Cross-Culture Adaptation and Psychometric Properties of the Persian Version of Duke Health Profile

Mohammad Hassan Novin [1], Farshad Farzadfar [2], Tahereh Pashaei [3] and Emran Razaghi [4, 1, *]

[1]Department of Neuroscience and Addiction Studies, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran
[2]Non-Communicable Diseases Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
[3]Environmental Health Research Center, Research Institute for Health Development, Faculty of Health, Kurdistan University of Medical Sciences, Kurdistan, Iran
[4]Department of Psychiatry, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

*Corresponding author: Department of Neuroscience and Addiction Studies, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran. Tel/Fax: +98-2155419113, Email: razaghie@sina.tums.ac.ir

Abstract

Background: Duke health profile (DHP) is a 17-item questionnaire that measures six health scales (physical, mental, social, general, perceptual, and self-confidence) and four dysfunction scales of anxiety, depression, pain, and disability.

Objectives: To systematically translate DHP to Persian language and measure the validity and reliability of the translated version.

Methods: We used the forward-backward method for translation of DHP from English to Persian. After linguistic matching and pilot review, a cross-sectional study was carried out on 239 individuals aged over 18 to measure the psychometric characteristics of the Persian version of DHP. The reliability of the questionnaire was assessed using Cronbach's alpha and test-retest analysis. Content validity, face validity, and construct validity were evaluated by an expert panel, interviewing a sample of the general population, and confirmatory factor analysis, respectively.

Results: Item content validity indexes (I-CVI) for relevance and clarity were between 88 and 100. Scale content validity index (S-CVI) for relevance and clarity were 96% and 94%, respectively. The calculated item content validity ratio (I-CVR) was between 0.78 and 1.0. The confirmatory factor analysis showed that the data fit the model, and the indicators of fitness were acceptable. The Cronbach's alpha was 0.77 for the total tool and varied between 0.47 and 0.69 for different subscales. The reliability of the test-retest was 0.64 - 0.88, which was good after two weeks.

Conclusions: The Persian version of DHP is a valid and reliable tool for measuring health profile.

Keywords: Duke Health Profile, Quality of Life, Psychometric Properties, Validity, Reliability

1. Background

In 1948 the World Health Organization (WHO) defined health as "A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (1). Although some authors do not agree on the inclusion of social well-being in health definition (2), according to the WHO definition, health is a complex term with a wide range of diverse conditions (3). Over the past two decades, much attention has been paid to the measurement of health, its improvement, and following-up on the outcomes of diseases (4). The index of quality of life (QOL) has been widely used as a measure of health outcomes (5). It could measure health outcomes beyond morbidity and biological dysfunction (2). WHO defines QOL as "The perception that an individual has of his or her place in life, within the context of the culture and system values in which he or she lives, and in relation to the objec-

tives, expectations, standards, and concerns of this individual" (6, 7). QOL can include subjective or objective or both conditions affecting individuals' existence; therefore, it is a broad concept (8). The term health-related quality of life (HRQOL); however, it focuses on the health domain of QOL with no incorporation of non-health factors of QOL, such as economic status or political circumstances (2). WHO defines HRQOL as "An integrative measure of physical and emotional well-being, level of independence, social relationships, and their relationship to salient features of their environment" (9, 10).

Although there is no single gold standard for health measurement (4), several generic HRQOL measurement tools have been used for this purpose, the Duke health profile (DHP) being one of them. Those tools can be used to determine the burden of disease and evaluate the outcomes of treatment in chronic diseases for the measurement of healthcare services and policy development (9). Since the

generation of HRQOL measurement tools is a complex and time-consuming challenge in different social and cultural settings (11), translation, cross-cultural modification, and validation (5) of existing tools appear to be more reasonable.

Duke health profile (DHP) is a 17-item questionnaire that can either be self-reported or filled by interviewers (9). It also includes six health scales (physical, mental, social, general, perceptual, and self-confidence) and four dysfunction scales of anxiety, depression, pain, and disability (4). Items 8, 9, 10, 11, and 12 are assigned to physical health, items 1, 4, 5, 13, and 14 to mental health, and items 2, 6, 7, 15, and 16 to social health. The average of those three sub-scales is used as a determinant of general health. Item 3 is used to assess perceived health, and items 1, 2, 4, 6, and 7 are used to score self-esteem. Items 2, 5, 7, 10, 12, and 14 are used to determine the anxiety score. Items 4, 5, 10, 12, and 13 measure depression, item 11 measures pain, and item 17 determines the degree of disability. The DHP scores a range of 0 - 100 with higher scores, indicating better health conditions. Conversely, 100 is the worst, and zero is the best in case of dysfunction (9). Each item is answered by three Likert scales, including "yes, describes me exactly", "somewhat describes me", and "no, does not describe me at all". In some items, the answers are presented as: "none", "some", and "a lot". The last item's answer is prepared as: "none", "1 - 4 days", and "5 - 7 days" (5). The score obtained from this questionnaire can be used as a health predictor. The questionnaire examines the health status of a person over the past week, and in older subjects, it is more suitable than the 36-Item Short-Form Health survey (SF-36 questionnaire) (9, 12). Up to 2011, the questionnaire had been translated into 17 different languages, including French, German, Italian, Afrikaans, Chinese, Dutch, Belgian, English, Portuguese, Spanish, Korean, Norwegian, Polish, Swedish, Taiwanese, and Vietnamese (9).

2. Objectives

There are approximately 110 million Persian speakers worldwide, justifying the need for a Persian-translated version of DHP. We, hereby, are reporting the process of translation of DHP into Persian language and its validation.

3. Methods

3.1. Translation of DHP

A forward and backward procedure was used to translate DHP from its English version to Persian. First, two bilingual experts with the instruction to focus on concepts rather than literal aspects of the text and that the audience would be the normal population, translated the questionnaire to Persian, separately. Then, the two translated questionnaires were merged by one of the authors, and an English to Persian translated questionnaire was obtained. In the next step, two other English professional translators who had not seen the original English questionnaire translated the Persian version again into English. Then, a panel of experts with educational background of psychiatry, clinical psychology, general practitioner, and health education, who were all bilingual, compared the original questionnaire with the Persian to English translated questionnaire, and eventually, after some linguistic and cultural adaptation, a basic Persian version was finalized. This version was tested in twenty people aged over 18 with different socioeconomic statuses in face-to-face interviews performed by the first author. After minor revision, the final version of the questionnaire was adopted.

3.2. Validation of the Questionnaire

Validation of the questionnaire was performed according to a cross-sectional study protocol. The study was carried out in Tehran, Iran, from August to September 2017. Participants in this study were volunteer individuals aged 18 and higher from two college students dormitories and visitors to three public parks who were recruited by convenience sampling. Based on previous studies (13, 14), the sample size was decided to be at least 10 times the questionnaire items. We, therefore, targeted a sample size of 240. Four trained interviewers initially introduced the objective of the study. In the case of subjects' agreement to participate in the study, written informed consent was obtained, and finally, the questionnaire was completed in the presence of interviewers. Completing each questionnaire took up to 10 minutes. A total of 239 participants answered the questionnaire. The data were analyzed using SPSS and Lisrel.

3.3. Reliability

In order to determine the reliability of the questionnaire by test-retest, 35 college students were invited to complete the questionnaires in a two-week interval. Cronbach's alpha coefficient was used to assess the internal consistency of the questionnaire. The alpha coefficient was separately measured for each subscale of the questionnaire, and values higher than 0.7 were considered satisfactory. To assess the questionnaire's stability, the test-retest reliability was examined using the intraclass correlation coefficient (ICC) with ICCs of 0.4 and over were considered acceptable (15, 16).

3.4. Content Validity

A panel of nine experts evaluated the content validity of the questionnaire. Professions of the panelists included

psychiatry, health education and promotion, psychology, and medical doctor with experience in public health and social medicine. The panel evaluated and scored the items of translated DHP for relevance, specificity, clarity, and simplicity on a Likert scale. The resultant content validity index (CVI) of 0.80 and over was considered acceptable ([17]). Furthermore, content validity ratio (CVR) was determined by the panel expressing their opinion about the necessity of each item on a three-point Likert scale with CVR of 0.78 and over was considered acceptable ([18]).

3.5. Face Validity

Twenty subjects from the general population with different ages and levels of education in both sexes were selected to assess the face validity of the items of the questionnaire. Each item was read for each member of the group. Their views on the ambiguity of the question and the problem in its perception and its relation to the purpose of the questionnaire were noted. This resulted in final amendments in the wordings of the questionnaire.

3.6. Construct Validity

A confirmatory factor analysis method was used to determine the construct validity. In this method, the χ^2/df ratio was calculated. A ratio between 2:1 and 5:1 was required for an acceptable fit ([19]). Also, the goodness of fit index (GFI), comparative fit index (CFI), Non-normed fit index (NNFI), normed fit index (NFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) were calculated. While CFI, GFI, NNFI, and NFI values may be between zero and one, a model valued 0.8 or higher was considered acceptable ([15], [19]). In fit models of RMSEA and SRMR, values less than 0.08 were considered acceptable ([20]).

4. Results

The descriptive characteristics of participants are shown in Table 1.

The overall Cronbach's alpha index for the internal reliability of the questionnaire was 0.77 and between 0.47 and 0.69 for its subscales. The questionnaire subscales ICC was between 0.64 and 0.88. The questionnaire's internal consistency and ICC are indicated in Table 2.

For each item, CVR was between 0.78 and 1, relevance CVI was between 88 and 100%, and S-CVI was estimated at 96%. Furthermore, clarity CVI for each item was between 88 and 100, and the clarity of S-CVI was 94%. Content validity indexes and qualitative face validity results were taken as proof that all items were valid. Construct validity was measured using confirmatory factor analysis (Figure 1). The original questionnaire covered six indicators of physical

Table 1. Descriptive Characteristics of the Study Cases (N = 239)[a]

Indicator	Values
Age, y	
18 - 28	140 (58.6)
29 - 38	62 (26)
39 - 48	25 (10.4)
> 48	12 (5)
Sex	
Male	137 (57.3)
Female	102 (42.7)
Job Status	
Jobless	84 (35.1)
Part-time	75 (31.4)
Full-time	79 (33.1)
Retired	1 (0.4)
Education	
Not graduated from high school	43 (18)
High school graduated	56 (23.4)
Academic degree	140 (58.6)
Marital status	
Married	85 (35.6)
Single	141 (59)
Divorced	10 (4.2)
Widow(er)	3 (1.3)
Physical illness	
Yes	54 (22.6)
No	185 (77.4)

[a]Values are expressed as No. (%).

Table 2. Internal Consistency and ICC of Questionnaire Subscales

Questionnaire Subscales	Cronbach's Alpha (95% CI) (N = 239)	ICC (95% CI) (N = 35)
Physical health	0.69	0.88 (0.78 - 0.94)
Mental health	0.59	0.75 (0.55 - 0.86)
Social health	0.53	0.77 (0.60 - 0.88)
Perceived health	-	0.68 (0.46 - 0.82)
Self-esteem	0.47	0.87 (0.76 - 0.93)
Anxiety	0.62	0.77 (0.59 - 0.87)
Depression	0.62	0.82 (0.68 - 0.90)
Pain	-	0.75 (0.56 - 0.86)
Disability	-	0.64 (0.40 - 0.80)

health (items 8, 9, 10, 11, and 12), mental health (items 1, 4, 5, 13, and 14), social health (items 2,6 ,7 , 15, and 16), self-esteem (items 1, 2, 4, 6, and 7), anxiety (items 2, 5, 7, 10, 12, and 14), and depression (items 4, 5, 10, 12, and 13). To determine fitness indexes, three subscales of physical health, mental health, and social health, as general health index, and subscales of self-esteem, anxiety, and depression were separately analyzed by first confirmatory factor analysis using Lisrel software (see Table 3). The fitness indexes, including χ^2/df, RMSEA, SRMR, GFI, NNFI, NFI, and CFI were within good or acceptable range.
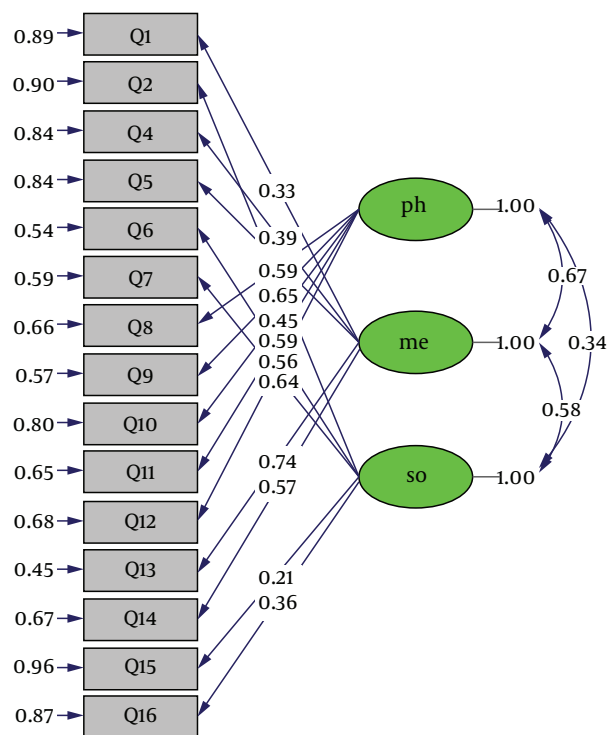
Figure 1. Confirmatory factor analysis of Persian-translated version of DHP

5. Discussion

The present study reports the process of translation of DHP to Persian language and further exploration of psychometric properties of the translated version. The original English version was translated into Persian, and adapted to this language by confirmatory factor analysis. Although a Persian version of WHOQOL and SF-36 are already available, DHP appears to be more convenient for the assessment of the quality of life.

Our study was able to demonstrate that all of the six subscales of the original version, i.e., physical health, mental health, social health, self-esteem, anxiety, and depres-

sion, were statistically valid and reliable in the Persian translation. Moreover, I-CVI and S-CVI indexes for relevance and clarity of items, as well as for the whole questionnaire, exceeded 88%, indicating good relevance and clarity of the items. Furthermore, the CVR index was between 0.78 and 1 for each item, which, according to Lawshe (21), indicating an acceptable content validity. The translated DHP Cronbach's alpha index in this study was 0.77, and for specific subscales ranged from 0.47 to 0.69, indicating moderate reliability. The self-esteem subscale had the lowest value. The reliability index in the original study, however, was between 0.55 and 0.78 (4). This index has been reported to be less than or equal to 0.7 in other studies (9, 22, 23); nevertheless, in one study, it was equal to or higher than 0.87 for different subscales (5). Low alpha value can be a result of a small number of questions, low internal consistency, and weak structural heterogeneity. The more the items of a test are relevant, the higher the alpha coefficient. However, a high alpha coefficient does not always mean a high internal consistency of the tool because this coefficient is influenced by the length of the test. If the test is short, the alpha value reduces (24).

The ICC values in this study were between 64% and 88%, which were quite promising in terms of stability and reproducibility of the questionnaire. The ICC values in the present study, however, were higher than in other studies (5, 25, 26) and even values acquired in the original Duke version's review (4).

For the assessment of the construct validity of Persian translated DHP, we tested CFA for four subscales. Fit index values, including χ^2/df, RMSEA, SRMR, CFI, GFI, NNFI, and NFI, were all within the acceptable range. Physical health, mental health, and social health subscales were shown to be able to determine the general health index. Also, self-esteem and common psychiatric disorders such as anxiety and depression items were shown to be reliably measured. The convergent and discriminant validity of DHP by score correlations between DHP and sickness impact profile, Tennessee Self-Concept scale, and Zung Self-Rating Depression scale (4), or by assessment of the scores differences between substance user and non-user individuals and between single parent and non-single parent conditions of participants (5) has been measured previously. We, however, used confirmatory factor analysis for the assessment of the construct validity of the instrument.

5.1. Conclusions

The Persian translated version of DHP was able to qualify psychometric properties required for a questionnaire, including reliability, content validity, face validity, and construct validity.

Table 3. Confirmatory Factor Analysis Results for Different Indexes

Index	χ^2/df	RMSEA	SRMR	GFI	NNFI	NFI	CFI
General health	2.36	0.076	0.073	0.90	0.87	0.82	0.89
self-esteem	1.65	0.052	0.043	0.96	0.92	0.91	0.96
Depression	1.43	0.043	0.033	0.99	0.97	0.96	0.99
Anxiety	1.52	0.047	0.041	0.98	0.95	0.93	0.97

5.2. Limitations

Regarding sampling, a selection bias could happen in convenience sampling. More than 70% of our sample was educated at the high school level or higher. This rate is somewhat higher than the general population literacy rate. Furthermore, our study does not prove that the Persian version of DHP will have the same results in cases with very lower education.

Acknowledgments

Footnotes

References

1. Svalastog AL, Donev D, Jahren Kristoffersen N, Gajovic S. Concepts and definitions of health and health-related values in the knowledge landscapes of the digital society. *Croat Med J*. 2017;**58**(6):431–5. doi: 10.3325/cmj.2017.58.431. [PubMed: 29308835]. [PubMed Central: PMC5778676].

2. Karimi M, Brazier J. Health, Health-Related Quality of Life, and Quality of Life: What is the Difference? *Pharmacoeconomics*. 2016;**34**(7):645–9. doi: 10.1007/s40273-016-0389-9. [PubMed: 26892973].

3. The Whoqol Group. The World Health Organization quality of life assessment (WHOQOL): Development and general psychometric properties. *Social Science & Medicine*. 1998;**46**(12):1569–85. doi: 10.1016/s0277-9536(98)00009-4.

4. Parkerson GJ, Broadhead WE, Tse CK. The Duke Health Profile. A 17-item measure of health and dysfunction. *Med Care*. 1990;**28**(11):1056–72. doi: 10.1097/00005650-199011000-00007. [PubMed: 2250492].

5. Hanh VT, Guillemin F, Cong DD, Parkerson GJ, Thu PB, Quynh PT, et al. Health related quality of life of adolescents in Vietnam: cross-cultural adaptation and validation of the Adolescent Duke Health Profile. *J Adolesc*. 2005;**28**(1):127–46. doi: 10.1016/j.adolescence.2003.11.016. [PubMed: 15683639].

6. Orley J, Kuyken W. *Quality of Life Assessment: International Perspectives : Proceedings of the Joint-Meeting Organized by the World Health Organization and the Fondation IPSEN in Paris, July 2-3, 1993*. Berlin, Heidelberg: Springer Berlin Heidelberg; 1994.

7. Ware J, Gandek B. Overview of the SF-36 Health Survey and the International Quality of Life Assessment (IQOLA) Project. *J Clin Epidemiol*. 1998;**51**(11):903–12. doi: 10.1016/s0895-4356(98)00081-x. [PubMed: 9817107].

8. Moons P, Budts W, De Geest S. Critique on the conceptualisation of quality of life: a review and evaluation of different conceptual approaches. *Int J Nurs Stud*. 2006;**43**(7):891–901. doi: 10.1016/j.ijnurstu.2006.03.015. [PubMed: 16696978].

9. Baumann C, Erpelding ML, Perret-Guillaume C, Gautier A, Regat S, Collin JF, et al. Health-related quality of life in French adolescents and adults: norms for the DUKE Health Profile. *BMC Public Health*. 2011;**11**(1):401. doi: 10.1186/1471-2458-11-401. [PubMed: 21619606]. [PubMed Central: PMC3123210].

10. The WHOQOL Group. The World Health Organization quality of life assessment (WHOQOL): Position paper from the World Health Organization. *Social Science & Medicine*. 1995;**41**(10):1403–9. doi: 10.1016/0277-9536(95)00112-k.

11. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. *J Clin Epidemiol*. 1993;**46**(12):1417–32. doi: 10.1016/0895-4356(93)90142-n. [PubMed: 8263569].

12. Perret-Guillaume C, Briancon S, Guillemin F, Wahl D, Empereur F, Nguyen Thi PL. Which generic health related quality of life questionnaire should be used in older inpatients: Comparison of the duke health profile and the MOS short-form SF-36? *The journal of nutrition, health & aging*. 2010;**14**(4):325–31. doi: 10.1007/s12603-010-0074-1.

13. Gable RK, Wolf MB. *Instrument Development in the Affective Domain Measuring Attitudes and Values in Corporate and School Settings*. Dordrecht: Springer Netherlands : Imprint: Springer; 1993.

14. Khazaee-Pool M, Moridi M, Ponnet K, Turner N, Pashaei T. Psychometric properties of the Persian version of the Time to Relapse Questionnaire (TRQ) in substance use disorder. *Am J Drug Alcohol Abuse*. 2016;**42**(6):682–8. doi: 10.3109/00952990.2016.1172593. [PubMed: 27286097].

15. Khazaee-Pool M, Pashaei T, Ponnet K, Jafari F, Alizadeh R. Decisional Balance Inventory (DBI) Adolescent Form for Smoking: Psychometric Properties of the Persian Version. *BMC Public Health*. 2017;**17**(1):507. doi: 10.1186/s12889-017-4425-2. [PubMed: 28545471]. [PubMed Central: PMC5445340].

16. Plichta SB, Kelvin EA, Munro BH. *Munro's statistical methods for health care research*. Philadelphie, Penn: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2013.

17. Polit DF, Beck CT. The content validity index: are you sure you know what's being reported? Critique and recommendations. *Res Nurs Health*. 2006;**29**(5):489–97. doi: 10.1002/nur.20147. [PubMed: 16977646].

18. Lawshe CH. A Quantitative Approach to Content Validity. *Personnel Psychology*. 1975;**28**(4):563–75. doi: 10.1111/j.1744-6570.1975.tb01393.x.

19. Kline RB. *Principles and practice of structural equation modeling*. New York: Guilford Press; 2016.

20. Hooper D, Coughlan J, Mullen MR. Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*. 2008;**6**(1):53–60. doi: 10.21427/D7CF7R.

21. Ayre C, Scally AJ. Critical Values for Lawshe's Content Validity Ratio. *Measurement and Evaluation in Counseling and Development*. 2017;**47**(1):79–86. doi: 10.1177/0748175613513808.

22. Novella J, Ankri J, Morrone I, Guillemin F, Jolly D, Jochum C, et al. Evaluation of the quality of life in dementia with a generic quality of life questionnaire: the Duke Health Profile. *Dement Geriatr Cogn Disord*. 2001;**12**(2):158–66. doi: 10.1159/000051251. [PubMed: 11173890].

23. Rapin A, Drame M, Jolly D, Novella J, Mahmoudi R, Toussaint-Thorin M, et al. Psychometric properties of the Duke Health Profile in a neuromuscular disease population. *Eur J Phys Rehabil Med*. 2016;**52**(1):57–64. [PubMed: 25986224].

24. Tavakol M, Dennick R. Making sense of Cronbach's alpha. *Int J Med Educ*. 2011;**2**:53–5. doi: 10.5116/ijme.4dfb.8dfd. [PubMed: 28029643]. [PubMed Central: PMC4205511].

25. Tran PL, Leigh Blizzard C, Srikanth V, Hanh VT, Lien NT, Thang NH, et al. Health-related quality of life after stroke: reliability and validity of the Duke Health Profile for use in Vietnam. *Qual Life Res*. 2015;**24**(11):2807–14. doi: 10.1007/s11136-015-1016-5. [PubMed: 26038217].

26. Vo TX, Guillemin F, Deschamps JP. Psychometric properties of the DUKE Health Profile-adolescent version (DHP-A): a generic instrument for adolescents. *Qual Life Res*. 2005;**14**(10):2229–34. doi: 10.1007/s11136-005-7021-3. [PubMed: 16328902].