards my patients.	7.76±1.65	0.87	0.28	7.80	7.72	70.11
15.I value professional care behaviors.	8.32±1.72	0.76	0.28	8.41	8.33	72.61
16.I can display responsibility towards professional roles and ensure nursing ethics.	8.15±1.72	0.74	0.28	8.19	8.11	70.66
17.I can research and use information independently.	7.81±1.67	0.77	0.28	7.85	7.77	69.78
18.I value all types of learning activities.	8.37±1.59	0.69	0.28	8.41	8.34	78.66
19. I trust myself in terms of offering new ideas for others' hypotheses.	7.53±1.79	0.68	0.28	7.57	7.48	62.82
20.I can develop effective communication channels in groups.	7.53±1.62	0.76	0.28	7.56	7.49	69.54
21.I can use communication skills in collaboration and fulfill my care duty.	7.67±1.68	0.83	0.28	7.71	7.63	68.32
22.I can resort to group dynamics in solving learning problems.	7.55±1.66	0.74	0.28	7.59	7.51	68.10
23.I can do my job professionally and effectively.	7.99±1.76	0.77	0.28	8.03	7.95	67.60
24.I have the necessary methods to cope with stress.	6.45±2.23	0.86	0.28	6.50	6.40	43.15
25.I can manage my emotions when under stress.	6.27±2.31	0.89	0.28	6.32	6.21	40.63
26.I can analyze stressors and look for solutions.	6.46±2.28	0.90	0.28	6.51	6.41	42.35
27.I can notice all types of stressors in the learning process.	6.53±2.15	0.81	0.28	6.58	6.48	45.38

x̄: Mean, SD: Standard Deviation, t: One sample t test

Table 4. *Findings for Confidence Analyzes (n=224)*

Scale and subscales	Number of items	Cronbach's Alpha	Test-retest	Spearman Brown Coefficient	Guttman Coefficient
Nursing Students Competence Instrument	27	0.96	0.80	0.87	0.87
Integrating care abilities	10	0.94	0.78	0.87	0.87
Leading humanity concerns	6	0.94	0.79	0.90	0.90
Advancing career talents	7	0.92	0.81	0.89	0.88
Dealing with tension	4	0.94	0.76	0.95	0.95

Table 5. *Correlations between the Nursing Students Competence Instrument total score and subscale scores (n=224)*

	NSCI	Integrating care abilities	Leading humanity concerns	Advancing career talents	Dealing with tension
	r; p	r; p	r; p	r; p	r; p
NSCI	1				
Integrating care abilities	0.922; <0.001	1			
Leading humanity concerns	0.883; <0.001	0.801; <0.001	1		
Advancing career talents	0.915; <0.001	0.781; <0.001	0.798; <0.001	1	
Dealing with tension	0.659; <0.001	0.448; <0.001	0.379; <0.001	0.525; <0.001	1

NSCI: Nursing Students Competence Instrument, r: Correlation coefficient, p: Significance level (<0.05)

4. DISCUSSION

Nursing education planned in two dimensions as theoretical and practical aims to get the students to gain competences in various fields in line with the changing student profile, learning needs, and care expectations (20). However, there is no valid and reliable measurement tool for evaluating the students' professional competences on the national scale, and thus it is not possible to systematically examine the competences of students, especially those in the final years of their undergraduate studies. In the present study, it was determined that the Turkish adaptation of the Nursing Students Competence Instrument met the validity and reliability criteria at an acceptable level. In line with the recommended international scale adaptation procedures, linguistic and content validity of the scale was ensured in the first place (21,22).

In calculating content validity index, Davis technique was employed, and the value was found as 0.94. This value indicates that the scale has a comprehensible linguistic structure and content (18).

4.1. Confirmatory Factor Analysis

In evaluating construct validity, which is one of the criteria for testing validity, factor analysis was used. Prior to the factor analysis, the sufficiency of the sample size was evaluated with KMO and Bartlett tests, as a result of which sample size was found to be sufficient. In the evaluation of model data fit, Chi-square value was divided by freedom degree, and x^2/sd value was determined as 2.42. This value shows that model data fit was good (16). Similarly, in the scale development study conducted by Lin et al (17), KMO sampling sufficiency was found as 0.92, Bartlett's test as $x^2_{(351)}$ = 4576.85 and statistically significant with p< 0.01. It is stated that it is more appropriate to evaluate other fit indices together (23). CFA conducted in this direction showed that the scale was acceptable with RMSEA (good fit), SRMR (good fit), CFI (good fit), NFI (moderate fit) and it was confirmed that the scale consisted of 27 items and 4 subscales as the original scale (Table 2). Also, it was determined that GFI and AGFI were weak fit indices. These values are thought to be affected by the sample size. Therefore, the chi-square value, which is an alternative to these values, was taken as a reference in the evaluation of the model fit. Moreover, the factor loads between the subscales of the scale and the scale items were determined to be between 0.40-3.22 and above 0.30, and no item was removed from the scale (16).

4.2. Reliability Analysis

Reliability, which is defined as the consistency between different measurements of the same variable, was determined through Cronbach's alpha coefficient. The proximity of this coefficient to 1 represents high internal consistency of the items (21). In the study, the Cronbach's alpha coefficient was 0.96. When the Cronbach's alpha coefficients of the subscales were examined, it was determined that it varied between 0.92-0.94. Similarly, in the scale development study they conducted, Lin et al (17) reported that the Cronbach's alpha coefficient of the total scale score was 0.96, and that the subscale coefficients ranged between 0.87 and 0.94. Also values the mean of the upper 27% and lower 27% by t-test was found to be positive. If the mean values for the upper 27% and lower 27% by t-test are positive, it means that the item measures the characteristic that the test measures.

Another analysis used in order to test reliability is test-retest analysis. In the literature, it is stated that in test-retest method, applying retest to 25-50% of the individuals who participated in the first measurement would be enough for calculating reliability (24). In the present study, three weeks after the data collection, 31% of the study sample were contacted and test-retest was applied. While the scale total test-retest value was calculated as 0.80, it was determined that test-retest values of the subscales varied between 0.76-0.81. As the test-retest values of the scale and its subscales were found to be in the range of 0.75-1.00, it can be stated that the scale's consistency in temporal process was very good (25). Also the Spearman and Guttman scores were found close to 1.00, indicating high internal consistency.

5. CONCLUSION

As a result of the study, it was determined that NSCI Turkish version is a valid and reliable measurement tool for the evaluation nursing students' competences. It is recommended that studies should be conducted on larger samples by using this scale. Also, as different methods and techniques are used in educational institutions, studies that compare interinstitutional competences of nursing students should be planned. Using NSCI in these studies to be planned will offer an opportunity to reveal nursing education program outcomes through an objective and reliable measurement tool.

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