

Validity and Reliability of the Jefferson Scale of Empathy, Nursing Student Version R in a Sample of Iranian Oncology Nurses

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Abstract

Background: Empathy is essential in the process of nurse-patient relationships in oncology wards. The lack of a rigorous tool to measure empathy in oncology nurses makes the research difficult.

Objectives: Modifying a Persian translation of the Jefferson scale of empathy to create an Iranian version of the Jefferson scale of empathy-nursing student version R (JSE-NS version R), and to determine its validity and reliability in oncology nurses of Tehran Universities of Medical Sciences.

Methods: This is a methodological study with cross-sectional design, conducted in 2015. The translation and modification process was conducted according to the World Health Organization guidelines and an Iranian version of the scale was created. Different types of validity, including face and content validity together with construct and convergent validity were assessed. Construct validity was evaluated in a convenience sample of oncology nurses (n = 181) through confirmatory (CFA) and exploratory factor analysis (EFA). By correlation assessment between the total score of the JSE-NS version R and the subscales of the interpersonal reactivity index (IRI), convergent validity was tested. Reliability was ascertained by assessing the internal consistency and stability of the scale. The data were analyzed using SPSS-13 and LISREL 8.8.

Results: Face and content validity of the scale was confirmed by an expert panel. The initial CFA did not show a three-factor structure of empathy, thus an EFA was run and a four-factor model with a grand factor was extracted. Subsequently, the results of the final CFA confirmed acceptable goodness of fit indices for the four-factor structure of empathy, and the scale explained 63% of variances in the data. Convergent validity showed a significant correlation between the total score of the scale and most subscales of the IRI ($P < 0.001$). Cronbach's alpha value (0.86) and the ICC level (0.90) showed satisfactory results in oncology nurses.

Conclusions: The Iranian version of the Jefferson scale of empathy-NS version R is a psychometrically sound instrument, implying that it is suitable for measurement of empathy in oncology nurses.

Keywords: Psychometrics, Empathy, Factor Analysis, Nurses

1. Background

The ability to have empathy with patients is one of the nurses' main communication skills (1). Empathy enables one to understand others' thoughts and feelings and to convey these, to put oneself in another person's shoes, to create a connection with the social world, to help others, and to avoid harming others (2). As cancer patients are confronted with a deteriorated quality of life, and have to cope with the diagnosis, treatments and their side effects (3, 4) having empathetic skills are crucial for nurses working in oncology wards (5). However, there is still no consensus regarding the conceptualization and measurement of empathy (6).

Empathy is a complex and multi-dimensional concept (7, 8) and can be measured in different ways. Self-rating (the assessment of empathy using standardized instru-

ments completed by the individuals assessed), patient-rating (the use of instruments given to patients to assess the empathy they experience among their caregivers) and observer rating (the use of standardized instruments by an observer to rate empathy in communications between healthcare team members and patients) are among these methods (9). A systematic review on measurement of empathy showed that 20 different instruments were used in different studies and they reported a low to well-developed empathy among nurses (8). However it seems that there is still a need to have rigorous tools to demonstrate empathic skills of nurses (8).

In the healthcare field, evidence shows that the Jefferson scale of empathy (JSE) is a valid instrument for measuring empathy (10, 11). The scale has been translated into 53 languages and has been applied in more than 83 coun-

tries (12). Different versions of this scale were developed including the medical students (S-version) (13), the physicians/health professions (HP-version), the health professions students (HPS-version) (14), and the nursing student version R (NS-version R) (15). Several studies have been conducted in Iran on different versions of the scale (16-18). The validity and reliability of the Persian translations of the HP version (16), the HPS version (17), and the S-version (18) have been supported in the Iranian population. But, the JSE-NS version R has not been used in Iran. The JSE-NS version R is a modified version of the physician scale, which measures empathy in nursing students. This is identical to the physician and medical student versions in all aspects, except for the term "Physician" being replaced by "Nurse" in the NS version R (15). Face validity of the NS version R was examined and improved by receiving feedbacks from 40 nursing schools. Construct validity of the scale showed a three-factor underlying construct: perspective taking, compassionate care, and standing in patient's shoes (15). This is consistent with the conceptual framework of empathy in most of the previous studies that used other versions of the JSE (19-21). But some of the studies showed the existence of four constructs (22-24), or even two constructs (25) in the JSE.

Given the critical role of empathetic skills in nurse-patient communication in oncology wards, and the importance of a rigorous measurement, an extensive search was undertaken among the papers published in the international databases during the last five years (i.e. in PubMed, Web of Science, PsycINFO, Google Scholar, and CINAHL); and no specific instrument was found for measurement of empathy in oncology nurses.

2. Objectives

The current study aimed to assess the psychometric properties of the Persian translation of the Jefferson scale of empathy to create an Iranian version of the Jefferson scale of empathy-nursing student version R (JSE-NS version R), and to determine its validity and reliability in oncology nurses of Tehran Universities of Medical Sciences.

3. Methods

This is a methodological study with cross-sectional design, which was carried out in different phases, in 2015. The preliminary phase was to modify a Persian translation of the Jefferson Scale of Empathy to create an Iranian version of the JSE-NS version R. The main phases were related to the psychometric analysis. Phase one was to define face and content validity of the scale. In phase two construct and

convergent validity were tested, and in the third phase reliability of the scale was determined.

3.1. Instruments

3.1.1. Jefferson Scale of Empathy-Nursing Student Version R (JSE-NS version R)

This is a modified version of the physician scale with 20 items, which measures empathy in nursing students (15). The responders need to state the level of their agreement or disagreement with each of the items on a 7-point Likert-type scale (from strongly disagree to strongly agree). The scale is comprised of 10 positive and 10 negative items with a total score ranging from 20 to 140; the higher the score, the stronger the empathy is (19). The validity of the JSE-NS version R was supported in a sample of nursing students at different levels of training and demonstrated three constructs: "perspective taking", "compassionate care", and "standing in patient's shoes" (15). The internal consistency of the scale was reported by Cronbach's alpha coefficient ($\alpha = 0.77$) in the same sample (15).

3.1.2. Interpersonal Reactivity Index (IRI)

The IRI is a measurement tool for the multi-dimensional assessment of empathy. It is composed of 28 items in four subscales, including "perspective taking", "fantasy", "empathic concern", and "personal distress" (26). The "perspective taking" measures the tendency to take the psychological point of view of others. The "fantasy" measures the tendency to engage in fictional stories and imagine oneself in the situations of a fictional character. The "empathic concern" measures warmth, compassion and concern for others. The "personal distress" measures the type of feelings (anxiety, etc.) that makes one hesitate to help others (26). All the items are scored on a five-point Likert-type scale (from "does not describe me well" to "describes me very well") and the total score of each subscale varies between 0 and 28. The scores of the four subscales cannot be added due to lack of a direct positive relationship between them (26). The validity and reliability of the IRI have been supported by different studies in Iran and other countries (27-29).

3.1.3. Demographic Attributes Questionnaire

A questionnaire with six questions was used to collect the nurses' demographic information including age, sex, marital status, education level and work experience in nursing and in the oncology ward.

3.2. Preliminary Phase: Translation and Modification Process of the Scale

During the preliminary phase, permission was obtained from the developer of the scale, and the English ver-

sion of the JSE-NS version R was collected. Due to similarities between this version and the HP version of the scale, the English translation of the JSE-NS version R was compared with the Persian translation of the HP version. The HP version for Physicians was translated into the Persian language in 2010 at Iran University of Medical Sciences and confirmed by the developer (Dr. Hojat) (30). Based on differences in 8 items, two translators, proficient in both English and Nursing, translated items No. 3, 4, 5, 6, 10, 16, 17, and 18 from English into Persian, and replaced all "Physician" terms by "Nurse" in 14 items. These translations, together with the original scale, were evaluated by the research team, and then two back-translations were performed by two different translators from Persian to English. The results of the back-translations were compared with the original English scale by the research team.

The translation and modification process of the scale was conducted based on the World Health Organization (WHO) guidelines for the translation and adaptation of the instruments (translation from the original language to the target language, expert panel, back-translation, expert panel, pre-test and cognitive interviewing, producing a final version, and documenting the whole process) (31).

3.3. Phase 1: Face and Content Validity

In order to determine face validity, qualitative content validity and scale's content validity index (S-CVI) of the JSE-NS version R, the Persian and original English of the scale were given to an expert panel with 10 faculty members from the school of nursing and midwifery of Shahid Beheshti University of Medical Sciences. They were specialists in the fields of psychiatric nursing (three women and one man), oncology nursing (two women) and psychometrics (two women and two men). They evaluated relevance, clarity, and simplicity of the individual items using the content validity index (CVI) assessment form on a four-point scale. The average of the item-level content validity index (I-CVI) value for all the items was reported as the S-CVI. All recommendations by the expert panel were assessed and the required modifications were made. Afterwards, the Persian translation of the scale was given to a convenience sample of 10 oncology nurses, separate from the main study sample, to determine face validity of the scale. The samples were asked to fill the scale, and also to release their comments on clarity and understandability of the items. Subsequently, all comments were assessed.

3.4. Phase 2: Construct and Convergent Validity

Construct validity of the scale was examined using factor analysis in three steps: an initial confirmatory factor analysis (CFA), then an exploratory factor analysis (EFA),

and a final CFA. At first, an initial CFA was performed on the data to confirm a predetermined hypothesis regarding the three underlying constructs of empathy (perspective taking, compassionate care, and standing in patient's shoes) (15), but the hypothesis was not confirmed. In the second step, an EFA was conducted on the data to find the hidden constructs. At last, a final CFA was run to confirm the extracted constructs by the EFA.

For evaluation of convergent validity of the scale, correlation between the total score of the Persian translation of the JSE-NS version R and the subscales of the IRI were examined by the Pearson's correlation coefficient.

3.4.1. Sampling and Data Collection

At first, the names of hospitals affiliated with three Universities of Medical Sciences in Tehran with oncology, hematology, and stem cell transplantation wards were listed. Afterwards, all hospitals affiliated with Shahid Beheshti University of Medical Sciences (n = 4), one hospital affiliated with Tehran University of Medical Sciences, and two hospitals affiliated with Iran University of Medical Sciences were selected. Subsequently, the first author visited the oncology, hematology, and stem cell transplantation wards of the selected hospitals. All oncology nurses, based on inclusion criteria were invited to participate in and sign on for this study.

Construct and convergent validity of the scale were examined with a convenience sample of 181 oncology nurses. For calculation of sample size in factor analysis, some authors suggest 5 or 10 times the number of observed variables (32). According to the number of the items of the scale (n = 20), and considering 9 samples for each item, sample size was determined as 180 participants. Due to attrition risk during the period of the study, 15% more participants were included (n = 205). Subsequently, the Persian translation of the JSE-NS version R was distributed among 205 oncology nurses, but only 181 participants returned it while it was filled out. Inclusion criteria were having minimum a bachelor of science in Nursing and at least six months experience in the cancer ward. A note attached to the questionnaires explained the purposes of the study and asked the participants to fill out all the questions. The questionnaires were collected 3-5 days after distribution. The response rate to the questionnaires was 88.3%. Duration of the data collection was 3 months, and missing data was less than 2%.

3.5. Phase 3: Reliability

Reliability of the scale was evaluated by two methods. The internal consistency of the scale was examined by Cronbach's alpha coefficient, and stability of the scale

was tested using test-retest with the intra-class correlation (ICC) coefficient.

3.5.1. Sampling and Data Collection

Reliability of the scale was obtained by Cronbach's alpha coefficient in a convenience sample of oncology nurses ($n = 30$), separate from the main study sample. Also, Cronbach's alpha coefficient was reported for the entire sample ($n = 181$). Test re-test reliability was evaluated in a convenience sample of oncology nurses ($n = 30$) by two measurements within a three-week interval.

3.6. Data Analysis

Normal distribution of the outcome variables was confirmed using the Kolmogorov-Smirnov (K-S) test. The data was analyzed by SPSS version 13 with descriptive (Mean and SD) and inferential statistics (EFA and Pearson correlation coefficient). In addition, CFA was carried out by LISREL version 8.8.

It is recommended to have I-CVI of 0.78 or higher, and S-CVI of 0.90 or above (33). In CFA, the root mean square error of approximation (RMSEA), X^2/df , comparative goodness of fit index (CFI), and Tucker-Lewis Index (TLI) were used as goodness of fit indices. $RMSEA < 0.10$ (34) and $X^2/df < 5$ (35) indicate acceptable goodness of fit. Satisfactory CFI and TLI was equal or higher than 0.90 (34).

In EFA analysis to evaluate the suitability of the data and the sample size, the Kaiser-Meyer-Olkin (KMO) index (criteria: $KMO > 0.70$) and Bartlett's test (test result < 0.05) were used (34). EFA was carried out, using principle component analysis and varimax rotation. For extraction of components, Eigen value higher than 1 and loading factor higher than 0.30 (34) were acceptable.

In order to evaluate convergent validity of the scale, Cohen et al.'s category was used to interpret the amount of correlation (36) between the total score of the Persian translation of the JSE-NS version R and the subscales of the IRI; giving 0.20 - 0.35 as weak, 0.36 - 0.65 as average, 0.66 - 0.85 as high, and more than 0.85 as a very high correlation. For reliability, acceptable alpha value was judged as 0.70 and above (37) and an ICC higher than 0.80 was assumed as excellent reliability level (34).

3.7. Ethical Considerations

Permission was obtained from the three Universities and seven hospitals. The participants were given an explanation of the purpose of the study after which they expressed their willingness to join in the study verbally and in writing. All participants signed an informed-consent form. Each participant received a code number that was entered into the data list. In addition, they were informed

that they could withdraw during the study whenever they liked. Confidentiality of disclosure and precision of the reported information were considered. The study was approved as research project No. 6641 by the Shahid Beheshti University of Medical Sciences under Ethical Code No. SB-MUZ.REC.1394.55.

4. Results

4.1. Results of the Translation and Modification Process

The best Persian translation (version I) and the best English back-translation of the scale (version II) were selected by the research team. Finally, a primary modified Persian scale was created.

4.2. Face and Content Validity Results

Face and qualitative content validity of the primary modified Persian scale was verified by the statements of the expert panel. Their feedbacks did not lead to any major linguistic changes. The range of the I-CVI for items relevance (92.5% - 100%) and simplicity (92.5% - 100%) and clarity (82.5% - 100%) was high. The average S-CVI for all items of the JSE-NS version R was 0.98. Also, face validity of the scale was supported with cognitive interviewing after applying the scale to a small sample of oncology nurses ($n = 10$) (4 men and 6 women in age range 33 - 55 years). No changes were made, and all nurses stated that the items were clear. Finally, the Iranian version of the JSE-NS version R was created. Differences between this version and the Persian HP version were, for example, in items No. 1, 2, 3, and 11, first-person subject singular pronouns were changed to third-person subject singular pronouns. Another example, in item No. 5 the phrase "I think", written in the Persian HP version, was deleted in the Persian translation of the JSE-NS version R.

4.3. Demographic Attributes and Descriptive Statistics

Demographic attributes of the oncology nurses is shown in Table 1. The majority of the participants were women (88.3%) and married (77.9%), (Table 1). Mean age of the participants was 34.92 ± 6.79 years. Mean and standard deviation of the total score of the JSE-NS version R was 106.02 ± 16.59 .

4.4. Construct and Convergent Validity Results

The initial CFA did not show a three-factor underlying construct and the goodness of fit indices were not acceptable (Table 2). Therefore, the latent factors of empathy were extracted by EFA (Table 3).

Table 1. Demographic Attributes of Oncology Nurses, Tehran, August 2015 (n = 181)

Variables	No. (%)
Sex	
Female	160 (88.4)
Male	21 (11.6)
Marital status	
Married	141 (77.9)
Single ^a	40 (22.1)
Education level	
Bachelor of Science	173 (95.6)
Master of Science	8 (4.4)
Experience in nursing, y	
< 1	8 (4.4)
1 - 4	43 (23.8)
5 ≤	130 (71.8)
Experience in the field of oncology, y	
< 1	40 (22.1)
1 - 4	83 (45.8)
5 ≤	58 (32.1)

^aSingle category includes unmarried, widowed, and divorced.

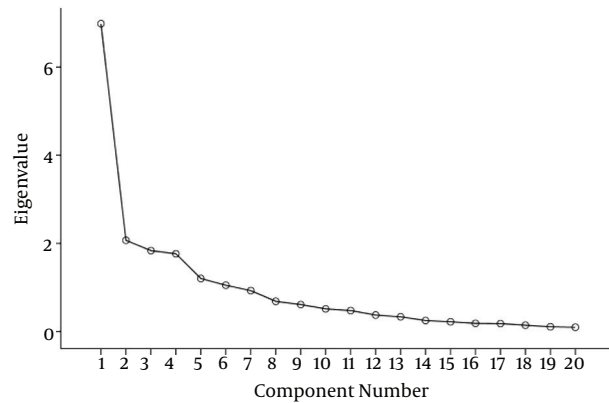
Table 2. Goodness of Fit Indices of Empathy Models by the JSE-NS Version R Through the Initial and Final Confirmatory Factor Analysis in Oncology Nurses, Tehran, August (n = 181)

Fit Indices	Three-Factor Model	Four-Factor Model
CFI	0.83	0.95
TLI	0.80	0.92
RMSEA	0.10	0.07
χ^2/df	5.70	3.09

A KMO index of 0.75 indicated that the study sample was adequate, and Bartlett's test was statistically significant (P value = 0.001). EFA showed that the data fitted a four-factor structure with the highest coefficients for related items on the extracted factors (higher than 0.30) (Table 3). Eigen value higher than 1 on a scree plot showed the extracted factors (Figure 1). The four-factor structure of the JSE- NS version R explained 63% of the data variance.

Next, final CFA confirmed the four-factor structure with satisfactory goodness of fit indices (i.e. RMSEA, χ^2/df , CFI and TLI) (Table 2). Figure 2 showed a four-factor structure comprised of a grand factor with nine items (1, 2, 4, 5, 7, 11, 12, 14, 15), a second factor with three items (3, 8, 19), a third factor with four items (6, 16, 18, 20), and an extra fac-

Scree Plot

**Figure 1.** Scree Plot Resulting From Exploratory Factor Analysis

tor with five items (9,10,13,17,18).

The results of convergent validity showed a significant correlation between the total score of the JSE-NS version R and the subscales of the IRI, except for the “fantasy” subscale ($P < 0.001$). The correlation was stronger for the two subscales of “compassionate care” ($r = 0.78$) and “perspective taking” ($r = 0.63$) (Table 4).

4.5. Reliability Results

The internal consistency of the JSE-NS version R, based on Cronbach's alpha coefficient for a sample of oncology nurses ($n = 30$) (12 men and 18 women, age range 30 - 55 years) was 0.90. In the main sample of the study ($n = 181$), the alpha coefficients for all the items, the 1st, 2nd, 3rd, and 4th factors were 0.86, 0.91, 0.61, 0.81, and 0.75, respectively.

Stability of the scale in a sample of oncology nurses ($n = 30$) using the test-retest method by the ICC coefficient was satisfactory (0.90).

5. Discussion

The aims of this study were to modify a Persian translation of the JSE to create an Iranian version of the JSE-nursing student version R, and to examine the validity and reliability of it in a sample of Iranian oncology nurses. The results supported validity and reliability of the scale in this sample.

Construct validity of the Persian translation of the JSE-NS version R using CFA and EFA in different steps showed a four-factor structure comprised of a grand factor with nine items, a second factor with three items, a third factor with four items, and an extra factor with five items. This means that there are four dimensions measuring different

Table 3. The Results of Exploratory Factor Analysis With Four-Factor Model of Empathy by the JSE-NS Version R in Oncology Nurses, Tehran, August 2015 (n = 181)^a

Items Numbers	Components			
	1	2	3	4
1	0.69			
2	0.86			
3		0.64		
4	0.82			
5	0.79			
6			-0.63	
7	0.67			
8		0.73		
9				0.72
10				0.69
11	0.79			
12	0.60			
13				0.68
14	0.72			
15	0.62			
16			0.57	
17				0.73
18			-0.36	0.32
19		0.71		
20			0.81	

^aThe four-factor model explains 63% of the variance in the data.

Table 4. Correlation Matrix by Pearson Correlation Coefficients Between Total Score of the Jefferson Scale of Empathy-NS Version R (JSE- NS Version R) and the Subscales Scores of the Interpersonal Reactivity Index (IRI) in Oncology Nurses, Tehran, August 2015 (n = 181)

Empathy	JSE-NS Version R	Perspective Taking	Fantasy	Empathic Concern	Personal Distress
JSE-NS Version R	1				
Perspective Taking	0.63 ^a	1			
Fantasy	0.10	0.09	1		
Empathic Concern	0.78 ^a	0.54 ^a	0.25 ^b	1	
Personal Distress	0.44 ^a	0.31 ^b	0.49 ^a	0.52 ^a	1

^aP < 0.001.

^bP < 0.05.

aspects of empathy in oncology nurses. Changes in the number of factors in the structure of empathy are consistent with earlier studies (22, 23). In our study the first factor, as a main factor, was similar to “perspective taking” in the three-factor models of empathy (18, 19). Perspective taking is the key element of cognitive empathy and depends on the perception of feelings, emotions and personal expe-

riences of the patient (19). But, “compassionate care” was the main factor of the empathy scale in a study conducted by Reed McMillan and Shannon (38). Nonetheless, in our study the items of the second and the third factors were not comparable with the three-factor models (19-21, 39-41). Evidences show the changes in empathy following professional clinical development over time (42, 43). It appears,

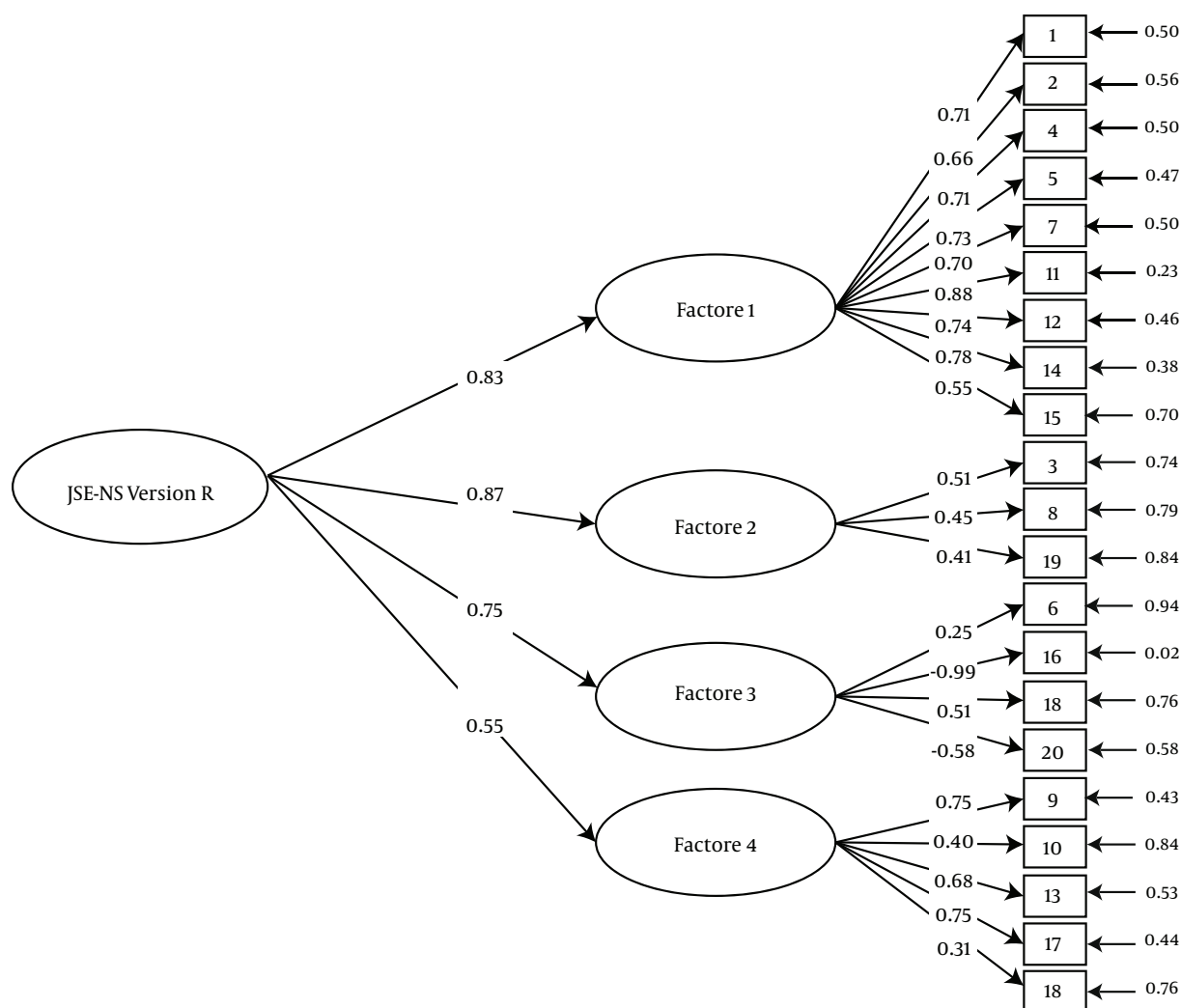


Figure 2. Confirmatory Factor Analysis of the Jefferson Scale of Empathy-Nursing Student Version R

thereby, that clinical experience influences one's clinical empathy (22), as we could also see in our study with experienced oncology nurses.

In order to distinguish the factors of empathy, Stansfield et al. introduced new labels for the four-factor model (i.e. feelings, importance, ease, and metacognitive effort) (22). The fourth factor in our study is corresponding to the "metacognitive effort". This factor "gauges the person's awareness of the need to actively try to think like the patient" (22). The emergence of a metacognitive factor suggests that the individuals may become more sensitive after clinical exposure and this sensitivity may decrease over time (22). Preusche and Wagner-Menghin found a four-factor model of empathy that encompasses "perspective

taking", "compassionate care", "walking in the patient's shoes" and an extra factor, in the German translation of the JSE S-version in Austrian medical students (23). Sherman and Cramer also conducted a study, measuring empathy changes in US dentistry students and found a four-factor model with the main factor being "perspective taking". Factors two and three were perception of experiences and emotions of the patients and factor four represented the attempt not to neglect emotions during patient care. This model explained 57.8% of the data variance (24). The four-factor model of the JSE-NS version R in our study explained 63% of the data variance. The results of CFA on the JSE-NS version R in two studies with American nursing students indicated three factors, which explained 36% (6) and

38.5% (38) of the data variances, respectively. In Tavakol et al.'s study the three-factor model explained 41.5% of the data variance (44). A three-factor structure has also been extracted from different versions of the JSE in Iran (17, 18). However, some of the studies show that there are even two-factor models of the JSE-HPS (perspective taking, empathic care) (25, 45).

The results of convergent validity in this study indicated that there is a correlation between the total score of the JSE-NS version R and all subscales of the IRI (except the fantasy subscale). This correlation was stronger in "compassionate care" (emotional dimension of empathy) and "perspective taking" (cognitive dimension of empathy). Our results are almost consistent with Hojat et al. (2005) using the same scales (46). It seems that the JSE-NS version R and the IRI, both measure empathy in a relative similar way.

Reliability results of the JSE-NS version R confirmed the internal consistency of the scale. Cronbach's alpha coefficient was 0.86 in the main sample. Ward et al. using the same scale on American nursing students at different levels, obtained a Cronbach's alpha coefficient of 0.77 (15). Cronbach's alpha coefficient of similar versions of the JSE was reported between 0.63 and 0.80 in Nursing and Medical students in Iran and other countries (17, 19, 21, 38, 47). Stability of the scale based on the ICC coefficient in a sample of oncology nurses was 0.90, similar to a study on the JSE S-version in Iran ($r = 0.95$) (18).

The strength of this study was the use of various measurement indicators for determining the psychometric properties of the scale. As to limitations, it is notable that the sample of oncology nurses was not selected randomly due to a limited study population. Thus, the findings need to be generalized with some caution. Further studies are needed, using this scale on other nurses and Nursing students. In summary, given the validity and reliability findings, the JSE-NS version R is recommended for measuring empathy in oncology nurses.

In conclusion, validity and reliability of the Jefferson scale of empathy-nursing student version R were supported by different methods for a sample of oncology nurses. The scale can be recommended for measuring empathy among oncology nurses. Structural aspects of empathy were demonstrated in a four-factor model (with a grand factor similar to "perspective taking" in the three-factor models of empathy) to measure empathy in a clinical setting. It is recommended that the suitability of the scale for measuring empathy in nurses of other wards should be examined in future researches.

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Footnotes

Authors' Contribution: Maryam Sedaghati Kesbakhi and Camelia Rohani did the planning and design of the study, data were collected and computerized by Maryam Sedaghati Kesbakhi. Maryam Sedaghati Kesbakhi and Malihe Nasiri analyzed the data together. Maryam Sedaghati Kesbakhi and Camelia Rohani interpreted the data. All of the authors contributed in drafting of the manuscript and critical revisions. Camelia Rohani did the translation and study supervision.

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