ORIGINAL ARTICLE

PSYCHOMETRIC PROPERTIES OF THE EUROHIS-QOL (WHO-8) – MALAY VERSION IN PEOPLE WITH COGNITIVE IMPAIRMENT

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Abstract

Objective*: Although a number of quality of life (QoL) measures have been developed for assessing QoL in older adults, few have been validated in developing countries. This study aimed to examined the construct validity and reliability of the EUROHIS-QOL (WHO-8) assessment in people with cognitive impairment in Malaysia. *Methods*: A cross sectional, quasi experimental study design involving people with cognitive impairment was employed. Two groups of people with cognitive impairment from government nursing homes (n=110) and community home care (n=109) were recruited. Measurements used in the study included; the EUROHIS-QOL (WHO-8), the Short Mini Mental State Examination (SMMSE), the Barthel Index (BI) and the Cornell Scale for Depression in Dementia (CSDD). *Results*: Exploratory factor analysis revealed a two-factor structure with loadings ranged from 0.59 to 0.88. The ordinal α value for the WHO-8 was 0.88. Confirmatory factor analysis showed better fit indices for two factors model. The WHO-8 demonstrates large correlation with cognitive impairment (SMMSE r=0.44; p<0.01), physical functions (BI r=0.44; p<0.01) and depression (CSDD r=-0.44; p<0.01). *Conclusion*: The WHO-8 has a satisfactory construct validity and reliability and hence an adequate tool to measure QoL in people with cognitive impairment in Malaysia. *ASEAN Journal of Psychiatry, Vol. 17 (1): January to June 2016: XX XX.

Keywords: Quality Of Life, Cognitive Impairment, Malaysia, Psychometric

Introduction

As the number of people reaching old age increases, the evaluation of quality of life (QoL) among older adults has become critically important since study findings have direct implications for ageing policy [1]. Most researchers acknowledge that QoL among older adults reflects a multidimensional concept, including physical, emotional and social domains [2, 3]. There is, however, little consensus concerning the more specific areas of life that are necessary to include in QoL assessment and the definition of the QoL in relation to older adults [4, 5].

In relation to diverse definitions and concepts of QoL, various QoL measures have been developed to examine a broad (generic) or narrow range (condition specific) of QoL [6-9]. The World Health Organization (WHO) has avoided this through the development of a family of QoL instruments, all of which have been based on an underlying concept of QoL as: 'An individual's perception of their position in life in the context of the culture and value systems in which they live and in

relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to their environment' [10].

Among the measures developed from this definition are the WHOQOL-100, WHOQOL-BREF and WHOQOL-OLD which were developed by the WHOQOL-Group to assess QoL in multicultural populations [3, 11]. In addition, the WHO-8 was derived from the reanalysis of the WHOQOL-100 and WHOQOL-BREF [8]. It is a brief adaptation measure aimed to assess the physical, psychological, environmental and social aspects of QoL [12]. The WHO-8 was developed based on three large, multinational samples of the WHOQOL-100 and the WHOQOL-BREF (n >20 000) and demonstrated good relaibility in this sample [8, 12]. It also exhibited good convergent and discriminant validity with other health measures [12]. Nonetheless, the use of the WHO-8 in studies is rare [12, 13] and there is no data to support its psychometric performance with regards to use in populations with cognitive impairment. Therefore, the objective of this study was to determine the validity and reliability of the WHO-8 assessment in people with cognitive impairment following the conceptual model of validity proposed by Kane [14].

Methods

Study design and Procedures

Participants were randomly sampled from government nursing homes and community home care. Government nursing homes in Malaysia is a secured facility and fully funded by the government. The nursing homes which participated in this study were Rumah Sri Kenangan in Seremban, Melaka, Ulu Kinta and Kelantan. Participants of home care on the other hand were sampled from memory clinic of government hospital of Selayang, Hospital Kuala Lumpur and Hospital Sungai Buloh. The selection of these centres was based on the geographical location which is situated in the city of Kuala Lumpur or nearest to the city of Kuala Lumpur (until the needed number of participants was reached).

All patients aged 60 years old and above who attended memory clinic or residing in the nursing homes were invited to participate in the study. Written informed consent was obtained from all participants prior to the interview. Consented participants were assessed for evidence of cognitive impairment based on the SMMSE score. Participants who scored below 11 in the SMMSE were recruited in the study.

Face to face interview was conducted involving the questionnaires mentioned below. These questionnaires were translated into Malay language prior to administration to participants. Detailed explanation of the translation process (eg: WHO-8) was explained under the measures section below. Those who were unable to communicate or understand Malay or English language were excluded from the study.

Ethical Approval

This study was approved by the Human Research Ethics Committee of the university, the Social Welfare Department of Malaysia and the Ministry of Health of Malaysia.

Measures

Demographic data

Socio-demographic questions included age, gender, ethnicity, marital status, education attained, financial status, and perceived health condition.

EUROPE Health Interview Survey-Quality of Life (WHO-8)

The original WHO-8 (English) was a derived QoL measures from the original WHOQOL-100 and the WHOQOL-BREF [8, 12]. It constitutes of 8 items which measured the psychological, physical, social and environmental domains of the WHOQOL-BREF [8]. Each item was rated using a 5-point response format on a Likert scale, ranging from '0 = not at all/very poor' to '5 = completely/very good'. The overall QoL score

was computed by summing all the scores on the eight items, with higher scores indicating better QoL [8]. The scale showed a good internal consistency with an alpha ranging from 0.80 to 0.83 and low to moderate floor and ceiling effects [12].

Adaptation of the WHO-8-Malay version from the original English version was done by the Institute of Translation of Malaysia in accordance to the WHO guideline of translating and adapting of instruments [15] in which, two independent native Malay language experts carried out the forward translation whose quality was checked by another independent translators. The backward translation into English language was carried out by another two independent translators. Discrepancies out of this process were resolved and consensus reached about the harmonized Malay version of WHO-8. The final version of translated questionnaire was approved by the Institute of Translation of Malaysia and researchers were consulted by the panel during this process.

Short Mini Mental State Examination (SMMSE)

The SMMSE [16] is a brief cognitive screening tool derived from the original Mini Mental State Examination (MMSE) [17]. It consists of 12 items and is scored binomially which gives a total score out of 12. The cut off score of 10 was suggested by the original author to differentiate those with cognitive impairment from the normal population with a reported sensitivity of 98% and specificity of 91% [16].

The Cornell Scale of Depression in Dementia (CSDD)

The CSDD [18] is an assessment specifically designed to screen depression in a dementia population. It consists of 19 items concerning physical well-being, sleep, appetite and other vegetative symptoms. Each of the items are rated as; a (unable to evaluate), 0 (absent), 1 (mild or moderate) and 2 (severe). The scores of the individual items are added and a cut-off of 8 indicates mild depression and 12 for major depression [18].

The Barthel Index (BI)

The BI [19] was the first functional measure developed to assess the rehabilitation process in patients with a neuromuscular or musculoskeletal disorder. It consists of 10 items; feeding, moving from wheelchair to bed and return, getting on and off toilet, bathing self, walking on level surface, ascending and descending stairs, dressing, and controlling bowels and bladder [19]. Each item is scored on a 3-point scale, with 0 = totally dependent to 2 = totally independent. Items are weighted and added to give a score range from 0 to 100. A score of 100 indicates total independence; 91–99 a slight dependence; 61–90 moderate dependence; 21–60 severe dependence and 0–20 mean total dependence [20].

Statistical Analyses

Data were analysed using version 16.0 of the Statistical Package for the Social Sciences (SPSS 16.0; SPSS Inc., Chicago) [21] and AMOS v.20 (AMOS v.20; IBM Corporation, New York) software. Missing values and data entry errors (value errors and double entry errors) were checked prior to analysis. Descriptive statistics and categorical variables were examined and presented as counts, and percentages. Normality of the data was assessed through frequencies and data distribution of the WHO-8 scale.

Validity and Reliability Testing

The validation process in this study followed a conceptual model of validity proposed by Kane [22] which assume that validity could be ensured by aggregating evidence about the following types of validity: Content validity, criterion validity and construct validity.

Content validity of WHO-8 was ensured through a rigorous process of review and filed test of the original English version of WHO-8. ***Criterion validity***, which is based on testing the correlation of scores from the test under investigation with externally, established criteria that can be specified. However, developing criterion measures is more challenging where the goal is to measure some ability or attribute that is not defined in terms of a specific behaviour or performance. Thus

for construct like QoL or mental abilities it was reported that none of external measures is necessarily more valid than the test, implying that criterion validity might not be applicable in our case. ***Construct validity*** in this study was ensured through exploratory and confirmatory factor analysis and the correlation of WHO-8 with the SMMSE, the CSDD and the BI, with hypothesis that there will be a significant correlation between the WHO-8 and these scales.

Exploratory factor analysis was used to investigate the factor structure of the WHO-8 [23]. Principal Axis Factoring with oblique rotation was used with the assumption that the resultant factors are correlated. The pattern matrix was then examined for the loadings and cross loading, with an item loading of more than 0.4 was considered significant to be retained providing that it does not load highly to other factors. The adequacy for factor analysis was checked using the Kaiser–Meyer–Olkin (KMO) and Bartlett's test. Value closer to 1 for the KMO indicates that factors resulted from the factor analysis is distinct and reliable [24]. The level of significance for the Bartlett test was set at $p<0.05$.

Confirmatory factor analysis was performed using AMOS v.20 software to compare two competing models. The original one factor model proposed by Schmidt and colleagues [12] and the two factor model obtained from the EFA. Fit indices including, Chi square value, CMIN discrepancy index, Comparative Fit Index (CFI), Goodness of fit Index (GFI), Normed Fit Index (NFI) and Root Mean Square (RMS) were presented.

Reliability of the WHO-8 was assessed by examining the ordinal alpha of the scale based on polychoric correlation matrix. R software was used and reliability if item deleted and total reliability was presented.

Results

Sample Characteristics

A total of 315 people with cognitive impairment were invited to participate in the study. In all, 295 participants gave their verbal consent but only 219 of the participants met the inclusion criteria and completed the questionnaires, giving a response rate of 69.5% [25]. In comparison to the participants in the study, non-consenting participants were statistically younger with a mean age of 69.1 years old ($t=-2.46$, $df=313$, $p=0.01$). There was no difference with regards to gender ($\chi^2=0.07$, $df=1$, $p=0.79$) and participation response rates between study cohorts ($\chi^2=2.47$, $df=1$, $p=0.12$).

Table 1 summarizes the comparison of socio-demographic profile of people with cognitive impairment in home care and nursing home. Out of 219 participants, 109 participants were from the home care and 110 were from nursing homes. There were no significant differences in age, gender and level of education attained between the study cohorts (all $p>0.05$). Among the three ethnicities, the proportion of the Malays in nursing homes was significantly higher (69.10%) compared to the Chinese (13.60%) and the Indians (17.30%) ($X^2=34.71$, $df=2$, $p<0.01$). There were significant differences in marital status between people with cognitive impairment in the study cohorts. Participants in the nursing homes were more likely to be single/separated (58.20%) ($\chi^2=92.93$, $df=2$, $p<0.01$) and reported significantly lower income (91.30%) ($\chi^2=107.58$, $df=1$, $p<0.01$) compared to those at home care.

In relation to other variables, people with cognitive impairment in the home care had significantly better cognitive function and QoL compared to those in nursing homes. No significant difference in depression and physical function was reported between study cohorts.

Table 1. Socio-demographic profiles of people with cognitive impairment in study population

Variables		Study cohort		Statistics (a)
		Home care	Nursing home	
		N (%)	N (%)	
Age	Mean (SD)	73.66 (7.68)	71.56 (7.79)	t=2.00, df=217, p=0.05
Gender	Male	56 (51.40)	55 (50.00)	
	Female	53 (48.60)	55 (50.00)	χ^2=0.04, df=1, p=0.84
Ethnicity	Malay	34(31.20)	76 (69.10)	
	Chinese	48 (44.00)	15 (13.60)	
	Indian	27 (24.80)	19 (17.30)	χ^2=34.71, df=2, p<0.01
Education	Non-formal	26 (23.90)	36 (32.70)	
	Primary school	72(66.10)	62 (56.40)	
	Higher	11 (10.10)	12 (10.90)	χ^2=2.40, df=2, p=0.30
Marital status	Single/separated	3 (2.80)	64 (58.20)	
	Partnered	53 (48.60)	7 (6.40)	
	Widowed	53 (48.60)	39 (35.50)	χ^2=92.93, df=2, p<0.01
Financial status	Average	88 (80.70)	12 (10.90)	
	Below average	21 (19.30)	98 (89.10)	χ^2=107.58, df=1, p<0.01
Perceived health condition	Not healthy	53 (52.50)	48 (47.50)	
	Healthy	56 (47.50)	62 (52.50)	χ^2=0.55, df=1, p=0.46
SMMSE	Mean (SD)	5.93 (2.51)	5.11 (2.42)	t=2.45, 217, p=0.02
WHO-8	Mean (SD)	3.52 (0.40)	3.04 (0.46)	t=8.50, 217, p<0.01
BI	Mean (SD)	77.06 (20.7)	77.45 (17.8)	t=-1.50, 217, p=0.88
CSDD	Mean (SD)	8.60 (3.76)	9.0 (4.04)	t=0.77, 217, p=0.45

Notes: SMMSE = Short Mini Mental State Examination; WHO-8 = EUROHIS-QOL, BI = Barthel Index, CSDD = Cornell Scale for Depression in Dementia; a = t: student t-test, χ2 : Chi-square

Exploratory Factor Analysis

Results were supportive of sample adequacy to perform EFA. The KMO for the WHO-8 was 0.79. Bartlett's test of sphericity χ^2 (222) = 610.005, p <0.01, indicating that there is sufficient correlation between items. Two factors emerged from EFA with Eigenvalues of 3.57 and 1.43 respectively, giving a cumulative variance of 62.54%.

Table 2. Loadings of items on factors from the factor structure matrix for two factors model

Items	F1	F2
How satisfied are you with your ability to perform your daily living activities?	**0.871**	
How satisfied are you with yourself?	**0.690**	
Do you have enough energy for everyday life?	**0.716**	
How satisfied are you with your health?	**0.837**	
How would you rate your quality of life?		**0.593**
Have you enough money to meet your needs?		**0.720**
How satisfied are you with your personal relationships?		**0.886**
How satisfied are you with the conditions of your living place?		**0.755**

Extraction Method: Exploratory Factor Analysis. Rotation Method: Oblimin with Kaiser Normalization. Limit for factor loading = 0.4; Kaiser-Meyer-Olkin = 0.79; Bartlett's test of sphericity χ^2 (222) = 610.00, p <0.01; % variance = 62.54

The factor loadings for the two factors were shown in Table 2 above. The first factor explained 44.64% of the variance and included satisfaction on performing ADL (r=0.87), satisfaction with self (r=0.69), energy for everyday life (r=0.72) and satisfaction with health (r=0.84). Factor 2 explained 17.90% of the variance and consists of satisfaction with personal relationship (r=0.89), satisfaction with living condition (r=0.76), money (r=0.72) and perceptions on QoL (r=0.59). Correlation between the two factors was 0.36.

Table 3. Correlation of WHO-8 with other measurement scales

	WHO8	P value
SMMSE	.44	p<0.01
CSDD	-.44	p<0.01
BI	.44	p<0.01

Notes: SMMSE = Short Mini Mental State Examination; WHO8 = EUROHIS-QOL, CSDD = Cornell Scale for Depression in Dementia, BI = Barthel Index

Table 3 shows the correlation of WHO-8 with the three other scales for the further test of construct validity. It is shown that the WHO-8 demonstrates good correlation with cognitive impairment (SMMSE r=0.44; p<0.01), physical functions (BI r=0.44; p<0.01) and depression (CSDD r=-0.44; p<0.01).

Confirmatory Factor Analysis

Results of CFA are shown in figure 1 and 2. It was observed that two factor model gave better fit indices than the one factor model. Loading were improved in two factor model which was associated with improvement in fit indices. The comparative fit index CFI improved from 0.715 to 0.867. The goodness of fit index GFI reached the threshold of optimal fit with value of 0.904 for two factors model. However, root means square error (RMS) still higher than the stipulated value of 0.08. The correlation between the two factors was large (0.57).

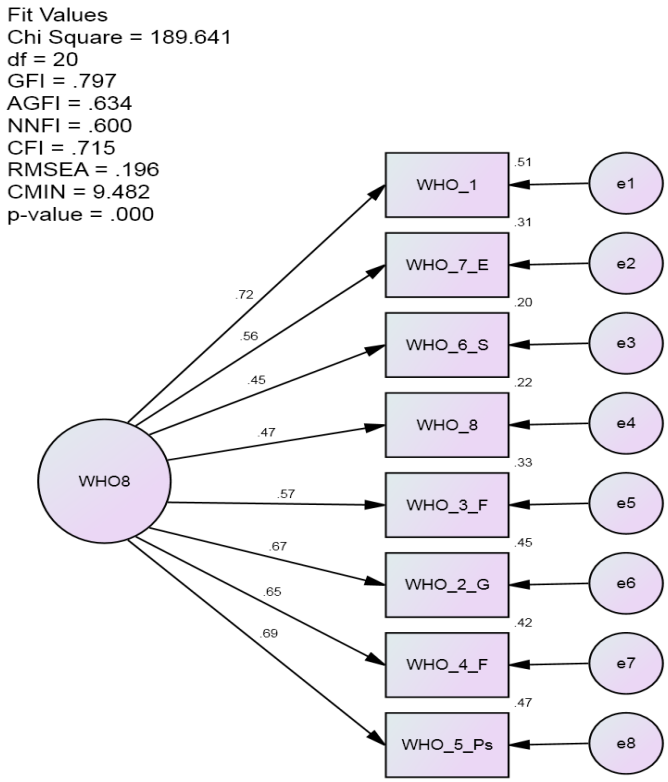

Figure 1. One Factor Model of the WHO-8

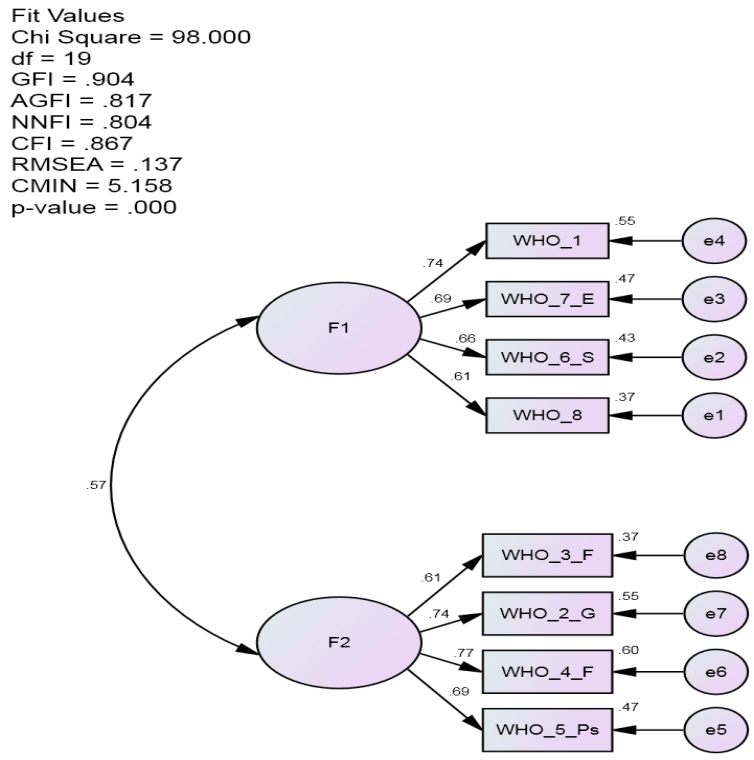

Figure 2. Two Factor Model of the WHO-8 Reliability of the WHO-8 Items

The raw and standardized alpha was found to be 0.88 for the scale. None of the variable deletion would improve the reliability of the scale beyond 0.88.

Table 4. Reliability of the WHO-8 Items

Item	Reliability if an item is deleted
WHO_1	0.85
WHO_7_E	0.86
WHO_6_S	0.88
WHO_8	0.87
WHO_3_F	0.86
WHO_2_G	0.86
WHO_4_F	0.86
WHO_5_Ps	0.85
Total	0.88

Discussion

There has been a shift in the assessment of medical treatment and intervention towards inclusion of patient's perspective and expectation. QoL is a new outcome measure that focuses on patient's perception of his/her own life in relation to different domains that include health. Among the QoL measures, the WHO-8 has been documented to be useful tool of assessing QoL among healthy and patient populations.

Indeed, validity and reliability are the most important characteristics of the instrument that enable proper measurement of the outcome. However, there is no single indicator can reflect the psychometric properties of a translated questionnaire. Translated questionnaire is usually expected to behave

differently from the original context owing to the differences in culture and norms; respondents characteristics, and also by perception and degree of education sometimes. We are reporting the results of first study in Malaysian context.

In regards to the WHO-8, our finding shows that all items achieved a satisfactory loading to the respective factors. All items achieved a loading more than 0.4, exceeded the criteria for factor analysis [26]. Thus we can say that the convergent validity has been achieved by the items. It is pertinent to note that different method of rotation may affect the loadings, in our case we choose oblimin rotation as we believed that the factors are correlated. In this study, the WHO-8 items has shown satisfactory discriminant validity by the fact that the cross loading of all items were greater than 0.15 [27]. Thus we are sure that the scale will be able to categorize respondent into different levels of QoL.

Regarding the factor structure, opposed the originally hypothesized factor structure of the WHO-8. A meticulous check of the items, one can deduce that first factors items include endogenous related items (ability to do things, self-satisfaction, energy and health perception). On the other hand, the four items which refer to QoL, money, relation and living condition may refer to external resources items. Nonetheless, our result is consistent with a study conducted in German that suggested that the WHO-8 is made of two factors rather a single factor of 8 items using EFA approach [13]. Surprisingly, the CFA approach of German sample could confirm one factor model with acceptable fit. In this study, we found that two factors model yielded better fit indices although didn't reach the optimum threshold for all of them. This affirms the fact that cultural and linguistic differences may affect the performance of a scale. It also pertinent to point out that difficulties in translating English term into Malay has been acknowledged since 1960, as the Malay language vocabulary is highly influenced by firstly Sanskrit, secondly Arabic and thirdly the English language. Moreover, the cross cultural validation of the WHO-8 in 10 European countries, showed that two of the item didn't fit the model in the Romania sample, affirming the possibility of cultural difference on the performance of the scale [12], and Rocha et al [28] hardly confirmed one factor model. It is important to note that the fit indices of the confirmatory factor analysis in these studies didn't reach the optimal values for all subpopulations. The impact of study population was documented in the development stage of the WHO-8 where it was shown that the result from ill participant differed from normal participants [29]. So the two factor analysis might be explained this fact as well.

Additionally, correlation between the WHO-8 and other scales was significantly large in this study. This affirms the construct validity of WHO-8. Expectedly, those who are depressed, have poor cognitive function, and poor physical functions would have poor QoL. These result are in tandem with results of Schmidt and colleagues whose reported good convergent validity of the WHO-8 with the Mental Health Index (MHI5), general health variable and social support (OSLO measure) [12].

Reliability on the other hand is the ability of the scale to reflect the true variation among the score with minimal error and it is quantified through with ordinal alpha. The ordinal alpha for this study was 0.88 for overall scale. This reflect that the true variance was large relative to the total measured variance [30]. Although we made all necessary steps to ensure optimum reporting of results, we acknowledge some limitation evident in this study. First the inclusion of Malay participants in this study may hinder generalizing the results to other ethnicities and may necessitate further testing of the scale. Secondly, Cronbach's alpha might be a limited indicator of reliability compared to test-retest reliability. However, it wasn't feasible to do test-retest reliability in our study.

In conclusion, the WHO-8 is a useful instrument in assessing QoL; it is valid and reliable in Malaysian context with people with cognitive impairment. It is confirming the trends of using shorter questionnaire would yield better response rate and perhaps more valid results.

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