

## Original Article

# Transcultural Adaptation and Validity of the Nurse Competence Scale

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### Abstract

**Background:** In this study, the competencies of the nurses working in the hospital for safe, ethical and quality care were evaluated. There is not a tool that measures the competencies of nurses in Turkey. This research is a methodological type study designed to adapt the Nurse Competency Scale to Turkish.

**Methods:** A psychometric study was conducted. Three hundred and seventy nurses at four public hospitals were participated and they complete the scale and demographic questionnaire (9 items).

Language validity was achieved by translating and re-translating the Nurse Competence Scale and then the scope validity was ensured with the necessary corrections made in line with the expert's recommendations. The total scale content validity index value was found to be 0.95. The scale was applied to the nurses forming the sample group after the pre-application. The factor loadings of the scale items with their size were found between 0.33 and 0.78. As a result of the confirmatory factor analysis, it was found that the 7 factorial structure of the scale is valid and goodness of fit tests is appropriate.

**Results:** The total scale content validity index value was found to be 0.95. As a result of the confirmatory factor analysis, it was found that the 7 factorial structure of the scale is valid and goodness of fit tests is appropriate. In this study, the competencies of the nurses working in the hospital for safe, ethical and quality care were evaluated. There is not a tool that measures the competencies of nurses in Turkey. This research is a methodological type study designed to adapt the Nurse Competency Scale to Turkish. As a result of the internal consistency of the Nurse Competence Scale, it was found that item total score correlations ranged from 0.33 to 0.70 and Cronbach alpha was 0.96 for all scales and subscales ranged from 0.74 to 0.92.

**Conclusions:** It was determined that the Turkish form of the Nurse Competence Scale had validity and reliability in a structure similar to the original scale and that it was a sufficient measurement instrument to determine the competencies of the nurses

**Keywords:** Instrument development; clinical standard; competency; nurses

### Introduction

Nursing is a profession that takes care of individuals in all aspects of health organizations and meets all the needs of individuals continuously by adapting to developing and changing situations (Adıguzel et al., 2011; İz & Temel, 2009). It is expected that the profession of nursing, which has an important place in the health care team as a result of the development and increase of the public awareness and the expectations of the society in today's health system, will be competent in all areas. Therefore, it is recommended that nurses plan and perform their care and behavior on the basis of competence (Zafarnia et al., 2017). Professional competence; knowledge, skill, attitude, creativity,

intellectual thinking and cooperation is the reflection of the application (Nilsson et al., 2014). Nursing competency is defined as the basic knowledge, skills, characteristics and attitude required for effective performance (Asahara et al., 2015). Nursing competencies it is evaluated by their use in the progress of professional development, meeting the needs of the patient, organizational and individual performance, risk management and determination of obligations. Nursing competencies are particularly important for patient safety and quality care. The higher the quality care we provide to a patient, in other words, the more we meet the expectations and needs of the patient, the more we increase patient satisfaction and efficiency.

Therefore, determining nursing competencies is important (Hamstrom et al., 2012; Demir et al., 2011). Although there are a variety of tools to measure nursing competencies abroad, tools to measure nursing competencies are limited in Turkey.

**Background:** Although competence is a frequently used concept in nursing in the international arena, it is expressed in various ways by health professionals (Garside & Nhemachena, 2013). Competency is primarily a concept of creating a more flexible workforce to increase competitiveness and efficiency in response to international market pressure (Windsor et al., 2012). Evaluation of nursing competency is a two-stage matter. The first stage must take place during nursing education and the second stage must take place during the nursing career (Flinkman et al., 2017). It is also important to assess nursing competence, to identify areas for professional development, training needs, and to the best patient care. Assessing the competency of nurses should be the main function in quality, patient safety, workforce planning and human resources management (Meretoja et al., 2004). As consensus cannot be achieved in the concept of competency, there is not a full-agreement in the basic competencies of nursing. Various researchers, unions, councils and associations have classified nursing competencies in various ways. Some of them are as followings; According to the American Association of Critical-Care Nurses (AACN) (Chang et al., 2012; The National CNS Competency Task Force, 2008): Coaching/guidance, Counseling, Research, Clinical and Professional Leadership, Collaboration, Ethical Decision Making, According to the Nursing and Midwifery Council (NMC) (Nursing & Midwifery Council, 2010): Professionalism, Communication, Nursing Practices, Decision Making, Leadership, Management, Teamwork According to the Canadian Nurses Association (Canadian Nurses Association (CNA), 2010): Professional role, Responsibility and Accountability (Clinical Skills, Collaboration, Consultation, Reference, Research, Leadership), Health assessment and diagnosis, Therapeutic management, Health promotion and prevention of disease and damage. According to the Nursing Leaders of Maine (OMNE) (Re-imagine Maine's Nursing Education and Practice, 2013; Massachusetts Department of Higher Education Nursing Initiative, 2016 ): Professionalism, Leadership, Patient-oriented care, Record-based practice, Teamwork and collaboration, Communication, System-based applications, Information and Technology, Security, Quality improvement. According to the American Nurses Association (ANA) (Nursing and Midwifery Board

of Australia, 2006): Communication, Culturally Compatible Practice, Collaboration, Ethics, Education, Professional practice evaluation, Leadership, Evidence-based practice and research, practice quality/quality improvement, resource utilization, environmental health. The concept of competency is named and diversified in many different ways in nursing: professional competency, cultural competency, patient safety competency, moral competency, compassion competency, clinical competency and so on. Although there is no universal definition of clinical competency, many researchers emphasize that both practical and theoretical knowledge are part of clinical competency (Nieminen et al., 2011; Yanhua & Watson, 2011). The simplest definition of clinical competency is the application of the necessary knowledge and skills in effective patient care (Blum et al., 2010). Benner discovered in his studies that as nurses gain clinical experience, they show five-stage progress from the novice to expert (novice, advanced beginner, competent, proficient and expert). According to Benner's theory, nurses should practice 2-3 years in similar environments and situations to gain competency (Morley, 2007). Benner also conducted researches about nursing practice areas and competencies and classified nursing practice areas and competencies in seven groups according to the function, purpose and meaning similarities (the helping role, teaching and coaching, the diagnostic functions, management of changing situations, therapeutic interventions, ensuring the quality, and work role-competencies (Benner, 1984). Evaluation of clinical competency of nurses is particularly important in determining the training needs of nurses, in searching the areas that require improvement as well as in providing nursing care properly. To assess competency self-assessment is the most widely used one. The assessment of clinical competency by nurses themselves gives nurses the opportunity to focus on their own performance in the working environment, which is useful for changing and improving their behavior (Bahreini et al., 2011). The purpose of the study was to develop and test the psychometric properties of Turkish Version of the Nurse Competence Scale (NPC).

## Methods

**Participants:** The research was carried out in four hospitals located in the center and districts of a province from March 2017- May 2017 . A total of 893 nurses work in these hospitals. The inclusion criteria were as follows: (a) Nurses who work in one of four hospitals regardless of clinical experience (even though education levels are different, nurses do the same work in Turkey) (b)

voluntary participation. There is no exclusion criterion. In the intercultural scale adaptation studies, it is recommended that the sample size should be at least 5-10 times the number of scale items while determining the sample volume (Yildiz & Tufekci, 2017). In this research, since the number of items in the scale is 73, it was aimed to reach at least 365 nurses considering the universe of the study. In this study, 370 nurses were reached (and 13 missing data is not included) which is 5.06 times the number of items in the scale.

**Design:** The development and validation process of the Turkish Version of the Nurse Competence Scale involved seven phases: (a) initial translation (b) the synthesis of the translations (c) back translation (d) testing the pre-final version (e) pilot testing of the pre-final version of the scale and the content validity (f) construct validity (g) reliability. The methodology followed the guidelines on scale development, developed by Beaton et al. and Sousa and Rojjanasrirat (Beaton et al., 2000; Sousa & Rojjanasrirat, 2010). In the study was also used with the “Enhancing the quality and transparency of health research” (EQUATOR) guidelines and “Strengthening the reporting of observational studies in epidemiology” (STROBE) checklist (See Supplementary File 1).

**Instrument:** This study used a data collection tool and the Nurse Competence Scale (NCS) developed by Meretoja, Isoaho and Leino-Kilpi (2004) which was adapted to Turkish. The descriptive information form prepared by the researcher consists of 9 questions that query the demographic characteristics (age, gender, marital status, educational status) and work characteristics of the nurses (year of work experience, year of work experience in the unit, working unit, working position, certificate status). The Nurse Competence Scale developed in 2004 by Meretoja et al. is an assessment tool developed to measure nurse competencies. This scale was developed in Finland by comparing the competencies of nurses working in 7 different size-clinics. The Nurse Competence Scale was used in several countries such as Finland, Australia, Lithuania, Spain, Norway, Iran and Italy. This scale consists of 73 items and 7 different sub-dimensions. These sub-dimensions are helping role (7 items), teaching-coaching (16 items), diagnostic functions (7 items), managing situations (8 items), therapeutic interventions (10 items), ensuring quality (6 items) and work role sub-dimensions (19 items). These categories consist of Benner's seven competency categories. The scale is a 4-point Likert scale and planned as the following; 0: not applicable in my work, 1: I use very rarely, 2: I use occasionally, 3: I use very often in my work (Meretoja et al., 2004). The proficiency levels of

the nurses were measured by a visual analog scale (VAS) from 0 to 100 mm. Scores lower than 25 mean “low competency”; scores between 25-49 mean “nearly good competence”; scores between 50-75 mean “good competence”; and scores greater than 75 mean “very good competence” (Wangensteen et al., 2012). The higher the competence level, the higher the score obtained from the scale. The Cronbach's alpha values of the sub-dimensions of Nurse Competence Scale reported by Meretoja et al. (2004) was found to be between 0.79 and 0.91 (Meretoja et al., 2004).

**Data Analysis:** Data were analyzed by SPSS (version 20. SPSS Inc.) program. Number, percentage, mean and standard deviation were used for descriptive statistics of the descriptive characteristics and scale scores of the individuals. The normal distribution of the data was evaluated by Kolmogorow-Smirnow test, Skewness and Kurtosis. Statistical significance level was accepted as  $p < .05$ . For scale validity and reliability analysis; Scope validity (evaluation of expert opinions): CVI and ICC analysis, Language validity: Wilcoxon signed rank test for comparison of scores of Turkish and English forms and Spearman correlation analysis for consistency analysis, Item analysis (item-total score analysis, item-sub-dimension analysis and sub-dimension-total scale analysis): Pearson Correlation analysis, Internal consistency of total scale and sub-dimensions; Cronbach Alpha reliability analysis, Time-dependent invariance: t-test and Pearson correlation analysis in dependent sample for test-retest reliability, Construct validity: Confirmatory factor analysis was used.

**Ethical considerations:** In order to use Nursing Competence Scale in this study, the necessary permission to adapt the scale into Turkish was taken by e-mail from developer and the corresponding author of the scale, and from the publishing house who owns the copyrights of the scale. Ethical approval from the Ethics Committee (TUTF-BAEK-2016/232-21/32) and the official permits from the hospitals where the study was conducted (22.02.2017-79056779-600- E.106897; 14.03.2017-27796-26559790 /605.01) were obtained. In order to use the Nursing Competence Scale, Meretoja Riitta, author of the scale, and Wiley - Blackwell permission department, who owns the publication rights of the scale, received the necessary permission via e-mail for the adaptation of the scale to Turkish. The purpose of the research and the responsibility of the individuals who will participate in the research have been explained to the participants and their informed consent has been received as an ethical principle. The written consent of the nurses who will be involved in the study was taken by

explaining that they are free to participate in the study due to the necessity of the answers to be given voluntarily.

## Results

**Initial translation:** The scale was translated from English to Turkish by the researcher and the two experts who are fluent in both languages.

**Synthesis of the translations:** Both translations were examined by the researcher in comparison with the original text and the expressions best reflecting the items were selected and arranged. The original scale was compared with the Turkish translation and it was determined that there was no change in the meanings of expressions in the scale. This is the way the Turkish translation of the scale was completed.

**Back-translation:** Then, the Turkish translation of the form was back-translated by an expert fluent in both languages.

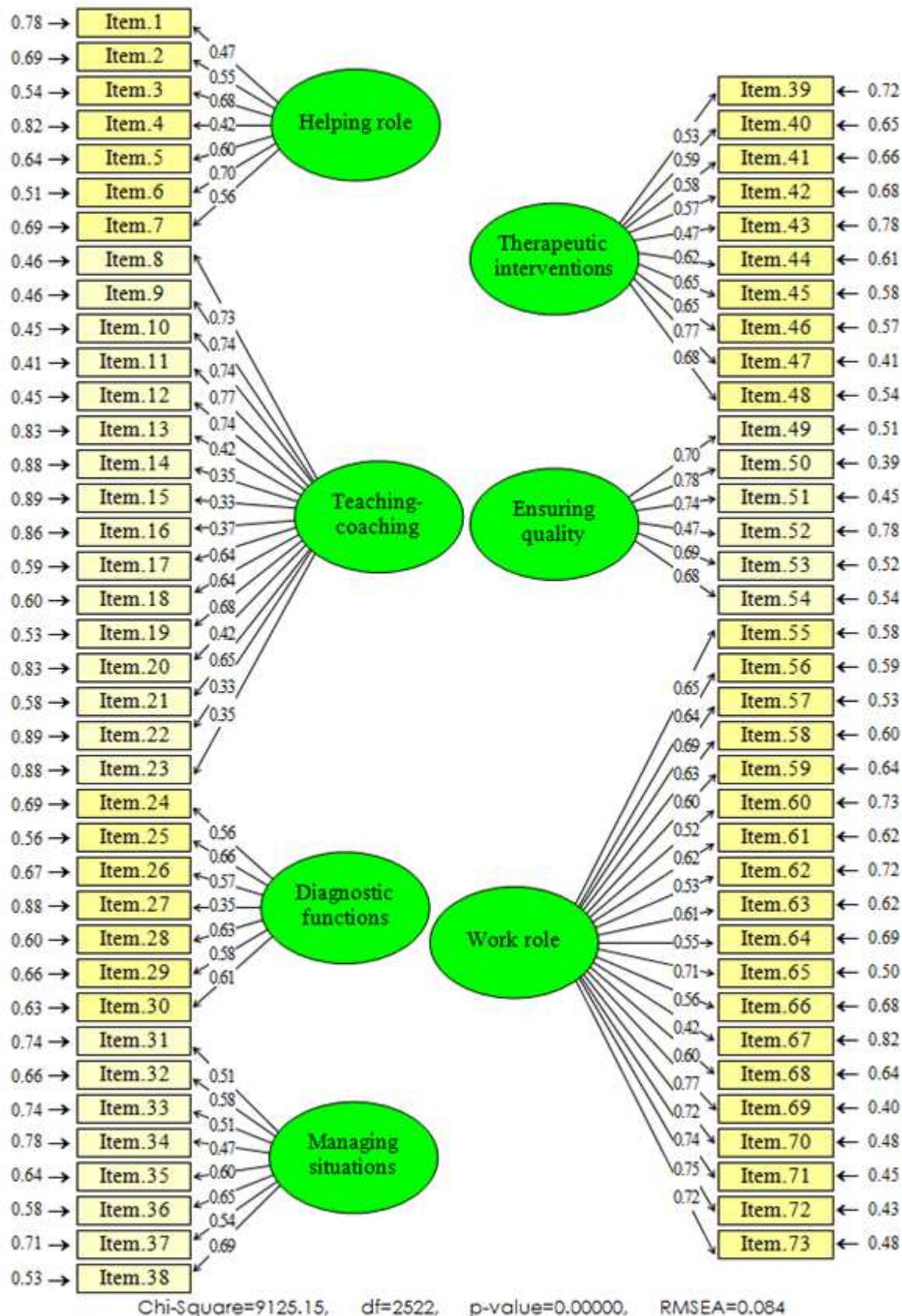
**Test of the pre-final version:** After the translation process, the original, back-translation and Turkish forms of the scale were applied to 10 individuals in each group and repeated with two weeks interval with a total of 30 individuals. The difference between the mean scores obtained from the two measurements was compared with the Wilcoxon test and the consistency between the results was examined by Spearman correlation analysis. There was no significant difference between the mean total scores and the mean scores of the seven sub-dimensions of the original and the English-translated version of the Nurse Competence Scale ( $p > .05$ , Table 1). It was determined that there was a positive, very strong and statistically significant relationship between the scores obtained from the original and the English-translated versions of the Nurse Competence Scale and its seven sub-dimensions ( $r_s: .94-1.00$ ,  $p < .001$ , Table 1). There was no significant difference between the total and the mean scores of the Turkish and the English-translated versions of the Nurse Competence Scale and seven sub-dimensions ( $p > .05$ , Table 2). It was determined that there was a positive, very strong and statistically significant relationship at the therapeutic level between the scores obtained from the Turkish and the English-translated versions of the Nurse Competence Scale and its seven sub-dimensions ( $p < .05$ ) and an even higher significant relationship was found between the total and the other six sub-dimension scores ( $r_s: .75-1.00$ , Table 2). There was no significant difference between the total and the mean scores of the Turkish and original English versions of the Nurse Competence Scale and the seven sub-dimensions ( $p > .05$ , Table 3). It was determined that there was a positive, very strong and statistically significant relationship at the

level of helping role ( $p < .01$ ) between the scores obtained from the Turkish and the original English versions of the Nurse Competence Scale and its seven sub-dimensions, an even higher significant relationship ( $p < .001$ ) was found between the total and the other six sub-dimension scores ( $r_s: .89-1.00$ , Table 3).

**Pilot testing of the pre-final version of the scale and the content validity:** It was observed that the scale items were understandable in the pilot group. The content was then presented to the expert for validity. In order to evaluate the content validity of the Nurse Competency Scale, the Turkish translation of the scale was presented to the opinion of 14 experts. Expert faculty members were asked to evaluate each of the items as 1-not relevant, 2-somewhat relevant (item needs some revision), 3- quite relevant (clear but needs minor revision), 4- highly relevant. The lowest and highest scores given by the experts to the items of the scale, the mean, standard deviations and CVI values are given in Table 4. The CVI value of all items in the scale was found to be  $.86-1.00$  ( $\geq .80$ ), and the total CVI value of the scale was  $.95$  (95%) (Table 4). Therefore, no item was removed from the scale in terms of content/content validity. The data obtained from 14 experts were evaluated by intraclass correlation coefficient (ICC) (two-way random effect, consistency model) method in order to evaluate the compatibility between the expert opinions on the Nurse Competence Scale items. The ICC value of the scale was found to be  $.94$  ( $F: 17.99$ ,  $p: .000$ ).

**Construct validity:** Confirmatory factor analysis (CFA) was performed for the construct validity of the Turkish version of the Nurse Competency Scale and compliance values are given in Table 5. As shown in Table 5, several fit indexes were used to assess the model fit of the scale. Of these, RMSEA was found to be  $0.084$ , CFI  $0.94$ , NNFI  $0.94$ , SRMR  $0.098$ . As a result of the relevant fit index values, it was decided that this model is acceptable as it is. In Figure 1, the sub-dimensions of the Nurse Competence Scale and the factor loads of the items are presented. The coefficients (factor loads) of the scale items within their sub-dimension are found to be between  $.42$  and  $.70$  for the helping role sub-dimension,  $.33$  and  $.77$  for the teaching and coaching,  $.35$  and  $.66$  for the diagnostic functions,  $.47$  and  $.69$  for managing situations,  $.47$  and  $.77$  for the therapeutic interventions,  $.47$  and  $.78$  for ensuring quality,  $.42$  to  $.77$  for the work role sub-dimensions (Figure 1). In summary, the coefficients (factor loads) of the scale items within their sub-dimension were found between  $.33$  and  $.78$  (Figure 1). The characteristics of the participants are given in Table 6.

**Figure 1. Confirmatory factor analysis of nurse competence scale: factor loads and error variances**



**Table 1. Comparison of the mean scores of the original English and translation English version of the nurse competence scale (S:10)**

Scale and Sub-dimensions		Original English Mean± SD	Translation English Mean± SD	Z	p	r <sub>s</sub>	p
<b>Nurse Competence Scale Total</b>		63.67±22.12	64.56±22.58	1.274	.203	.95	< .001
Sub-dimensions	1. Helping role	66.19±20.87	67.14±22.05	1.000	.317	.98	< .001
	2. Teaching and coaching	61.67±29.30	61.87±29.46	.276	.783	1.00	< .001
	3. Diagnostic functions	60.48±25.99	65.24±26.75	1.730	.084	.94	< .001
	4. Managing situations	72.50±19.26	72.08±21.16	.378	.705	.98	< .001
	5. Therapeutic interventions	61.67±28.29	61.00±28.50	.707	.480	.99	< .001
	6. Ensuring quality	53.89±30.66	53.89±31.10	.000	1.000	.99	< .001
	7. Work role	69.30±21.09	70.70±20.84	1.725	.084	.99	< .001

Z: Wilcoxon Signed Rank test r<sub>s</sub>: Spearman correlation analysis**Table 2. Comparison of the mean scores of the Turkish and translation English version of the nurse competence scale (S:10)**

Scale and Sub-dimensions		Turkish Mean± SD	Translation English Mean± SD	Z	p	r <sub>s</sub>	p
<b>Nurse Competence Scale Total</b>		84.29±15.58	84.16±16.00	.633	.508	.96	< .001
Sub-dimensions	1. Helping role	90.00±15.79	89.52±16.46	.577	.564	1.00	< .001
	2. Teaching and coaching	82.92±19.64	82.50±20.63	.520	.603	.99	< .001
	3. Diagnostic functions	78.09±21.20	79.52±21.77	1.342	.180	.99	< .001
	4. Diagnostic functions	87.50±13.18	87.50±11.95	.000	1.000	.94	< .001
	5. Therapeutic interventions	86.00±14.30	86.33±14.18	.171	.864	.75	.013
	6. Ensuring quality	78.33±20.53	77.22±21.67	1.000	.317	.96	< .001
	7. Work role	87.19±12.57	86.49±12.89	1.265	.206	.97	< .001

Z: Wilcoxon Signed Rank test r<sub>s</sub>: Spearman correlation analysis

**Table 3. Comparison of the mean scores of the Turkish and original English version of the nurse competence scale (S:10)**

Scale and Sub-dimensions		Turkish Mean± SD	original English Mean $\bar{x}$ ± SD	Z	p	r <sub>s</sub>	p
<b>Nurse Competence Scale Total</b>		78.31±14.06	78.51±13.70	.816	.415	.99	< .001
<b>Sub-dimensions</b>	1. Helping role	79.52±16.04	80.48±14.97	1.000	.317	.89	< .001
	2. Teaching and coaching	74.79±18.83	74.58±19.66	.181	.856	.98	< .001
	3. Diagnostic functions	78.09±14.75	78.09±14.41	.000	1.000	.97	< .001
	4. Diagnostic functions	79.58±15.52	80.42±16.56	.707	.480	.91	< .001
	5. Therapeutic interventions	76.00±16.54	76.00±16.16	.000	1.000	1.00	< .001
	6. Ensuring quality	76.67±17.33	76.11±16.98	.577	.564	.98	< .001
	7. Work role	83.51±12.27	83.86±11.45	.632	.527	1.00	< .001

Z: Wilcoxon Signed Rank test      r<sub>s</sub>: Spearman correlation analysis

**Table 4. Evaluation of expert opinions for the content validity of nurse competence scale items (S= 14)**

Scale items	Min-Max score	Mean ± SD	Number of experts giving 3-4 points	CVI*	Scale items	Min-Max score	Mean ± SD	Number of experts giving 3-4 points	CVI*
Item 1	3-4	3.57±.51	14	1.00	Item 38	3-4	3.79±.43	14	1.00
Item 2	4-4	4.00±.00	14	1.00	Item 39	2-4	3.29±.73	12	0.86
Item 3	3-4	3.79±.43	14	1.00	Item 40	2-4	3.71±.73	12	0.86
Item 4	2-4	3.64±.63	13	0.93	Item 41	2-4	3.79±.58	13	0.93
Item 5	2-4	3.57±.65	13	0.93	Item 42	3-4	3.93±.27	14	1.00
Item 6	2-4	3.43±.65	13	0.93	Item 43	3-4	3.86±.36	14	1.00
Item 7	4-4	4.00±.00	14	1.00	Item 44	3-4	3.93±.27	14	1.00
Item 8	2-4	3.43±.65	13	0.93	Item 45	3-4	3.79±.43	14	1.00
Item 9	3-4	3.93±.27	14	1.00	Item 46	4-4	4.00±.00	14	1.00
Item 10	3-4	3.57±.51	14	1.00	Item 47	1-4	3.29±.91	12	0.86
Item 11	3-4	3.86±.36	14	1.00	Item 48	3-4	3.79±.43	14	1.00
Item 12	3-4	3.86±.36	14	1.00	Item 49	3-4	3.93±.27	14	1.00
Item 13	2-4	3.50±.65	13	0.93	Item 50	2-4	3.50±.65	13	0.93
Item 14	2-4	3.43±.65	13	0.93	Item 51	3-4	3.93±.27	14	1.00
Item 15	3-4	3.86±.36	14	1.00	Item 52	3-4	3.86±.36	14	1.00
Item 16	4-4	4.00±.00	14	1.00	Item 53	3-4	3.71±.47	14	1.00
Item 17	2-4	3.79±.58	13	0.93	Item 54	2-4	3.57±.76	12	0.86

Item 18	3-4	3.86±.36	14	1.00	Item 55	2-4	3.21±.70	12	0.86
Item 19	3-4	3.86±.36	14	1.00	Item 56	2-4	3.79±.58	13	0.93
Item 20	1-4	3.64±.84	13	0.93	Item 57	2-4	3.57±.76	12	0.86
Item 21	2-4	3.79±.58	13	0.93	Item 58	2-4	3.50±.65	13	0.93
Item 22	2-4	3.64±.63	13	0.93	Item 59	1-4	3.57±.85	13	0.93
Item 23	1-4	3.57±.94	12	0.86	Item 60	2-4	3.64±.63	13	0.93
Item 24	3-4	3.86±.36	14	1.00	Item 61	1-4	3.29±.91	12	0.86
Item 25	3-4	3.64±.50	14	1.00	Item 62	3-4	3.86±.36	14	1.00
Item 26	2-4	3.57±.65	13	0.93	Item 63	2-4	3.71±.61	13	0.93
Item 27	1-4	3.43±.94	12	0.86	Item 64	2-4	3.64±.63	13	0.93
Item 28	3-4	3.79±.43	14	1.00	Item 65	3-4	3.71±.47	14	1.00
Item 29	3-4	3.86±.36	14	1.00	Item 66	2-4	3.29±.73	12	0.86
Item 30	2-4	3.57±.65	13	0.93	Item 67	2-4	3.36±.74	12	0.86
Item 31	3-4	3.71±.47	14	1.00	Item 68	3-4	3.71±.47	14	1.00
Item 32	2-4	3.21±.70	12	0.86	Item 69	4-4	4.00±.00	14	1.00
Item 33	3-4	3.93±.27	14	1.00	Item 70	1-4	3.36±.93	12	0.86
Item 34	2-4	3.36±.74	12	0.86	Item 71	2-4	3.64±.63	13	0.93
Item 35	3-4	3.71±.47	14	1.00	Item 72	2-4	3.64±.63	13	0.93
Item 36	2-4	3.71±.61	13	0.93	Item 73	3-4	3.93±.27	14	1.00
Item 37	2-4	3.71±.61	13	0.93	<b>TOTAL</b>				<b>0.95</b>

\*Content validity index: Number of experts giving 3 and 4 points for item suitability / total number of experts

**Table 5. Confirmatory factor analysis compliance values of nurse competence scale (n: 370)**

CFA compliance statistics	CFA compliance values
Chi-squared / p-value	9125.15 / 0.000 (p<.001)
Chi-squared : degree of freedom	9125.15: 2522 = 3.62
RMSEA / p	.084 (p<.05)
SRMR	.098
CFI	.94
NNFI	.94

**Table 6. Characteristics of study participants (n:370)**

Characteristics	Min-Max	$\bar{x} \pm SS$
Age	19-60	33.89 $\pm$ 7.71
	<b>n</b>	<b>%</b>
<b>Gender</b>		
Female	334	90.3
Male	36	9.7
<b>Marital Status</b>		
Married	255	68.9
Single	115	31.1
<b>Educational Status</b>		
Health Vocational High School	31	8.4
Associate	80	21.6
Bachelor	236	63.8
Master and doctorate	23	6.2
<b>Work unit</b>		
Medical clinics	148	40.0
Surgery clinics	65	17.6
Intensive care unit	70	18.9
Special branch	12	3.2
Emergency	32	8.6
Management	38	10.3
Other	5	1.4
<b>Manager position</b>		
Yes	38	10.3
No	332	89.7
<b>Years of experience</b>		
$\leq 2$ years	32	8.6
3-5	69	18.7
6-10	71	19.2
11-15	65	17.6
$> 16$	133	35.9
<b>Working years in the unit</b>		
$\leq 2$ years	113	30.5
3-5	118	31.9
$>6$	139	37.6
<b>Certificate status</b>		
No	282	76.2
Yes	88	23.8
Yes, related his/her field	62	16.8
Yes, not related his/her field	26	7.0

## Reliability

**Test-Retest Analysis:** The difference between the nurses' scores of the Nurse Competence Scale and the mean scores of the seven sub-dimensions obtained from the first and the second measurements (with the 2-week interval) were compared with the t-test in the dependent groups. The relationship between the scores from the two repetitive measurements was evaluated by Pearson correlation analysis. It was found that there was no significant difference between the mean score of the Nurse Competence Scale and the mean score of the seven sub-dimensions obtained from the two repetitive measurements ( $p > .05$ ).

When the relationship between the test-retest scores of the Nurse Competence Scale and its seven sub-dimensions was examined, there was a very strong ( $r: .95$  to  $1.00$ ), positive and statistically significant relationship between the scores of both the total scale and the seven sub-dimensions obtained from the first and second measurements ( $p < .001$ ).

**Internal Consistency:** The total scale score and correlations of the Nurse Competence Scale items which were translated into Turkish were evaluated with Pearson correlation analysis. When the total item score correlations were examined for the Turkish version of the Nurse Competence Scale, the reliability coefficient was found to be between  $r: .33$  and  $.70$ , positive and highly statistically significant ( $p < .001$ ).

The Cronbach's alpha reliability coefficient was found to be  $\alpha = .96$  for the whole scale in an analysis performed to test the internal consistency which is one of the reliability indicators of the Nurse Competence Scale and its sub-dimensions. The Cronbach's alpha reliability coefficient of the sub-dimensions of the scale was found to be  $.79$  for the helping role sub-dimension,  $.89$  for the teaching and coaching,  $.77$  for the diagnostic functions,  $.74$  for the management of situations,  $.86$  for the therapeutic interventions,  $.82$  for the quality assurance, and  $.92$  for the work role sub-dimensions.

## Discussion

**Language validity:** In the scale adaptation studies, the following protocol is suggested for achieving the language equivalence. First, the scale is translated into the language of choice by a translator who is fluent in both languages. Then, it is back-translated by another translator

who is fluent in both speaking and writing in both languages. The items are compared with the original scale and the meaning unity is analyzed (Secer, 2015). In the translation-back translation method, the Nurse Competence Scale was first translated from English into Turkish by the researcher and two experts in both languages. All translations were examined by the researcher and his consultant by comparing them with the original text and the scale is prepared by choosing the best expressions that reflect the meaning of the scale items. Then, the form, which was translated into Turkish, was back-translated by a field expert who is fluent in both languages. The English translation was then compared with the original scale and it was determined that there was no change in the meaning of the scale items. In order to examine the language validity after the translation of the original text into Turkish, a pilot study was performed where Turkish-translated, original English and English-translated versions of the scale was applied to a group of 30 individuals who are fluent in both languages. After the application, correlation values between the scale forms of the individuals are calculated. The high correlation values indicate that the two scales have linguistic equivalence and they measure the same thing. For linguistic equivalence, it is recommended to have a value of  $.70$  and above (Secer, 2015). There was a positive and highly significant relationship between the scores of the original and English-translation versions, Turkish-translation and English-translation versions, and Turkish translation and the original versions of the Nursing Competence Scale and seven sub-dimensions. As a result of these studies, it can be said that the Nurse Competence Scale in Turkish is an appropriate measurement tool in terms of linguistic validity.

**Content Validity:** Expert opinion is the most commonly used method for content validation. In order to calculate the content validity ratio, the expert group should have between 3-20 individuals (Erdogan et al., 2017). In this respect, after the translation process, 14 experts were consulted to evaluate the content validity of the scale.

Lawshe and Davis techniques are used in the evaluation of expert opinions (Erdogan et al., 2017). Expert opinion is rated on a 4-point ordinal scale according to the Davis technique as; 1-not relevant, 2-somewhat relevant (item need some revision), 3-quite relevant (clear but need

minor revision), 4-highly relevant (very clear) (Yildiz & Tufekci, 2017). In this technique, the content validity index (CVI) is calculated by the ratio of the number of experts rated 3 and 4 by the total number of experts. If this value is 0.80 and above, it is an acceptable level (Karakoc & Donmez, 2014). In this respect, after the translation process, experts were asked to rate each item in the scale between 1-4 points in order to evaluate the content validity and the content validity of the scale obtained from the expert evaluations was found to be .95. In this sense, the Nurse Competence Scale can be considered as sufficient in terms of the content validity. The content validity index was found to be .85 in the scale adaptation study conducted in Iran by Bahreini et al. (Bahreini et al., 2011). After the content validity analysis, the comprehensibility of the expressions in the scale were evaluated by a pilot study and it was observed that the expressions in the scale were clear. At the end of the pilot study and based on the recommendations of the experts, the Nurse Competence Scale was finalized.

**Construct Validity:** It is recommended that the road coefficients (factor loads) indicating the relationship of the items in the scale with their sub-dimensions should be at least .30 and above (Simsek, 2007; Harrington, 2009). In this adaptation study of the scale into Turkish, the factor loads of all items were found to be between .33 and .78. In confirmatory factor analysis, the compliance of fit statistics should also be at the desired level. According to the results of the confirmatory factor analysis of the Turkish version of the Nurse Competence Scale, the chi-square statistics were found to be 3.62, and the RMSEA value was found to be .084 and significant ( $p < .001$ ). Based on the SRMR (.098), CFI (.94), NNFI (.94) values, the Turkish version of the Nurse Competence Scale has been observed to be a good fit.

In Norway, the study conducted by Wangensteen et al. found  $X^2 / dF$ : 3.32, CFI: 0.703, NFI: 0.626 and RMSEA: 0.063 (Wangensteen et al., 2015). In another study conducted by Muller, it is found that  $x^2 / dF$ : 2.92, CFI: 0.53, TLI: 0.51 and RMSEA: 0.09 (Muller, 2013). In both studies, since the adaptation analyzes did not show good agreement, some items were removed from the scale. However, in our study, since the adaptation analyzes were in good agreement, there was no item removed from the scale.

**Reliability:** It is stated in the literature that at least 30 individuals should be reached for the test-retest (Tavsancıl, 2006). In this study, the scale was applied to a sample group of 30 individuals twice with 2-3 week intervals. Pearson Product Moment Correlation coefficient was used in test-retest reliability. When the relationship between the test-retest scores of the Nurse Competency Scale and its seven sub-dimensions was examined, There was a very strong ( $r$ : .95 to 1.00), positive and highly significant relationship ( $p < .001$ ) between both the total score and the scores from the seven sub-dimensions obtained from the first and second measurements. The reliability of the Nurse Competence Scale was found to be highly time-independent.

Internal consistency is defined as the compatibility of the items that make up a scale (Secer, 2015; Karakoc & Donmez, 2014). At the same time, internal consistency is a good measure of whether scale items lead to the desired goal (Karakoc & Dönmez, 2014). In order to calculate the internal consistency, the Split-Half Method, Item Total Score Correlation Coefficient, Kuder Richardson 20-21 Reliability Coefficient and Cronbach's Alpha Reliability are used (Erdogan et al., 2017). In order to measure the internal consistency and homogeneity in the reliability study of the Nurse Competence Scale, Cronbach's alpha coefficient and item total score correlation were calculated. The Nurse Competence Scale was found to be highly reliable ( $\alpha = .96$ ). The Cronbach's alpha reliability coefficient of the sub-dimensions of the scale was found between .74 and .92. The Cronbach's alpha values of the sub-dimensions of the Nurse Competence Scale were 0.79-0.91 in the study by Meretoja et al., 0.78-0.91 in the study of Salonen et al., 0.79-0.93 in the study of Hengstberger et al., 0.76-0.85 in the study of Bahreini et al., and 0.72-0.92 in the study of Wangensteen et al. (Wangensteen, 2014). In the study of Hamstrom et al., the Cronbach's alpha values were found to be between 0.81-0.90 (Hamstrom et al., 2012). Again in a study by Cruz, the Cronbach's alpha values were found to be between 0.79-0.91 (Cruz, 2016).

The level of item-total score correlations is an important criterion in selecting or evaluating the items. In order for an item to be acceptable, the item-total correlation coefficient should be positive and at least 0.20, but the most acceptable value is .25. The higher the correlation

coefficient, the better the reliability of the items (Cam & Arabacı, 2010). In this study, item-total correlations ranged from .33 to .70, and item-total correlations of all items reached a sufficient level. When the correlations of the sub-dimensions of the scale with the total scale score are examined, it is seen that the coefficients vary between .65 and .88. Accordingly, the relationship of the sub-dimensions of this scale with the total scale is sufficient.

**Limitations:** The fact that the study was conducted with nurses working in public hospitals in the provincial center and districts where the data was collected and the fact that the research was conducted with individuals more than five times the number of items are the limitations of the study. Therefore, the results obtained from the research can only be generalized to this research group. It was difficult to reach the volunteers due to the high number of questions in the study and the shift-working conditions of the nurses.

**Impact Statement:** Nurse managers and nurses need valid measurement tools to compare competency in practice for competence-based performance evaluation. Also one of the reasons why it is not to do research on the competencies of nurses in Turkey, there is no appropriate instrument. The Turkish version of the NPC has shown acceptable levels of reliability and validity for nurses. Therefore, we hope to fill this gap in Turkey both for nurse and researchers. Moreover, the public health sector in Turkey is made in the performance appraisal for doctors only. We hope that if we draw attention to this issue, we can guide health politicians.

**Conclusion:** The linguistic validity of the Nurse Competence Scale was analyzed by the translation-back translation method and the content validity was ensured by expert opinions. In confirmatory factor analysis, it was determined that the compliance indexes and factor loads are sufficient, the 7-sub-dimensional structure of the scale is valid and the model fit is acceptable. The Cronbach's alpha coefficient (total scale = 0.96) was found to be highly reliable for internal consistency. It was found that the item-total score correlation values of the scale ranged between 0.33-0.70 and therefore there was no need to exclude any item from the scale. According to the test-retest results, the reliability of the scale was high in terms of time-independence.

**Scoring the scale:** There is no item where the score was reversed. The sub-dimension and total scores are evaluated between 0 and 100. Calculation of the sub-dimension scores: The sum of the scores of the items in each sub-dimension where scores are between 0-3 were divided by the number of items and the resulting number was multiplied by 33.333 giving a total score between 0-100. The total score of the seven sub-dimensions was divided by 7 (the number of sub-dimensions) giving a total scale score between 0-100.

As a conclusion; it has been determined that the Nurse Competence Scale can use for determining nurse competence in the Turkish population.

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