



## ORIGINALES

### Validation of the Subjective Happiness Scale in people with Chronic Kidney Disease

Validação da “Subjective Happiness Scale” em pessoas com Doença Renal Crónica  
Validación de la “Subjective Happiness Scale” en personas con Enfermedad Renal Crónica

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#### ABSTRACT:

**Objective:** To explore the psychometric properties of the Subjective Happiness Scale (SHS) in patients with Chronic Kidney Disease (CKD) undergoing hemodialysis.

**Methods:** This is a methodological study. The random sample included 171 patients with CKD under hemodialysis program in two clinics in the region of Lisbon, Portugal. Data was collected between May and June 2015. The following psychometric properties were evaluated: validity (construct, convergent and discriminant), reliability through internal consistency (Cronbach  $\alpha$ ) and stability (intraclass correlation coefficient and Spearman-Brown correlation coefficient).

**Results:** The results support the unifactorial structure, with reliability ( $\alpha = 0.90$ ). In addition, this scale is positively correlated with the Satisfaction Life Scale ( $r = 0.60$ ;  $p < 0.001$ ), supporting the validity criteria.

**Conclusions:** The Portuguese version of the SHS is valid and reproducible in patients with CKD.

**Keywords:** Renal Insufficiency; Chronic; Validation studies; Psychometrics; Happiness; Nursing.

#### RESUMO:

**Objetivo:** Validar as propriedades psicométricas da Subjective Happiness Scale (SHS) em pessoas com Doença Renal Crónica (DRC) em programa de hemodiálise.

**Método:** Trata-se de um estudo metodológico. A amostra randomizada foi constituída por 171 pessoas com DRC submetida a hemodiálise em duas clínicas na região de Lisboa, Portugal. Os dados foram colhidos de maio a junho de 2015. Foram avaliadas as propriedades psicométricas: validade (construto, convergente e discriminativa), fidedignidade por meio da consistência interna ( $\alpha$  de Cronbach) e estabilidade (Coeficiente de Correlação Intraclasse e Coeficiente de Correlação de Spearman-Brown).

**Resultados:** Os resultados suportam a estrutura unifatorial, com uma confiabilidade ( $\alpha=0,90$ ). Além disso, esta escala está positivamente correlacionada com a Escala de Satisfação com a Vida ( $r=0,60$ ;  $p<0,001$ ), apoiando assim a sua validade de critério.

**Conclusões:** A versão portuguesa da SHS é válida e reprodutível em pessoas com DRC.

**Palavras chaves:** Insuficiência Renal Crónica; Estudos de Validação; Psicometria; Felicidade; Enfermagem.

## RESUMEN:

**Objetivo:** Verificar las propiedades psicométricas de la *Subjective Happiness Scale* (SHS), en personas con Enfermedad Renal Crónica (ERC), en hemodiálisis.

**Método:** Estudio metodológico cuya muestra aleatoria estuvo constituida por 171 personas con ERC que realizan hemodiálisis en dos clínicas de la región de Lisboa (Portugal). Los datos se obtuvieron entre Mayo y Junio del 2015. Las propiedades psicométricas estudiadas fueron la validez (construto, convergente, discriminante), la fiabilidad (consistencia interna ( $\alpha$  de Cronbach)) y la estabilidad (Coeficiente de Correlación Intra-clase y de Correlación de Spearman-Brown).

**Resultados:** Los resultados confirman la estructura uni-factorial, presentando una fiabilidad con  $\alpha=0,90$ . La escala presenta una correlación positiva con la Escala de Satisfacción con la Vida ( $r=0,60$ ;  $p<0,001$ ), lo que sirve para certificar su validez de criterio.

**Conclusión:** la versión portuguesa de la SHS es válida, fiable y reproducible en personas con ERC que realizan hemodiálisis.

**Palabras clave:** Insuficiencia Renal Crónica; Estudios de Validación; Psicometría; Felicidad; Enfermería.

## INTRODUCTION

Chronic Kidney Disease (CKD) is a degenerative disease characterized by the progressive, gradual and irreversible destruction of a large number of nephrons and consequently, decreased capacity of the kidneys to excrete metabolites, corresponding to a loss of renal function<sup>(1-4)</sup>. Hemodialysis is one of the options for treating people with CKD. This technique consists of extracorporeal blood filtration by means of a machine. Hemodialysis has an impact on the physical, psychological and social level, with repercussions on personal and family life<sup>(1)</sup>.

Subjective well-being or happiness<sup>(5)</sup> can be described as stable extroversion, which seems to be related to easy sociability, which favors a natural and enjoyable interaction with other people. The person with the higher level of well-being seems to have better social relations than the one with a reduced level of well-being<sup>(5)</sup>.

The Subjective Happiness Scale (SHS), developed by Lyubomirski and Lepper<sup>(6)</sup> consists of four items. The SHS is composed of four items: within two items (two and three) respondents are asked to characterize and compare themselves with others, both in absolute and relative terms; the two other items correspond to descriptions of happiness and unhappiness. The score is reversed in the last item.

This scale requests the person to indicate the extent to which the statements presented characterize them. The answer is given on a visual analogical scale with seven positions, based on two antagonistic statements, which express the level of happiness or its lack. Its authors conceived the one-dimensional measure of the scale, with only four items, so as not to overload the participants.

The SHS was developed for both the North American and Russian population<sup>(6)</sup>, however, it has been validated in other populations, namely the Japanese<sup>(7)</sup>, the Chinese and Malay<sup>(8)</sup>, Australian, German and Filipino<sup>(9)</sup>, Chinese students<sup>(10)</sup>, Arabic<sup>(11)</sup>, Spanish<sup>(12)</sup>, Italian<sup>(13)</sup>, European Portuguese<sup>(14-15)</sup>, Brazilian Portuguese<sup>(16)</sup> and Mexican population<sup>(17)</sup>.

In the construct validity only one dimension was demonstrated, this study was done by exploratory factorial analysis<sup>(6,9-10,12-16)</sup>, with Principal Component Analysis<sup>(12)</sup> or Principal Axis Factoring<sup>(9,16)</sup> with rotation Quartimax<sup>(9)</sup> and by confirmatory factor analysis<sup>(10-17)</sup>.

Concurrent validity was achieved with other measures related to happiness<sup>(6,9)</sup>, satisfaction with life<sup>(9,13-16)</sup>, affectivity<sup>(6,9)</sup>, self esteem<sup>(6,16)</sup>, hope<sup>(16)</sup>, quality of life<sup>(10)</sup>, depression<sup>(6,13)</sup>, and anxiety<sup>(13-14)</sup>.

Regarding the reliability of the original scale, it has a Cronbach's alpha ranging from 0.79 to 0.94 (M = 0.86) which has shown a good internal consistency. It exhibits stability over time, with test retest reliability ranging from 0.55 to 0.90 (M = 0.72)<sup>(6)</sup>. In all populations, the scale has proved to be a valid and reliable instrument for assessing subjective happiness<sup>(7-16)</sup>. The Portuguese version of the scale revealed psychometric properties identical to those of the original version<sup>(6)</sup> and can be used to make comparisons in cross-cultural investigations<sup>(15)</sup>.

Given the above, this study aims to determine whether the Portuguese version of SHS<sup>(15)</sup> is considered valid and reliable in patients with CKD undergoing hemodialysis.

## METHOD

This is a methodological study<sup>(18)</sup>, carried out in June 2015, in two dialysis units of Diaverum in the Lisbon region.

The sample is comprised of patients with CKD undergoing hemodialysis.

Inclusion criteria were as follows: CKD, undergoing hemodialysis for at least six months, aged 18 years or over. People with cognitive impairment and active psychiatric illness were excluded. The information on the exclusion criteria was obtained through the clinical history, recorded in the clinical process.

The population was composed of a group of 248 people with CKD, who met the inclusion criteria (139 of clinic 1 and 114 of clinic 2). The sample consisted of individuals who accepted the eligibility criteria and their evaluation was 19% (19), in order to obtain a minimum sample of 192 people (103 at clinic 1 and 89 at clinic 2). A random selection without replacement was made. Concerning Clinic 1, six people refused to participate, two were hospitalized and two dropped out. In clinic 2, four people refused to participate, two were hospitalized and five gave up. Data were obtained from 171 people, 93 from clinic 1 (89%) and 78 (88%) from clinic 2.

For data collection, the Portuguese version of SHS<sup>(15)</sup> was used to evaluate happiness and to evaluate satisfaction with life in general, the Personal Welfare Index (PWI)<sup>(20)</sup> was used to collect data whose original version is the PWI, developed from the Comprehensive Quality of Life Scale<sup>(21)</sup>. An instrument was also used to characterize

the profile of the sample at the sociodemographic and clinical level, specifically, age, gender, nationality, schooling, professional activity, marital status, dialysis time, presence of Arterial Hypertension and Diabetes.

The SHS is ask to indicate the extent to which the four affirmations characterize them, with a visual analog scale graded from 0 to 7. The Portuguese version presents a single factor and has an internal reliability with the value of Cronbach's  $\alpha$  of 0.76<sup>(15)</sup>.

The PWI consists of seven items / domains (satisfaction with standard of living, health, personal fulfillment, personal relationships, sense of security, community attachment, and security with the future) that aim to evaluate "satisfaction with life in general ". For each question respondents are asked to say how satisfied they are with each item / domain on a scale from "0" (extremely dissatisfied) to "10" (extremely satisfied) with a neutral intermediate position. The PWI is calculated on a score of 0-100 (maximum percentage of the scale). The confirmatory factor analysis of the Portuguese version demonstrates the existence of a single factor, with the Cronbach's Alpha value of 0.81<sup>(20)</sup>.

Statistical analysis were performed with the Statistical Package for Social Sciences (SPSS) version 20.0. Reproducibility was studied by internal consistency and stability. The reliability study was performed using the Cronbach's  $\alpha$  and to evaluate stability the Intraclass Correlation Coefficient (ICC) and Spearman-Brown Correlation Coefficient<sup>(22)</sup> in the Test Retest (after 48 to 96 hours in 40 people randomly selected, 26 per questionnaire and 14 per interview) were used. A minimum value of 0.70 was adopted as a satisfactory internal consistency<sup>(22)</sup>.

In this study the validity of the construct, concurrent and discriminant was analyzed. The construct validity was performed using exploratory factorial analysis (EFA) and confirmatory factorial analysis (CFA). The CFA was performed using the maximum likelihood method, with Varimax rotation. Adequacy was estimated by Kaiser-Meyer-Olkin (KMO) and Bartlett's sphericity test.

The CFA was developed using AMOS 21.0 software. The robust estimation method was used in maximum likelihood<sup>(23)</sup>. The adjustment indexes used to verify the adjustment of the model were: ratio between chi-square and degrees of freedom ratio ( $X^2 / g.l.$ ); Goodness-of-fit index (GFI), root mean square error of approximation (RMSEA); Comparative fit index (CFI), Tucker-Lewis index (TLI)<sup>(22-23)</sup>.

These indices can be classified into absolute indices and relative indices. The Absolute Indices evaluate the quality of the model, without comparing with other models. The most used indices in this family are:  $X^2 / g.l.$  that when  $X^2 / g.l. = 1$ , the fit is perfect, when  $X^2 / g.l.$  is less than 2, the fit is good, it is acceptable when  $X^2 / g.l. < 5$  and unacceptable when  $X^2 / g.l. > 5$ . Root Mean Square Residual (RMSR) is determined by dividing the square root of the error matrix by the degrees of freedom. Thus, the lower the RMSR the better the adjustment. When RMSR = 0 indicates that the adjustment is perfect. The Goodness of Fit Index (GFI) explains the proportion of the observed covariance among the manifested variables, explained by the fitted models. In general, GFI  $< 0.8$  indicates models with poor fit to the data; GFI between [0.9; 0.95] indicates a good fit; GFI  $> 0.95$  indicate very good fit and GFI = 1 perfect fit. The Relative Indices evaluate the quality of the model under test, relative to the model with the worst possible adjustment and / or the model with the best possible adjustment. The Comparative Fit Index (CFI) compares the adjustment of the model under study ( $X^2$ ) with the degrees of freedom ( $g.l.$ ), with the adjustment of the basal

model with degrees of freedom. It is generally accepted that CFI < 0.9 indicates models with poor fit; CFI between [0.9; 0.95] indicates a good fit; CFI > 0.95 very good adjustment and CFI = 1 perfect fit. The TLI-Lewis Index (TLI), also known as Bentler-Bonett-non-normed fit index (NNFI), where TLI values range from 0 to 1. Values close to 1 indicate very good fit<sup>(23)</sup>.

The convergent validity was verified through the Pearson Correlation Coefficient between SHS and PWI. To verify the discriminant validity, the student t test for independent samples or ANOVA was used for more than two independent samples (verified normal distribution by Kolmogorov-Smirnov KS test).

Categorical variables were expressed as percentage or absolute value and continuous variables as mean ± standard deviation or median. The cutoff point was the median age and the time of hemodialysis to create category variables. The level of significance was set at p < 0.05.

Permission of author of the Portuguese versions of SHS<sup>(15)</sup> and PWI<sup>(19)</sup> was requested and granted.

This study was approved by Diaverum's Ethics Committee (nº1 / 2015). All participants signed the informed consent form after being informed about the guarantee of confidentiality of their data and the right of withdrawal.

## RESULTS

The socio-demographic and health profile is shown in table 1. In this study the mean age of the sample is 60.20 ± 14.34 years. The majority are men (61%), Portuguese (80.1%), 4 years of schooling (42.9%), retired (76.7%) and married (56.5%). Regarding health data, the subjects of the sample underwent hemodialysis for 72,17 ± 54,23 months, 62,1% referred Hypertension and 27,1% has Diabetes.

**Table 1** – Characteristics of the patients with CKD evaluated in both clinics. Lisbon, Portugal, 2015.

	F	%
Genre		
Feminine	66	38,6
Masculine	105	61,4
Nationality		
Portuguese	137	80,1
Cape Verdean (Cape Verde)	24	14,0
Santomense (Sao Tome and Principe)	6	3,5
Guinean (Guinea Bissau)	1	0,6
Angolan (Angola)	3	1,8
Education		
Illiterate	6	3,6
4th Year of Basic Education	72	42,9
6th Year of Schooling	31	18,5

9th Year of Secondary Education	25	14,9
12th Year of Secondary Education	19	11,3
Bachelor's Degree	13	7,7
Masters/PhD	2	1,2
<b>Occupational Activity</b>		
Retired	125	76,7
Active	38	23,3
<b>Marital Status</b>		
Single	44	25,9
Married	96	56,5
Widowed	20	11,8
Divorced/separated	10	5,9
<b>Hypertension</b>		
No	64	37,9
Yes	105	62,1
<b>Diabetes</b>		
No	124	72,9
Yes	46	27,1

### Reliability and stability

In the analysis of the psychometric properties, the reproducibility of SHS, verified by the coefficient of Cronbach  $\alpha$ , varied from 0.85 to 0.90 after the exclusion of each of the items. In the stability evaluation (Test-Retest), the data obtained by questionnaire ( $n = 26$ ) presented a global Cronbach's  $\alpha$  in the first evaluation of 0.80 and in the second evaluation of 0.61. The Spearman-Brown Correlation Coefficient was 0.82 and the ICC was 0.82 [95% CI; 0.71 to 0.91,  $p < 0.001$ ]. By interview ( $n = 14$ ) the global Cronbach's  $\alpha$  in the first evaluation was 0.83 and in the second evaluation was 0.85. The Spearman-Brown Correlation Coefficient was 0.77 and the ICC was 0.87 [95% CI; 0.74 to 0.95,  $p < 0.001$ ]. In this way the consistency and the stability between the SHS evaluations were demonstrated through a self-reported questionnaire and interview.

### Validity

The exploratory factorial analysis (KMO = 0.83; Bartlett  $\chi^2$  sphericity test [6] 486,679,  $p < 0.001$ ) presented a single factorial solution, which was responsible for 72.10% of the explained variance of the construct. All items were loaded into the factor, with adequate factor loads (ie > 0.6, see Table 2). The value of Cronbach's  $\alpha$  coefficient was 0.90.

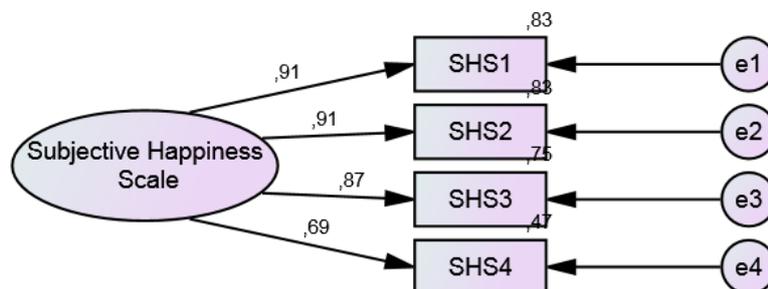
**Table 2** – Exploratory factorial analysis of the Portuguese version of SHS in patients with CKD. Lisbon, Portugal, 2015.

	Factor 1 SH*
SHS1- In general, I consider myself	0,912
SHS2- Compared to other people like me, I consider myself	0,909
SHS3- Some people are generally very happy.	0,868
SHS4- Some people generally are not very happy	0,687
Eigenvalue	3,142
Explained variance	72,10
Alfa coeficiente	0,90
Mean (SD)	19,97 (±5,96)

\*Subjective Happiness

The confirmatory factorial analysis obtained,  $X^2 / g.l = 0.971$ ,  $RMSEA = 0.00$ ;  $GFI = 0.994$ ,  $CFI = 1.00$  and  $TLI = 1.00$ . These values show a very good fit for the hypothesis of one solving factor (figure 1).

**Figure 1** – SHS confirmatory factorial analysis model



In the study of convergent validity, there was a moderate positive correlation ( $r = 0.60$ ;  $p < 0.001$ ) between the SHS score and the PWI. Table 3 shows the results regarding discriminant validity in order to identify whether SHS is able to differentiate subjective happiness in the variables gender, age, nationality, schooling, occupational activity, marital status, presence of Hypertension, Diabetes and dialysis time.

The SHS can discriminate by age, nationality, occupational activity and presence of diabetes. In this sense, people under the age of 63, with an occupational activity, have higher levels of happiness. People of Portuguese nationality have lower levels of happiness than people with the nationality of an African country. In addition, people with diabetes have lower levels of happiness than those without diabetes.

**Table 3** – Discriminante validity of the SHS. Lisbon, Portugal, 2015.

	Mean ( $\pm$ SD)	<i>p-value</i>
Genre		
Masculine	19,8 $\pm$ 5,6	0,630
Feminine	20,2 $\pm$ 6,4	
Age		
Less than 63 years	21,3 $\pm$ 5,9	0,006
More than 63 years	18,8 $\pm$ 5,7	
Nationality		
Portuguese	19,4 $\pm$ 6,1	0,020
Other	22,1 $\pm$ 5,2	
Education		
Less than 12 years	19,7 $\pm$ 5,9	0,150
More than 12 years	21,3 $\pm$ 5,4	
Occupational activity		
Retired	19,3 $\pm$ 5,9	0,010
Active	22,1 $\pm$ 5,6	
Marital Status		
Single	20,6 $\pm$ 5,7	0,151
Married	20,2 $\pm$ 6,1	
Other	18,1 $\pm$ 5,9	
Hypertension		
No	20,6 $\pm$ 5,6	0,280
Yes	19,6 $\pm$ 6,1	
Diabetes		
No	20,6 $\pm$ 5,8	0,018
Yes	18,2 $\pm$ 6,2	
Time of haemodialysis		
Less than 60 months	19,5 $\pm$ 5,6	0,360
More than 60 months	20,3 $\pm$ 6,3	

## DISCUSSION

The reliability values were similar to the original version<sup>(6)</sup> and higher than the Austrian ( $\alpha = 0.80$ )<sup>(9)</sup>, Filipino ( $\alpha = 0.82$ )<sup>(9)</sup>, Chinese ( $\alpha = 0.82$ )<sup>(10)</sup>, Brazilian ( $\alpha = 0.74$ )<sup>(12)</sup>, Brazilian ( $\alpha = 0.81$ )<sup>(13)</sup>, Italian ( $\alpha = 0.79$ )<sup>(14)</sup> and European Portuguese ( $\alpha = 0.84$ )<sup>(16)</sup>. The Cronbach's  $\alpha$  values obtained in this study are considered good<sup>(22)</sup>. On what concerns stability, in both questionnaire and interview, correlation values were higher than the original study ( $r = 0.55$  to  $0.86$ )<sup>(6)</sup>, Chinese version ( $r = 0.70$ )<sup>(10)</sup>, and Spanish

version ( $r = 0.72$ )<sup>(13)</sup>. In this study the values are higher than 0.7 which indicates that there is good stability of the measurement<sup>(22)</sup>. We obtained support for the stability of this measure in the questionnaire and interview modality.

All items were loaded on a single factor, similar to other studies that performed exploratory factor analysis<sup>(6-7,9-10,16)</sup>. The factorial weight was identical to the Chinese and Portuguese versions of Brazil ( $> 0.60$ ) and higher than the Lebanese version ( $> 0.46$ ). The KMO value was higher than the Austrian (KMO = 0.80)<sup>(9)</sup> and Philippine (KMO = 0.65)<sup>(9)</sup>, Chinese (KMO = 0.79)<sup>(10)</sup>, Lebanese (KMO = 0.75)<sup>(12)</sup> and Brazilian Portuguese (KMO = 0.79)<sup>(16)</sup> versions. In this study the KMO value is good and reveals the adequacy of the model to the data<sup>(22)</sup>. The variance explained for one factor was higher than the Austrian (65.7%)<sup>(9)</sup> and Filipino (53.2%)<sup>(9)</sup>, Chinese (65.3%)<sup>(10)</sup>, Lebanese (45.2%)<sup>(12)</sup> and Brazilian Portuguese (64.2%)<sup>(16)</sup> versions. It was thus demonstrated that the SHS score is valid for measuring subjective happiness. In this study the CFA also supported the one factor solution<sup>(11-17)</sup>.

The convergent validity also presented results in the expected directions, that is, high SHS scores are associated with high PWI scores (satisfaction with life in general). Support was obtained for the external validity of the measure, similar to the samples<sup>(9,13-16)</sup>.

The SHS is able to distinguish patients with CKD under hemodialysis program by age, professional status, nationality and presence of Diabetes. In the Lebanese version it was verified that this measure can also distinguish patients by age and parental rejection in childhood<sup>(12)</sup>. In the Italian version it was observed that elderly men have a lower percentage of high scores (ceiling effect) and have higher percentage of low scores (floor effect) when compared to women and young people<sup>(14)</sup>.

Our main limitations were the sample size and lack of financial support.

The results of this study are in agreement with the original scale and all other adapted versions of SHS<sup>(7-16)</sup> and suggest that the European Portuguese version of SHS is a valid and reliable measure to evaluate subjective happiness in patients with CKD, in a self-filled questionnaire and interview format.

This study used a representative sample of patients with CKD under dialysis program. However, in future research it is important to perform a confirmatory factor analysis in this specific population with a sample greater than 300 people.

## CONCLUSIONS

The SHS in patients with CKD is a reliable, reproducible and valid instrument when applied as a questionnaire and interview. This tool presents good psychometric properties suggesting that it can be considered a good measure, with similar properties to the original and Portuguese version, as well as, to the versions in other languages and cultures.

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