

# DEVELOPMENT AND PSYCHOMETRIC TESTING OF THE SELF-CARE AGENCY SCALE FOR PATIENTS UNDERGOING LONG-TERM DIALYSIS IN TURKEY

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## SUMMARY

**Background:** No instruments specifically evaluating the self-care agency of patients on dialysis have been developed before. This methodological study aimed to develop a Self-Care Agency Scale for patients on long-term dialysis and to test the scale's psychometric properties.

**Design and Measurement:** This cross-sectional methodological design study comprised 175 haemodialysis and 125 peritoneal dialysis patients receiving treatment at five different medical centres in Istanbul. The Self-Care Agency Scale items were generated after reviewing the literature and considering Orem's self-care model. Content validity was tested on the basis of the views of experts, and a pilot study was conducted. The construct validity and reliability of the Self-Care Agency Scale were tested.

**Results:** The final version of the scale was administered to 300 patients. Intraclass correlation coefficients showed stability of subscales. An exploratory factor analysis was performed. Cronbach's alpha coefficients were acceptable across all groups, as were item-total correlations.

**Conclusion:** The Self-Care Agency Scale is a valid and reliable instrument for patients on long-term dialysis.

**KEY WORDS** Long-term dialysis • Reliability and validity • Self-care agency

## INTRODUCTION

Chronic kidney disease (CKD), which results in the progressive loss of kidney function, requires treatment with either dialysis or transplantation. Although transplantation continues to be the most successful of renal replacement therapies, due to the

difficulty of finding donors, it is a less prevalent method of treatment around the world (Erek *et al.* 2002). Patients with CKD are more often treated with dialysis, and in Turkey, haemodialysis (HD) is especially widespread (Serdengeçti *et al.* 2010).

Self-care refers to the individual's efforts to do what is necessary to maintain health and well-being (Marriner 1986; Hartweg 1990). According to the theory on self-care developed by Orem, which has been published in different editions since 1971, the concept encompasses the human capabilities that allow an individual to adopt behaviour designed to maintain and improve health and well-being, become interested in matters relevant to self-care, achieve understanding and perception, observe pertinent activities and use the knowledge thereby learned, make decisions and succeed in attaining self-maintenance goals (Orem 1995).

As implied in this definition, an individual's self-care agency has an impact on the factors that lead to the success of self-care efforts. Self-care agency can be defined as an individual's ability to continually evaluate health-related needs and perform self-care activities aimed at promoting and maintaining health and well-being (Orem 1995). When self-care agency is good, an individual is able to meet his/her needs, take responsibility for his/her own health and avoid dependence upon others. If an individual lacks these capacities, he becomes incapable of taking

## BIO DATA

**Dr. Besey Ören** is a nursing academic. She has an interest in peritoneal and haemodialysis, and critical care nursing and she has published papers on those topics. She has a background in medical nursing. She translated to Turkish from English four chapters of EDTNA/ERCA's books. She has presented her work at national and international conferences. She is a member of the Turkey Nephrology Nursing Association.



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good care of himself. Nurses support patients to help them overcome their lack of self-care.

As in many chronic diseases where health is compromised, self-care needs often exceed self-care agency, and this holds true for individuals with CKD who may be on dialysis (Ricka *et al.* 2002). In some countries, only 25% of HD patients are successful in caring for themselves (Tsay & Healstead 2002). Several studies have showed that self-care agency is an important construct in the development and maintenance of both health-promoting and particular illness self-management abilities (Sousa *et al.* 2010; Godfrey *et al.* 2011; Lin *et al.* 2012). Some studies have indicated that patients with higher self-efficacy have better self-management. (Ünsar *et al.* 2007; Curtin *et al.* 2008).

The aim of study was to develop a Self-Care Agency Scale (SCAS) and test its psychometric properties.

## METHODS

### DESIGN, SETTING AND PARTICIPANTS

The SCAS was designed to measure the self-care agency of patients on long-term dialysis. The development of the scale was conducted in three phases: (1) Item development, (2) Content validity and a *small-sample pilot test* and (3) *Construct validity and reliability analysis* (Burns & Grove 2005).

The study population comprised patients on long-term HD and peritoneal dialysis (PD), being treated at five medical centres in Istanbul. The inclusion criteria were: over the age of 18 years; having dialysis treatment for at least six months; being literate; having no mental ill-health; and being capable of answering all of the questions. The sample consisted of 175 patients on HD and 125 patients on PD. At the time of the study, 595 patients on HD and 220 patients on PD were being treated at the five medical centres. The sample that answered the 22-item scale in the study is 13.5 times the item number and is sufficient ( $n=300$ ). Furthermore, criteria suggested regarding factor analysis by Kline (1994) and Tabachnick and Fidell (2001) were taken into consideration in the specification of the number of samples. The authors proposed that the number of study subjects should not fall under 100 for factor analysis (Kline 1994; Tabachnick & Fidell 2001).

### ETHICAL CONSIDERATIONS

The informed consent of all the patients taking part in the study and the approval of the ethics board of Istanbul University was

obtained. The research was conducted in line with the rules of the Helsinki declaration.

Data were collected using face-to-face interviews and a 22-item questionnaire was developed by the researchers: the 22-item SCAS. Demographic data were acquired from the entries of the last month found in the files of laboratory values.

All items were coded and scored, and the completed questionnaires were included in the data set. Individual unanswered items were excluded from the analysis. Data were analysed using SPSS 15.0 for Windows. A p value of less than 0.05 was considered statistically significant. Descriptive statistics were used to analyse the sample characteristics.

## INSTRUMENT DEVELOPMENT AND TESTING IN THE THREE PHASES

### PHASE 1: ITEM DEVELOPMENT

The parameters that could be important in evaluating the self-care agency of patients on chronic dialysis were considered and categorised in a pool of items concentrated in five main categories. (Orem 1995; Ören *et al.* 2000; Tsay & Healstead 2002; Ricka & Evers 2004; Ünsar *et al.* 2007). These categories consisted of the use of medicine, diet, self-monitoring, hygienic care and mental status. The draft questionnaire that included both positive and negative statements evaluating self-care agency was made up of 56 items.

### PHASE 2: CONTENT VALIDITY AND A SMALL-SAMPLE PILOT TEST

The draft scale was first evaluated in terms of language by two Turkish language experts. In terms of content validity, 8 specialists in nephrology (2 academic physicians, 2 academic nurses, 2 clinical nurses, a clinical psychologist and a clinical dietician specialising in nephrology) were consulted to determine whether the items on the measurement tool were appropriate. In line with the feedback received from the specialists, revisions were made in some of the statements and seven items were removed from the questionnaire. Consequently, the number of items dropped below 49. With regard to the items acquired from the scale, the following statement can be given as an example, 'I pay attention to swallow the liquid little by little during daytime'.

In the pilot study, the SCAS was administered to 30 patients on HD and 30 patients on PD patients, all of whom were excluded from the study. It was emphasised that the respondents could ask questions about any of the items on the questionnaires that were not understood and they could make suggestions. At the end of the pilot implementation, the data were reviewed and revisions were made in some of the statements in the questionnaire. The scale was presented to the specialists again and approval was obtained for its implementation (Burns & Grove 2005).

### PHASE 3: CONSTRUCT VALIDITY AND RELIABILITY ANALYSIS

Reliability of the SCAS was judged from internal consistency. The internal consistency of the instrument was measured: Cronbach's alpha (coefficient of reliability was taken as 0.70 or over) and item-total correlation (correlation coefficient over 30 was adopted) were examined (Nunnally & Bernstein 1994; Kline 1994; Burns & Grove 2005; Bowling & Ebrahim 2005). The item analysis was performed to eliminate, low item-total correlations.

In order to examine the test-retest reliability, the instrument was administered twice at a two-week interval. The intraclass correlation coefficient was calculated. The value of 0.40 to 0.70 is considered fair to good (Shrout & Fleiss 1979; Müller & Büttner 1994; Streiner & Norman 1995; Everitt 1996; Takase & Teraoka 2011).

The construct validity of the instrument was examined by exploratory factor analysis using principal components with varimax rotation. Factor analysis was performed in three stages: investigating whether the data were suitable for factor analysis (using Kaiser-Meyer-Olkin (KMO) and Bartlett's test), designating factors and rotating factors (Kline 1994; Şencan 2005).

### INSTRUMENTS

#### THE SELF-CARE AGENCY SCALE (SCAS)

The final version of the SCAS was used for data collection. The SCAS is a 22-item instrument and is a Likert-type scale with three response categories scored from 0 to 2. Items 12, 20, 21 and 22 are scored reversely. In the scoring, the response 'Always' receives 2 points, 'Sometimes' receives 1 and the response 'Never' receives 0 points. Scores can range from 0 to 44. Total and sub-scale scores are calculated by adding up the item scores. The range of sub-scale scores are as follows: use of medicine

0–12, diet 0–10, self-monitoring 0–8 hygienic care 0–8 and mental state 0–6 points. Higher scores indicate better levels of self-care agency, whereas lower scores indicate worse self-care agency. It takes approximately 10 minutes to complete the SCAS. The participant is asked to read each item and report his/her self-care behaviour in daily situations by marking one of the choices.

### RESULTS

In order to examine the reliability and construct validity of the scale, the data obtained from 300 patients were analysed. The scale, made up of 56 items at first, was reduced into 49 items. Distribution of personal and clinical characteristics of the study patients are shown in Table 1.

#### RELIABILITY OF THE INSTRUMENT

As a result of item analysis, we found that 22 items had correlation coefficients greater than 0.30, which indicated that the items were weakly correlated with the other items in the instrument. Twenty-seven questions were therefore removed because of low correlation coefficients ( $r < 0.30$ ). The final instrument consisted of 22 items.

The mean score for the whole scale was  $30.86 \pm 5.55$ . The mean values of the SCAS sub-scales varied from 3.04 to 8.80. The lowest mean score was obtained from the 'mental state' subscale, and the highest mean score was observed in the 'use of medicine' subscale (Table 2).

The internal consistency of the SCAS was evaluated with item-total correlation and Cronbach's alpha coefficient. Table 3 shows the reliability of the final 22-item instrument. Corrected item total correlations ranged from 0.47 to 0.79 in the patients on HD and from 0.30 to 0.81 in the PD sample; in the complete sampling of 300, the correlation varied between 0.47 and 0.79. Cronbach's alpha was found to be 0.75 in the HD group, 0.72 in the PD group and 0.74 in the entire group.

The ICC results were found to have satisfactory values in all sub-scales and in total (0.60 in the sub-scale of mental state, 0.73 in the sub-scale of hygienic care and 0.70 in total) (Table 4).

#### CONSTRUCT VALIDITY

In order to evaluate the factor structure of the scale, the factorability of the 22 SCAS items was first examined. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was found to be

Characteristics	Data	
	HD (n = 175)	PD (n = 125)
Age (years) mean ± SD	47.56 ± 15.32	46.44 ± 14.57
Duration of dialysis (years) mean ± SD	7.87 ± 5.0	3.78 ± 2.9
Gender n (%)		
Female	73 (41.7)	63 (50.4)
Male	102 (58.3)	62 (49.6)
Educational level n (%)		
No formal education and primary school	96 (54.9)	37 (29.6)
Secondary school	60 (34.3)	54 (43.2)
High school	19 (10.9)	34 (27.2)
Marital status n (%)		
Married	106 (60.6)	82 (65.6)
Single	69 (39.4)	43 (34.4)
Employment status n (%)		
Employed	56 (32.0)	53 (42.4)
Unemployed	119 (68.0)	72 (57.6)
Income status n (%)		
High	39 (22.3)	46 (36.8)
Average	98 (56.0)	65 (52.0)
Low	38 (21.7)	14 (11.2)
Family type n (%)		
Immediate family	113 (76.0)	106 (84.8)
Extended family	42 (24.0)	19 (15.2)
Social support from the family n (%)		
Receives	137 (78.3)	109 (87.2)
Does not receive	37 (19.7)	16 (12.8)
Additional illness n (%)		
Diabetes		
Present	17 (9.7)	28 (22.4)
Absent	158 (90.3)	97 (77.6)
Hypertension		
Present	37 (21.1)	60 (48.0)
Absent	138 (78.9)	65 (52.0)
Heart disease		
Present	18 (10.3)	10 (8.0)
Absent	157 (89.7)	115 (92.0)
Hepatitis B		
Present	23 (13.1)	1 (0.8)
Absent	152 (86.9)	124 (99.2)
Hepatitis C		
Present	57 (32.6)	7 (5.6)
Absent	118 (118)	118 (94.4)

Table 1: Distribution of personal and clinical characteristics of the study patients (n = 300).

0.74, and this value was above the recommended value of 0.60 (Hutcheson & Sofroniou, 1999) and Bartlett's test of sphericity was also significant ( $p < 0.001$ ) (Bartlett 1950; Field 2005). It was considered that the data were suitable for factor analysis.

Exploratory factor analysis was carried out for the 22-item scale. Varimax rotation was repeated five times. At the fifth rotation, it was seen that the five-factor form representing similar properties and five dimensions, with eigenvalues of 2.49, 2.32,

2.19, 2.02 and 1.84, explained 43.42% of the total variance and that the factor loading of each item was greater than 0.40 (Kline 1994) (Table 5). Factor one, 'use of drugs', was represented by six statements (items no. 1, 2, 3, 4, 5, 18), factor two 'diet' by five statements (items no. 8, 9, 10, 11, 12), factor three 'self-monitoring' by four statements (items no. 6, 7, 13, 14), factor four 'hygienic care' by four statements (items no. 15, 16, 17, 19) and factor five 'mental state' by three statements (items no. 20, 21, 22).

Total group	X ± SD	Variance	Median	Mode	Min.	Max.	Range of score
Use of medicine	8.80 ± 2.25	5.04	9	10	1	12	0–12
Diet	7.33 ± 2.11	4.47	8	10	1	10	0–10
Self-monitoring	4.87 ± 1.89	3.57	5	5	0	8	0–8
Hygienic care	6.83 ± 1.36	1.84	7	8	1	8	0–8
Mental state	3.04 ± 1.56	2.44	3	4	0	6	0–6
Global scale	30.86 ± 5.55	30.80	32	32	9	44	0–44
HD group (n = 175)							
Use of medicine	8.55 ± 2.38	5.69	9	10	1	12	0–12
Diet	7.08 ± 2.19	4.79	7	9	1	10	0–10
Self-monitoring	4.41 ± 1.99	3.98	5	5	0	8	0–8
Hygienic care	6.77 ± 1.37	1.88	7	8	1	8	0–8
Mental state	2.89 ± 1.57	2.47	3	3	0	6	0–6
Global scale	29.70 ± 5.74	32.90	30	30	9	44	0–44
PD group (n = 125)							
Use of medicine	9.14 ± 1.99	3.98	10	10	2	12	0–12
Diet	7.68 ± 1.96	3.85	8	10	2	10	0–10
Self-monitoring	5.50 ± 1.53	2.33	5	5	2	8	0–8
Hygienic care	6.91 ± 1.34	1.79	7	8	3	8	0–8
Mental state	3.25 ± 1.53	2.35	3	4	0	6	0–6
Global scale	32.49 ± 4.85	23.53	33	34	17	44	0–44

Table 2: The distribution of SCAS sub-scale scores.

Sub-scales	Item no.	Corrected item-total correlation		
		Haemodialysis (n = 175)	Peritoneal dialysis (n = 125)	Total sample (n = 300)
Use of medicine	1	0.47**	0.46**	0.47**
	2	0.53**	0.40**	0.48**
	3	0.56**	0.44**	0.53**
	4	0.68**	0.69**	0.68**
	5	0.63**	0.73**	0.66**
	18	0.55**	0.58**	0.56**
Cronbach's alpha		0.65	0.62	0.63
Diet	8	0.72**	0.66**	0.69**
	9	0.65**	0.61**	0.63**
	10	0.74**	0.69**	0.72**
	11	0.58**	0.62**	0.60**
	12	0.51**	0.52**	0.52**
Cronbach's alpha		0.65	0.63	0.64
Self-monitoring	6	0.54**	0.32**	0.49**
	7	0.73**	0.69**	0.68**
	13	0.79**	0.78**	0.79**
	14	0.71**	0.81**	0.76**
Cronbach's alpha		0.68	0.56	0.67
Hygienic care	15	0.71**	0.69**	0.70**
	16	0.61**	0.62**	0.61**
	17	0.50**	0.49**	0.48**
	19	0.62**	0.65**	0.64**
Cronbach's alpha		0.56	0.53	0.53
Mental state	20	0.77**	0.74**	0.77**
	21	0.70**	0.73**	0.72**
	22	0.68**	0.54**	0.61**
Cronbach's alpha		0.57**	0.52**	0.52**
SCAS total Cronbach's alpha		0.75	0.72	0.74

Table 3: Reliability of 22 item of SCAS (n = 300).

\*\*p &lt; 0.001 for corrected item total correlation.

Scale	ICC*
Use of medicine	0.63
Diet	0.63
Self-monitoring	0.67
Hygienic care	0.73
Mental state	0.60
Global scale	0.70

Table 4: Test re-test reliability of the SCAS (n = 60).

\*Intraclass correlation; all correlations are statistically significant at  $p < 0.001$ .

## DISCUSSION

### RELIABILITY AND VALIDITY

This study was carried out to develop the SCAS and to test its validity and reliability. The research showed that the SCAS was a valid and reliable instrument. This scale provides information about self-care agency by evaluating the patients' self-care

agency in five different dimensions. The scale will be a guiding tool for nurses working in dialysis centres in their patient care planning.

Item total correlations below  $r = 0.20$  are usually rejected in the development of measurement scales. The minimum recommended correlation between item and total scores is over 0.30. An item total correlation of 0.20–0.40 indicates that the differences between individuals were at a moderate level (Nunnally & Bernstein 1994; Kline 1994; Burns & Grove 2005; Bowling & Ebrahim 2005). It was regarded as a good result when total correlations of the whole group consisting of 300 patients in the present study proved to be greater than 0.40.

The Cronbach's coefficient is a measurement of the internal consistency of the items in the instrument. If overall Cronbach's

Items	Factors and factor loadings				
	I Use of medicine	II Diet	III Self-monitoring	IV Hygienic care	VI Mental state
1. I take my medication regularly	0.45				
2. I know the names of each of my medicines	0.55				
3. I keep reserve medicine in case I run out	0.53				
4. I ask a doctor/nurse why I use those medications and what side effects they have	0.65				
18. I care about myself	0.53				
5. I ask a doctor/nurse if my method of treatment and the medication I use has effects on my sex life	0.41				
8. I conform to the dietary scheme I was suggested		0.65			
9. I try to keep my weight in the limits suggested by the doctor/nurse		0.55			
10. I conform to the daily amount of salt I must take		0.72			
11. I add salt to my food		0.66			
12. I often consume food like salted nuts, potato chips, corn cereals, instant soup and bullion		0.48			
6. I regularly go to the doctor for check ups			0.44		
7. I weigh myself everyday			0.51		
13. I take my blood pressure everyday			0.80		
14. I take a pulse count everyday			0.79		
15. I regularly brush my teeth				0.54	
16. I regularly shower				0.73	
17. I always take care that my nails are short				0.57	
19. I enjoy life				0.48	
20. I think I can't fulfil my familial duties after the illness					0.73
21. I think my working capacity is lower after the illness					0.65
22. I feel lonely since the illness					0.56
Eigenvalue	2.49	2.32	2.19	2.02	1.84
Variance %	9.95	9.27	8.77	8.06	7.37
Total variance %	43.42				

Table 5: Factor construct of 22 item of SCAS (n = 300).

Extraction method: principal component analysis. Rotation method: Varimax with Kaiser normalisation. A rotation converged in the 5th iteration. Extraction method: principal component analysis.

alpha levels are greater than 0.80, this is considered sufficient (Şencan 2005). The minimum value for Cronbach's alpha is controversial and the recommended values that can be accepted vary in the range of  $>0.70$  to  $>0.50$  (Bowling & Ebrahim 2005). In the examination of the reliability of SCAS, it was found that Cronbach's alpha value was between 0.52 and 0.68 for the five factors and it was between 0.72 and 0.75 in the total scale (Table 3). This scale was observed to have a satisfactory level of reliability.

The range of the ICC may be between 0 and 1 (Bland & Altman 1986). Some sources have attempted to delineate good, medium and poor levels for the ICC, but there is certainly no consensus as to what constitutes a good ICC (Shrout 1998). But generally ICC can be interpreted as follows: 0–0.20 indicates poor agreement; 0.30–0.40 indicates fair agreement; 0.50–0.60 indicates moderate agreement; 0.70–0.80 indicates strong agreement and  $>0.80$  indicates almost perfect agreement (Landis & Koch 1977; Portney & Watkins 2000). The present study determined that the SCAS was reliable since ICC values proved to be at a moderate level in all sub-scales and the scale showed good ICC levels in general.

In factor analysis, it is important that the study variables are appropriate for the analysis. The Kaiser-Meyer-Olkin (KMO), a useful method determining the applicability of a factor analysis, is to compute a measure of sampling adequacy. It is stated that the lower limit for the KMO value should be 0.50. If the KMO is  $\leq 0.50$  this indicates that factor analysis for the data set is not appropriate (Tabachnick & Fidell 2001; Field 2005). Statistical significance in Bartlett's test ( $p < 0.001$ ) is said to show that items in a scale are appropriate for factor analysis (Bartlett 1950; Tabachnick & Fidell 2001; Pett *et al.* 2003). In the present study, when the variables were evaluated with KMO (0.74) and Bartlett's test ( $p < 0.001$ ), it was found that a factor analysis was appropriate.

The exploratory factor analysis results for the SCAS were of an acceptable level (Kline 1994; Field 2005; Şencan 2005; Burns & Grove 2005; Aytaç & Öngen 2012). The factor loading for all the statements was  $>0.40$ . The statements were collected under the expected groups in the factor analysis, and eigenvalues showed a five-factor structure that was  $>1$ . There were four or more items in each dimension except for emotional status (Table 5).

## STUDY LIMITATIONS

The data were collected in a single city in Turkey. The age of the patients was diverse, and can be considered to be a study limitation. In future studies, using this form can be measured of self-care agency in different patients groups and different populations within an international context.

## IMPLICATIONS TO CLINICAL PRACTICE

Nurses should use a valid and reliable self-care agency scale to evaluate the self-care agency of patients on chronic dialysis. The SCAS can yield an insight for nursing care plan and create care strategies to help them. This instrument may well facilitate the identification of patients and interventions and further pinpoint the specific areas, on an individual-patient basis, that would most benefit from proper interventions.

## CONCLUSION

The self-care agency and needs of dialysis patients are constantly changing and are affected by various variables, so the self-care needs of patients should be screened periodically. Utilisation of the SCAS, which is a disease-specific valid and reliable instrument, in determining the self-care needs of dialysis patients would help care units to take more accurate steps in planning the care that should be provided to patients. It can be suggested that this scale, which has been developed specifically for this disease and has been tested for validity and reliability, would be appropriate for use in further studies and that the scale should be improved as a Likert-type scale with five response categories.

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## CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

## AUTHOR CONTRIBUTIONS

BÖ and NE were responsible for the study conception and design. BÖ performed the data collection and data analysis. BÖ and NE were responsible for the drafting of the manuscript and made critical revisions to the paper in terms of important intellectual content. BÖ provided statistical expertise. BÖ and NE provided administrative, technical or material support.

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