

# Psychometric properties of Persian version of the Caring Dimension Inventory (PCDI-25)

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## ABSTRACT

**Background:** The purpose of this study was to examine the psychometric properties (validity and reliability) of Persian version of the 25-item Caring Dimension Inventory (CDI-25).

**Materials and Methods:** A psychometric instrument validation study was designed. Content validity, internal consistency, and stability were confirmed. A total of 288 participants (143 nurses and 145 nursing students) were selected based on quota sampling approach.

**Results:** The PCDI-23 showed good test-retest (Spearman correlation coefficient of 0.89 for nursing students and 0.91 for nurses), internal consistency reliability (0.86), and acceptable face and construct validity. However, considering the results of analyses, excluding items 4 and 16 from the Persian version of the CDI is suggested.

**Conclusion:** This instrument can be used to determine caring behaviors and nurses' perceptions of the importance of caring behaviors among Persian language nurses.

**Key words:** CDI-25, Iran, nursing care, Persian version, validation studies

## INTRODUCTION

Caring as the essential element of nursing is widely accepted among nurses, although it is a difficult entity to explain or define.<sup>[1]</sup> It is considered by many as the primary task of nursing. Leininger has defined caring as assistive, supportive, or facilitative acts toward another individual or group with evident or anticipated needs to ameliorate or improve a human condition or life way.<sup>[2]</sup> Jenson defined care as being a state or mode of being that resists command and instruction.<sup>[3]</sup> Bassett defined caring as a prime example of emotion, thought, and action coming together to provide comfort, both physical and emotional, for another individual. She believes the way that nurses interpret and perceive their roles as caregivers is essential to clarify the care debate.<sup>[4]</sup> According to Patistea, a deep understanding of caring and the way it is expressed will help nurses to provide high-quality services and, more importantly, to understand nursing itself.<sup>[5]</sup>

Translating questionnaires into other languages is a common procedure today.<sup>[6]</sup> The rationale being that it is better to use existing instruments that successfully measure variables than develop new tools with all the time-consuming procedures that this involves. In fact, a carefully translated instrument makes it possible to compare different populations across cultural settings.<sup>[7]</sup> Although caring is somewhat a neglected concept in Iran, newly there is a growing interest on investigating caring among Iranian nurse researchers.<sup>[8-11]</sup> The 25-item Caring Dimension Inventory (CDI-25) is a tool that might help Iranian nurse researchers in understanding nurses' caring behaviors and plan to improve positive caring behaviors among them. Thus, the purpose of this study was to examine the psychometric properties (validity and reliability) of Persian version of CDI-25 among Iranian nurses.

## MATERIALS AND METHODS

This part includes sections on design, description of the instrument, translation procedure, the participants, and the statistical analysis.

### Design

This study is a cross-sectional survey to examine the psychometric properties of the Persian version of CDI-25. Psychometric properties are defined as the elements that contribute to the statistical adequacy of the instrument in terms of reliability and validity. When both validity and

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reliability analyses produce reasonably good results, then the translated questionnaire can be concluded and declared to have acceptable psychometric properties. In the present study, content validity, internal consistency, and stability of the Persian version of CDI-25 were investigated in order to confirm its reliability and validity.

### The instrument

Effectively measuring the process of nurse caring is vital in nursing research. Watson and Lea argued that although caring is an elusive phenomenon, this should not prevent the development and validation of reliable quantitative tools for studying this concept in large samples of nurses.<sup>[8]</sup> There are a few scales to measure caring; among these, the Care Questionnaire (Q-Care) and the CDI-25 are the most applied. The CDI consists of 25 core questions [Table 1] designed to gather perceptions of caring by asking subjects to indicate their agreement to statements about their nursing practice as constituting caring.<sup>[12]</sup> There is a stem question (“do you consider the following aspects of your nursing practice to be caring”), and for each of the

items in the questionnaire (e.g. “listening to a patient” or “measuring the vital signs of a patient”), the respondent is required to indicate on a 5-point Likert scale ranging from “strongly agree” to “strongly disagree” whether or not they perceive caring in this manner. Studies have shown that the CDI-25 is an instrument with acceptable psychometric properties.<sup>[12-16]</sup>

The reliability or internal consistency of the 25 core items in the CDI was measured by computing Cronbach’s alpha. The value that the CDI-25 obtained in the study of Watson and Lea was 0.91, indicating that it had a high degree of internal consistency.<sup>[12]</sup> Although Watson and Lea pointed out to the items that may reflect psychosocial or technical aspects of caring, they did not describe clearly which items measure psychosocial or technical aspects of the care in their first work. Watson and Lea in their later work categorized the CDI-25 into five dimensions: Psychosocial (10 items), technical (11 items), professional (1 item), inappropriate (1 item), and unnecessary (2 items) activities.<sup>[13]</sup>

Psychosocial dimension (items 4, 7, 10, 11, 13, 17, 19, 21, 23, and 24 of Table 1) includes items like “getting to know the patient as a person,” “sitting with a patient,” “being with a patient during a clinical procedure,” and “being honest with a patient.” Technical dimension (items 1, 2, 5, 8, 9, 12, 14, 15, 18, 20, and 25 of Table 1) include items like “assisting a patient with an activity of daily living (washing, dressing, etc.),” “making a nursing record about a patient,” “being technically competent with a clinical procedure,” and “observing the effects of a medication on a patient.” Item 6 (being neatly dressed when working with a patient) in the CDI-25 was defined as “professional” caring behavior. Item 16 (sharing your personal problems with a patient) was classified as “inappropriate” caring behavior, and items 3 (feeling sorry for a patient) and 22 (giving reassurance about a clinical procedure) were classified as “unnecessary” caring behaviors. Although these three items might help to distinguish careless responses from detailed responses, this might also confuse respondents. The other concern regarding these items is about their dimensionality. Since Cronbach’s alpha of any scale depends on the number of items, this will lead to decrease alpha value of these dimensions.<sup>[17]</sup> However, presence of single item dimensions seems inevitable in the short form of the questionnaires.

### Translation procedure

We translated the 25-item CDI into Persian, in accordance with the guidelines for the translation and adaptation of psychometric scales: (1) Forward translation: Two of the authors carried out independent translations of the CDI from English into Persian. (2) Reconciliation: Five

**Table 1: The Caring Dimension Inventory (CDI-25)**

CDI-1	Assisting a patient with an activity of daily living (washing, dressing, etc.)
CDI-2	Making a nursing record about a patient
CDI-3	Feeling sorry for a patient
CDI-4	Getting to know the patient as a person
CDI-5	Explaining a clinical procedure to a patient
CDI-6	Being neatly dressed when working with a patient
CDI-7	Sitting with a patient
CDI-8	Exploring a patient's lifestyle
CDI-9	Reporting a patient's condition to a senior nurse
CDI-10	Being with a patient during a clinical procedure
CDI-11	Being honest with a patient
CDI-12	Organize the work of others for a patient
CDI-13	Listening to a patient
CDI-14	Consulting with the doctor about a patient
CDI-15	Instructing a patient about an aspect of self-care (washing, dressing, etc.)
CDI-16	Sharing your personal problems with a patient
CDI-17	Keeping relatives informed about a patient
CDI-18	Measuring the vital signs of a patient (e.g. pulse and blood pressure)
CDI-19	Putting the needs of a patient before your own
CDI-20	Being technically competent with a clinical procedure
CDI-21	Involving a patient with his or her care
CDI-22	Giving reassurance about a clinical procedure
CDI-23	Providing privacy for a patient
CDI-24	Being cheerful with a patient
CDI-25	Observing the effects of a medication on a patient

faculty members including the authors met and reached a consensus on a draft Persian translation of the CDI that best reflected the literal and conceptual content of the original English CDI. (3) Cognitive debriefing and review of cognitive debriefing results: Five nurses and five nursing students tested the CDI, and the authors reworded phrases to make them more understandable. (4) Back-translation: Two assistant professors of English Language, who did not know about the original English version of the CDI, carried out a back-translation of the Persian version into English. (5) Back-translation review and finalization: The authors reviewed the back-translations against the source instrument and ensured the literal and conceptual equivalence of the translation.<sup>[18]</sup>

### Participants

There were a total of 288 (143 nurses and 145 nursing students) participants in the study. The process of translation and data gathering lasted 6 months from August 2010 to March 2011. The nurse participants were selected based on quota sampling approach from four educational hospitals affiliated to Urmia Medical Sciences University, located in West Azerbaijan Province of Iran. These four governmental hospitals serve more than 1.5 million people of Urmia and the neighboring cities. Most of the city's patients (about 80%) are admitted in these hospitals and more than 60% of the city's nurses (about 1200 people) are working at these centers. The nursing student participants were selected based on quota sampling approach from two nursing colleges located in Urmia, Iran. In the nursing group, the criteria for selection included: (1) having BS degree certificate in nursing, (2) having more than 6 months of job experience, and (3) being occupied in a general ward of the hospitals. In the nursing students' group, subjects were selected from among the second to fourth year students.

The participants who satisfied the sample criteria were contacted, and the nature and purpose of the study explained. Those who were willing to participate signed the consent forms. They were then given the questionnaires and asked to complete. The completed questionnaires were collected later at the same shift. In seven cases that had difficulty in completing the questionnaire, an interviewer filled in the questionnaire based on a face-to-face interview.

The suitability of the data for factor analysis was first examined using the Kaiser–Mayer–Olkin (KMO) measure of sampling adequacy and Bartlett's chi-square test of sphericity. The value of KMO and the probability Bartlett's test were estimated at 0.88 and 0.0001, respectively, showing that the number of samples was adequate to perform factor analysis. According to Brace, Kemp, and

Snelgar, a KMO value of greater than 0.6 is acceptable.<sup>[19]</sup>

Use of human subjects was reviewed and approved by the research and ethics committee of the Nursing and Midwifery School of medical branches of IA University of Tehran. Also, permission to conduct this study was taken from the managers of four hospitals and their nursing administrator. Further permission and written consent were obtained from all who participated in the study. All questionnaires were anonymous and confidentiality was assured.

### Statistical analysis

The Predictive Analysis Software 18.0 (PASW 18.0) was utilized to compute descriptive statistics, reliability coefficients, and factor analysis. To obtain reliability indicators, two reliability tests were employed. The first, test–retest reliability, measured temporal stability through calculating the correlation between the pre- and post-test scores. The second test measured internal consistency with Cronbach's alpha to ensure that all the items are measuring the same concept.

To extract a factor structure of the scale items to address factor-based validity, an exploratory factor analysis (EFA) using the principal component method and Varimax rotation for the total respondents was applied with the number of factors determined based on the criteria of eigenvalues greater than 1.00. The exact *P* value is reported for all tests of significance; *P* values less than 0.05 were considered statistically significant.

## RESULTS

### Sample characteristics

The participants consisted of 143 qualified nurses and 145 nursing students. Sample distribution by age, sex, and job experience is presented in Table 2. In the nursing group, there were no statistically significant differences regarding age, sex, and job experience in response to technical or psychosocial items of care, but in the nursing students' group, male students gave less scores in technical items of care ( $df = 1, \chi^2 = 0.04$ ) and older students gave less scores in psychosocial items of care ( $df = 2, \chi^2 = 0.04$ ), which was statistically significant.

There were no significant differences between the average scores of nurses and nursing students in the psychosocial and technical dimensions of caring. But there were statistically significant differences between the average scores of two groups in five items of technical dimension (mean scores of nursing students to items 5, 15, and 18 were more than of nurses, and mean scores of nurses to items 1 and 8 were more than of nursing students).

**Table 2: Demographic characteristics of the samples**

Group	Variable		n%		$\chi^2$ (P)			
					Tech.	Psyc.		
Nurses	Sex	Female	112	77.8	0.45	0.21		
		Male	32	22.2				
	Age	Less than 25 years	33	23.6			0.22	0.19
		26-30 years	45	32.1				
		31-40 years	41	29.3				
		>41 years	21	15.0				
	Job experience	Less than a year	25	18			0.28	0.36
		1-3 years	26	18.7				
		3-6 years	29	20.9				
		6-10 years	16	11.5				
>10 years		43	30.9					
Nursing students	Sex	Female	123	84.8	0.043	0.27		
		Male	22	15.2				
	Age	Less than 22 years	100	69.4			0.98	0.038
		23-27 years	42	29.2				
		>27 years	2	1.4				

Tech., technical items; Psyc., psychosocial items

### Validity analysis

In the present study, five faculty members reviewed the translated questionnaire. The content validity index for each of the 25 items (CVIs) for the total group of experts was calculated and used to make decisions about accuracy of the translation. We used a 4-point CVI to assess clarity, simplicity, and ambiguity of the items. According to Polit *et al.*, items with a CVI of 0.78 or higher were considered good, otherwise the translation was revised to meet the criteria.

Construct validity looks into the agreement between a theoretical concept and a specific measuring procedure. Examining construct validity allows researchers to determine if the scores obtained from an instrument actually represent the phenomenon being measured.<sup>[21]</sup> Among the different methods of obtaining construct validity is the application of factor analysis. The main applications of factor analysis techniques are: (1) to reduce the number of variables and (2) to detect structure in the relationships between variables, that is, to classify variables. Therefore, factor analysis is applied as a data reduction or structure detection method.

To test the construct validity of the Persian version of the CDI (PCDI), a principal components factor analysis using eigenvalue procedure was performed on the item responses from the entire sample of 288 participants. The KMO was 0.88, indicating meritorious sampling adequacy, and Bartlett's test of sphericity was significant ( $c^2 = 2360.36$ ,

$df = 300, P < 0.0001$ ), suggesting correlations between responses of the participants.

EFA was conducted and yielded six factors based on the criteria of eigenvalues greater than 1.0. The six factors determined by eigenvalues greater than 1.0 explain 60.51 of the total variance. By excluding three items (4, 16, and 25) with corrected item-total correlation less than 0.2, all 22 items were loaded on five factors; yet, there were differences in distribution of the items among factors when compared with the findings of the study by Lea *et al.*<sup>[16]</sup> As discussed later in "Discussion" section, we do not recommend excluding all of these three items from the PCDI.

After excluding two problematic items (4 and 16), the software was forced to load items on four factors in order to factor reduction and improve their internal reliability. These four factors determined by eigenvalues greater than 1.0 explain 55.07 of the total variance. Factor I (eight items) explains 17.73% of the total variance with Cronbach's alpha of 0.76. Factor II (eight items) explains 17.36% of the total variance with Cronbach's alpha of 0.85. Factor III (four items) explains 11.59% of the total variance with Cronbach's alpha of 0.69. Factor IV (three items) explains 8.39% of the total variance with Cronbach's alpha of 0.62. Small values of alpha of factors III and 4 IV might be attributed to the limited number of items in these factors. Results of the Rotated Component Matrix (RCM) using Varimax method are presented in Table 3. Although the factor distribution did not clearly reflect the five CDI subscales extracted by Lea *et al.*, 14 items of psychosocial and technical dimensions showed the highest loading on factors I and II.<sup>[13]</sup>

### Reliability analysis

The PCDI was re-administered 10 days after the first visit to 20 nursing students and 18 nurses to evaluate the instrument's test-retest reliability. These participants were excluded from the study sample. Test-retest correlation coefficients were high (Spearman correlation coefficients were 0.89 for nursing students and 0.91 for nurses). Also, internal consistency, an additional measure of reliability, was calculated for the entire sample of 288 participants. The alpha coefficient for overall CDI-25 was 0.91. By excluding two items including items 4 (getting to know the patient as a person) and 16 (sharing your personal problems with a patient), the alpha coefficient for remaining 23 items was 0.86. This is very close to the coefficient of 0.91 reported for the original CDI-25.<sup>[12]</sup>

### DISCUSSION

The main objective of this study was to determine the psychometric properties (validity and reliability) of the

**Table 3: Factor loadings from exploratory analysis by item of the Persian version of CDI (PCDI-23)**

CDI items	Factors			
	I	II	III	IV
CDI-17	0.546			
CDI-18	0.681			
CDI-19	0.579			
CDI-21	0.634			
CDI-22	0.714			
CDI-23	0.765			
CDI-24	0.703			
CDI-25	0.373			
CDI-5		0.625		
CDI-6		0.624		
CDI-10		0.454		
CDI-11		0.607		
CDI-12		0.588		
CDI-13		0.679		
CDI-14		0.731		
CDI-15		0.684		
CDI-1			0.559	
CDI-3			0.435	
CDI-7			0.660	
CDI-8			0.765	
CDI-2				0.829
CDI-9				0.426
CDI-20				0.445

Persian version of CDI-25. It revealed similar reliability properties to the original; however, there were some differences in constructs and dimensions from the original.

The overall alpha value of 0.86 obtained for PCDI is very close to the reliability coefficient found for the original English version of the CDI-25 (Lea *et al.*, 1998) and the CDI-35 version.<sup>[14]</sup> Although by excluding three problematic items (4, 16, and 25) the alpha coefficient increases to 0.91, we do not recommend omission of all these three items. Deletion of the items 16 (sharing your personal problems with a patient) and 4 (getting to know the patient as a person) might not damage the structure of the questionnaire; however, item 25 (observing the effects of a medication on a patient) is different. It is a very clear and globally accepted nursing care behavior. It seems that Iranian nurses have difficulty in accepting these three items as caring behavior. The rationale for this is unclear. Possibly, differences in the knowledge level of the participants might be the reason for this variation. In addition, it might be a reflection of problems in nursing education in such a way that some nurses do not believe that the observing and

recording of drug complications is among the nursing care behaviors. Udomluck *et al.* suggested that some of CDI items may not be appropriate for some cultures.<sup>[22]</sup> In fact, both groups, nurses and nursing students, gave relatively high scores to the item 25 (4.33 and 4.15, respectively); however, this item had large variance (3.33) and small inter-item correlation matrix (less than 0.17). By removing this item, the reliability showed an increase from 0.86 to 0.90, but our concern was that excluding this item might compromise the integrity of the data. Therefore, we suggest deletion of the items 4 and 16 and preserving item 25 in the PCDI.

Another measure of reliability, test-retest correlation coefficients, of the PCDI, also, was high (0.89 for nursing students and 0.91 for nurses). Overall, these findings suggest that the PCDI has good reliability properties.

The results of EFA provided support for four underlying factors that was similar to those reported for the original CDI-25.<sup>[12]</sup> In that study, the researchers found two models using factor analysis. Model 1 postulated that there were four latent dimensions in the CDI data. They named these dimensions as psychosocial, professional, technical, and altruism or personal disposition of caring in nursing. In another study, they called the last dimension as unnecessary behavior.<sup>[15]</sup> The second model was very similar to Model 1 in that there were four factors with almost identical correlations with items as in Model 1. However, a fifth factor was introduced in Model 2 onto which all of the CDI items, except those correlating uniquely with factor 4, correlated. They named this factor “general caring in nursing” factor. Finally, they concluded that the Model 2 best fit with the scale.

In the present study, after dropping problematic items (4 and 16), five factors were loaded. Only two items were loaded on factor V with Cronbach’s alpha of 0.31; therefore, we decided to force factor loading to a smaller number of factors. Our final model suggested that there were four latent dimensions in the CDI data [Table 3]. Eight items loaded on factor I, five of these items (17, 19, 21, 23, and 24) classified as “psychosocial” aspects of caring, two items (18 and 25) as “technical,” and one (item 22) as “unnecessary” caring behavior. Eight items loaded on factor II, of which four (5, 12, 14, and 15) were classified as “technical,” three (10, 11, and 13) as “psychosocial,” and one (6) as professional dimension of caring by the inventors. Four items (1, 3, 7, and 8) loaded on factor III, of which two (1 and 8) were classified as “technical,” one (7) as “psychosocial,” and one (3) as “unnecessary” caring behavior. Three items (2, 9, and 20) loaded on factor IV and all of them were classified as “technical” aspect of

caring by the inventors. These variations in loading of CDI items on different factors can also be seen in other studies, for example, Model 2 of the study mentioned earlier and the study by Watson *et al.*<sup>[15]</sup> Because of these variations, we were unable to classify the items as the inventors did. However, most of the correlations between variables were moderate with no very high correlations, but most were highly statistically significant. This finding, which is in congruence with the findings of the inventors, shows that all items seem to measure one unique variable.<sup>[13]</sup> Three notable exceptions were CDI items 4, 16, and 25, which correlate poorly with most of the others. Lea *et al.* reported that item 16 had poor correlation with the rest, whereas items 4 and 25 gained significant correlations with the others in their study.<sup>[13]</sup>

In the present study, some variables had considerable correlation with two factors. For instance, item 20 had reasonably high correlations with factors I and IV, or item 17 with factors I and III, suggesting that individual differences in these items arise from more than one latent source of variance. This finding is in accordance with the findings of Lea *et al.*<sup>[13]</sup>

There were differences in the scores of nursing students in psychosocial and technical aspects of caring regarding age and gender. The results suggest that older nursing students gave less scores to the psychosocial items of caring and male students gave less scores to the technical items of caring, which is generally in accordance with the findings of the study by Watson and Lea.<sup>[12]</sup>

### Limitations of the study

Some possible limitations should be considered. First, the generalization of the findings should be done with caution because participants were selected using a different sampling approach and only from specific areas and hospitals. Second, due to the limited number of similar studies and the lack of translation of CDI-25 into other languages, comparing the results with the findings of other studies was not possible. Hence, the results were compared and interpreted only with the findings of the inventors of the instrument. Third, we utilized face-to-face interview to fill out the questionnaires in only seven cases; this may negatively affect the results.

### Application

Nursing researchers and managers need brief instruments to assess caring behaviors of the staff and the nursing students to better understand their caring behaviors and to plan improvements. For example, this study revealed that a significant number of the participants did not consider item 25 (“observing the effects of a medication on a patient”)

as caring. The PCDI is a very useful and confident means to understand such behaviors, which can be applied easily among Persian language nurses in Iran, Tajikistan, and Afghanistan. Hence, as some studies argued that nurses might perceive psychosocial or technical aspects of caring as more important, this instrument can also be used to determine nurses’ perceptions of the importance of caring behaviors.<sup>[4,23-25]</sup>

### CONCLUSION

The PCDI showed good test–retest and internal consistency reliability and acceptable face and construct validity. However, considering the results, we suggest excluding at least one item, item 4 (getting to know the patient as a person), from PCDI. Item 16 (sharing your personal problems with a patient) is a lie item and there is no need to omit it, and item 25 (observing the effects of a medication on a patient) is a true nurse caring behavior, although distribution of the responses to this item had considerable skewness. Besides these acceptable psychometric properties, the PCDI also proved to be a practical measure. The PCDI is easy to use, and consequently, it can easily be integrated into practice. Measuring the nurse caring behaviors by the PCDI is simple and does not take too much of the care providers’ time.

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