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Psychometric Properties of the WHO Quality of Life Disability (WHOQOL-DIS) among Persons with Disabilities in Malaysia

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ABSTRACT

The main objective of this paper is to test the psychometric properties of the World Health Organization's instrument (WHOQOL-DIS) in assessing the quality of life (QoL) in a sample of persons with disabilities in Malaysia. The sample consisted of 300 respondents who were stratified based on types of disabilities (hearing and speech, visual and physical impairment). Classical and modern psychometric methods were used to assess the reliability and validity while Cronbach's alpha (α) and Item-total correlation matrix to test the instrument scales and subscales for reliability. Construct validity of the WHOQOL-DIS instrument was assessed using both convergent and discriminant validity. Validity DISQOL module was evaluated using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The WHOQOL-DIS was found to have acceptable levels of reliability and validity for persons with disabilities within the sample. Cronbach's alpha ranged from 0.60 to 0.83 across domains with alpha scores greater than or equal to 0.6 considered acceptable and of adequate internal consistency. Convergent and discriminant validity were satisfactory. Significant correlation was found between each item and the domain to which it had been assigned. The instrument was able to discriminate between healthy and unhealthy respondents for all domains. EFA and CFA revealed similar models of DISQOL module on par with the original version. The results provide satisfactory evidence of the validity

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and reliability of the WHOQOL-DIS as an instrument in assessing the QoL of Persons with Disabilities in Malaysia.

Keywords: Persons with disabilities, quality of life, reliability, validity, WHOQOL-DIS

INTRODUCTION

The number of Persons with Disabilities (PWDs) in Malaysia has grown substantially in recent decades with the increase in the Malaysian population. In 2017, there were a total of 453,258 disabled persons in Malaysia who were registered with the Department of Social Welfare (Department of Social Welfare Malaysia, 2017). However, the figure is less than that estimated by WHO, since PWDs registration with the Department of Social Welfare is on voluntary basis (The Economic and Social Commission for Asia and the Pacific, 2017). Based on the current trend, the number of PWDs in Malaysia is expected to match that of other countries in Asia and the Pacific due to factors such as ageing of population, natural disasters, chronic health conditions, road traffic injuries, poor working conditions and better identification and measurement of disability through new methodologies (Islam, 2015). With a rising number of PWDs and concerted government welfare initiatives, assessing the quality of life (QoL) of PWDs has become increasingly important.

As there is no consensus with no single definition in interpreting quality of life (Felce & Perry, 1995; Kimura & Silva, 2009; Lazim & Osman, 2009), numerous instruments have been developed over the years to measure it. Quality of life cannot be defined specifically as it covers many aspects of life and researchers agree that the definition of QoL is a multidimensional character definition (Dučinskienė et al., 2003; Kane, 2003; Taillefer et al., 2003). Reviews from previous research found that there are over 44 definitions of quality of life and over 800 tools for measuring the quality of life which include those developed for people with intellectual or other cognitive disability and some for use by families (Baker, 2012). The lack of agreement on a concept of QoL across disciplines has hindered attempts to create a multidimensional measurement (Bowling, 2010). Research on populations of PWDs has also suffered from a lack of generic QoL instruments that are truly applicable to this group.

WHOQOL team has developed several generic instruments to measure QoL for different groups of people. One of the instruments is known as WHOQOL-DIS. WHOQOL-DIS is a generic instrument developed specifically to measure QoL of PWDs and is suitable for use cross-culturally. This instrument consists of an existing WHOQOL-BREF and WHOQOL-100 as well as the incorporation of a supplementary disability module (Power & Green, 2010). Many researchers in other countries have used this instrument to measure QoL of PWDs.

Although there have been several studies on QoL in Malaysia using the instruments developed by WHOQOL group

such as WHOQOL-BREF and WHOQOL-HIV Bref (Bandar et al., 2014; Hasanah et al., 2003; Saddki et al., 2009; Shaik et al., 2015), WHOQOL-DIS is still considered new in this country. The WHOQOL-DIS instrument, measuring the generic, cross-cultural quality of life of PWDs can be useful in the development of interventions designed to meet the needs of this population and contribute to rational allocation of resources (Bredemeier et al., 2014) . Even though the Malaysian government seems committed to improve the QoL of PWDs at the policy level, empirically however, there are no specific instruments that could assess the QoL of PWDs in this county. Therefore, this cross-sectional study aimed to take the first step at extracting evidence on the validity and reliability of WHOQOL-DIS as an instrument for measuring the QoL of PWDs in Malaysia.

MATERIAL AND METHODS

Participants

A cross-sectional study was designed where 300 PWDs, stratified into three groups - Hearing and Speech Impaired, Visually Impaired and Physically Disabled - participated in this research. A list of potential respondents was procured from several sources including associations and organizations such as Department of Social Welfare Malaysia, Development Organization for the Blind Malaysia, Society of The Orthopedically Handicapped Malaysia**,** Malaysian Deaf Muslim Association and Social Security Organization (SOCSO). Assistance from these organizations was sought to locate PWDs as potential participants for the survey. The exclusion criteria were: PWDs <18 years of age and those in the mental illness category. Official permission and letters or emails seeking for appointments together with documentation regarding the study were submitted prior to data collection. Data collection was mostly carried out at the venue where the respondents were located. Participation in the survey was voluntary with confidentiality of information assured and would be used for research purposes only. Participants in this study were briefed on the purpose of the study and informed consents were obtained prior to commencing the survey. Assurance was given to participants that they would not be exposed to any kind of harm, physical or psychological as well as social or economic. Face-to-face interview was conducted with the visually impaired respondents, a sign interpreter was employed to assist those with hearing impairment while self-administered questionnaire was administered to the physically disabled respondents. On average, face to face interviews as well as interviews using sign interpreters took approximately one hour, while self-administered took around 45 minutes to complete the questionnaire.

Instruments

The WHOQOL-DIS was implemented by administering of the WHOQOL-BREF together with the disability module. WHOQOL-BREF consists of two global items (overall QoL and general health) and four domains namely physical health (7

items), psychological health (6 items), social relationships (3 items) and environment (8 items). The disability module comprises 12 items that function as a single domain (DISQOL module) with one additional global item which assesses the impact of disability. Overall, WHOQOL-DIS consists of 39 items, including 36 items which were grouped into five domains and 3 global items.

One item within the social relationship domain, pertaining to sexual activity has been removed since there was a high number of missing responses, perhaps due to cultural sensitivities in the Malaysian context. Therefore, a total of 38 items were used in this study. All 38 items contain five Likert response scale, where one indicates low and five indicates high quality of life. As such, higher scores denote a better quality of life. However, there were a few items which were scaled in the negative direction, these items were reversely scored to ensure consistency of the measure of quality of life. All scores were transformed to reflect 4–20 for each domain with higher scores representing higher QoL. Both English and Malay languages were used in the questionnaire. WHOQOL-BREF was available in Malay version (Hasanah et al., 2003), while the DISQOL module was translated into Malay independently by four professionals who were fluent in both languages.

Statistical Analysis

The data were analyzed using SPSS software, version 18.0. Descriptive analyses were generated in the form of frequencies, percentages and means. Reliability of WHOQOL-DIS was assessed through internal consistency check using item-total correlation (Wieland et al., 2017). Internal consistency was measured using Cronbach's alpha for each domain of the WHOQOL-DIS instrument. Cronbach's alpha has a value between 0 and 1 where a value greater than 0.7 is considered acceptable with 0.6 as the lowest acceptable threshold and that reliability increases with increasing Cronbach's alpha value (Sekaran, 2000; van Griethuijsen et al., 2015). An Item-total correlation matrix assessed the reliability of summed scale where several items were summed to form the total scores. The items should be correlated with the total, the corrected item-total correlation should be greater than 0.3 and items with low correlation may have to be dropped (Brzoska & Razum, 2010; Maltby et al., 2007).

Construct validity was assessed by examining both convergent and discriminant validities. The method for assessing convergent validity is by calculating Pearson's Correlation Coefficients between the items of the WHOQOL-DIS and its five domains. Convergent validity is satisfied if the correlation between the items and the domain is strong. Literature suggests values over 0.3 as an acceptable level of correlation (Skevington et al., 2004; Streiner et al., 2015).

Discriminant validity or the ability of the WHOQOL-DIS domains to differentiate among groups was assessed by comparing between the five domains of WHOQOL-

DIS with self-evaluated health conditions. Since the self-evaluate health condition was grouped into two categories (healthy and unhealthy), the difference in the mean score was analyzed using independent sample t-test or the Mann-Whitney U test. Pearson Correlation Coefficients was also used to examine the pattern structure coefficient to determine whether the five domains in WHOQOL-DIS instrument are empirically distinguishable, with an acceptable discriminant validity if the measure of the domain is not too highly correlated with other domains (Sekaran, 2000).

Both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed to test construct validity of the DISQOL module. Exploratory factor analyses were carried out using principal component analysis with Varimax rotation and Kaiser Normalization. Confirmatory factor analysis (CFA) was used to investigate construct validity of the DISQOL module using Analysis of Moment Structure (AMOS) 22 version. Various standard fit indices were used to confirm whether the observed data fit the original structure of DISQOL module: Goodness of fit index (GFI), adjusted goodness of fit index (AGFI), Comparative fit index (CFI) and Root mean squared error of approximation (RMSEA) were also performed. The acceptable scores for a good model fit are: GFI ≥0.90, AGFI ≥0.90, CFI ≥0.90 and RMSEA ≤ 0.08 (Byrne, 2016; Hair et al., 1998; Hu & Bentler, 1999).

Ethical Clearance

Ethical approval for the study was obtained from the University of Malaya Research Ethics Committee (Reference Number: UM.TNC2/UMREC-190). All the participants agreed to participate in this research by signing the informed consent formed.

RESULT

Socio-Demographic Characteristics

A total of 300 Persons with Disabilities (PWDs) participated in the study with a mean age of 31.93 years (standard deviation = 13.29); 68.3% were male and 65.6% of them have completed secondary education. Of the total sample, 30.0% had hearing impairment, 16.0% were visualy impaired and 54.0% were physically impaired. About 17.5% of the respondents were living alone and majority had a household income of less than RM3000 monthly (Table 1).

Table 1

Socio-demographic characteristics

Variable	Frequency	%
Gender		
Male	205	68.3
Female	95	31.7

Table 1 *(Continued)*

Variable	Frequency	%
Age Group		
18 - 24	124	41.3
25 – 39	93	31.0
40 – 60	69	23.0
60 >	14	4.7
Education Level		
Primary school	15	5.0
Secondary school	196	65.6
College/University	88	29.4
Types of Disabilities		
Hearing and speech impaired	90	30.0
Visually impaired	48	16.0
Physically disabled	162	54.0
Living Arrangement		
Living alone	51	17.5
Living with family	170	58.2
Friends	71	24.3
Monthly Household Income		
< RM1000	87	34.1
RM1000 – RM3000	101	43.6
RM3000 >	37	14.5

Descriptive Statistics

The scores of all 36 items WHOQOL-DIS ranged from minimum four to maximum twenty (Table 2). The mean of the domain scores was 14.42 (SD 2.28) for the physical domain, 14.97 (SD 2.29) for the psychological domain, 15.48 (SD 2.79) for the social relationships domain, 14.70 (SD 2.51) for the environment domain, and 13.71 (SD 2.07) for the disability module domain.

Reliability

Internal consistency (Cronbach's α) coefficients were 0.60 to 0.83 at domain level (Table 2) and 0.91 for the whole questionnaire. As shown in Table 1, overall the value of Crobach's α of this study did not differ much from the study conducted by WHOQOL Group (Power & Green, 2010), except in physical health domain. Even though all alpha scores were considered acceptable, however, the scores in physical

Table 2

Cronbach's Alpha

The WHOQOL -DIS domain	Number of Item	Mean	sd	Skewness	Kurtosis	Cronbach's Alpha	
						Malaysia	WHOQOL
Physical health	7	14.42	2.28	-0.365	0.217	0.67	0.82
Psychological	6	14.97	2.29	-0.388	0.919	0.72	0.82
Social relationships	2	15.48	2.79	-0.256	-0.373	0.60	0.62
Environmental	8	14.70	2.51	0.148	-0.184	0.83	0.79
DISQOL module	12	13.71	2.07	-0.047	0.281	0.74	0.85

health and social relationship domains were found to be lower than 0.7. Lower reliability on the social relationship domain has been consistently reported by other researchers and may be related to the smaller number of items (2 items) compared to the number of items included in other domains (Bandar et al., 2014; Bredemeier et al., 2014; Lucas-Carrasco et al., 2010; Skevington et al., 2004). While the value of Cronbach's α for the physical health domain is acceptable, it is somewhat lower than WHOQOL value and those found in previous research (Bredemeier et al., 2014; Lucas-Carrasco et al., 2010; Usefy et al., 2010; Yao et al., 2002). After further analysis using item-total statistics (Table 3), one item, 'pain and discomfort' had a Cronbach's α of 0.67 which is slightly less than 0.70. However, the item was retained because 'pain and discomfort' is an important of the physical health domain.

Table 3

Corrected Item-Total Statistics Physical health domain

Physical health items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Pain and discomfort	22.10	13.78	.15	.70
Dependence on medication or treatments	21.98	12.85	.22	.69
Energy and fatigue	21.39	12.48	.46	.61
Mobility	21.54	12.13	.46	.61
Sleep and rest	21.58	12.08	.40	.63
Activities of daily living	21.44	11.56	.64	.56
Working capacity	21.56	12.70	.42	.62

Convergent Validity

Table 4 shows the correlation between the items of the WHOQOL-DIS instrument and its five domains. As expected, all the items had strong positive correlations with the domains to which they had been assigned except for two items in DISQOL module in which the correlation was less than the accepted criteria of 0.30. Acceptable thresholds for corrected item-to-total correlations range between 0.20 to 0.40 (Hagell & Westergren, 2006). These items are advocacy and future prospects. Since the DISQOL module can also be divided into 3 domains (Discrimination, Autonomy and Inclusion), further analysis using both exploratory factor analysis (EFA) and Confirmatory factor analysis (CFA) were performed to examine this issue.

Table 4

Item-scale correlation matrix for the five WHOQOL-DIS measures

	Physical Health	**Psychological health**	**Social Relationships**	**Env.**	**DISQOL module**
Physical Health					
Pain and discomfort	**.406**	-.061	-.072	-.165	.079
Dependence on medication or treatments	**.490**	-.130	-.069	-.139	.053
Energy and fatigue	**.624**	.510	.374	.483	.350
Mobility	**.640**	.397	.415	.486	.401
Sleep and rest	**.605**	.384	.375	.440	.286
Activities of daily living	**.758**	.541	.619	.585	.482
Working capacity	**.589**	.499	.504	.476	.468
Psychological health					
Positive feelings	.351	**.756**	.393	.532	.455
Spiritual/ religion/ personal beliefs	.332	**.778**	.426	.504	.480
Thinking, learning, memory and concentration	.287	**.696**	.405	.503	.373

Table 4 *(Continued)*

	Physical Health	Psychological health	Social Relationships	Env.	DISQOL module
Physical Health					
Bodily image and appearance	.433	**.698**	.357	.380	.400
Self-esteem	.462	**.642**	.611	.439	.421
Negative feelings	.026	**.336**	.080	.013	.148
Social Relationships					
Personal relationships	.450	.510	**.834**	.530	.536
Social supports	.396	.484	**.855**	.537	.398
Environmental					
Physical safety	.265	.506	.369	**.644**	.397
Physical environment	.270	.396	.347	**.668**	.383
Financial resources	.308	.420	.381	**.704**	.451
Opportunities for acquiring new information and skills	.426	.424	.374	**.694**	.436
Leisure and recreation	.357	.484	.416	**.666**	.522
Home environment	.369	.364	.551	**.646**	.409
Health and social care	.325	.297	.482	**.712**	.417
Transport	.382	.409	.510	**.731**	.410
Disability module					
Discrimination	.139	.099	.053	.046	**.303**
Advocacy	.042	.035	-.043	-.061	**.195**
Future prospects	.111	.106	-.026	-.011	**.251**
Control	.312	.293	.270	.366	**.424**
Choice	.343	.282	.339	.304	**.534**
Autonomy	.221	.236	.254	.281	**.438**
Communication ability	.339	.443	.484	.485	**.677**
Social acceptance	.336	.461	.439	.490	**.709**
Respect	.337	.445	.481	.595	**.693**
Social network and interaction	.360	.460	.469	.573	**.705**

Table 4 *(Continued)*

	Physical Health	Psychological health	Social Relationships	Env.	DISQOL module
Social inclusion and contribution	.363	.492	.469	.605	**.732**
Personal potential	.309	.411	.384	.425	**.596**

*Correlations ≥0.30 was considered acceptable. Env. = Environmental

Discriminant Validity

Pearson's correlations (r) tested for significant inter-domain correlations in the total sample. Overall, the range of the correlations between the domains was 0.424 to 0.631, none of the correlation achieved a value 0.70 (Table 5). This study demonstrated that the strongest correlation was observed between the environmental and the social relationship domain (r = 0.631), followed by the relationship between environmental domain and DISQOL domains (r = 0.626). The weakest relationship was observed between physical health domain and overall QoL.

PWDs in healthy condition showed consistently significant higher scores than PWDs in unhealthy condition in all domains (Table 6). Therefore, the WHOQOL-DIS instrument was able to show excellent ability in discriminating between healthy and unhealthy PWDs in all five domains. It is important to note that the DISQOL module domain was the lowest in the unhealthy group, followed by the physical health domain. These show that the health

Table 5

Pearson's correlation coefficients of WHOQOL – DIS domain

	Overall QoL	Physical Health	Psychological health	Social Relationship	Env.	DISQOL module
Overall QoL	1.00					
Physical Health	.424	1.00				
Psychological health	.598	.481*	1.00			
Social Relationship	.470	.488*	.579*	1.00		
Environment	.499	.488*	.604*	.631*	1.00	
DISQOL module	.445	.494*	.584*	.550*	.626*	1.00

* Correlation is significant at the 0.01 level (2-tailed). Env. = Environmental

condition of PWD's indicated a high reading on the DISQOL module and the physical health domain.

Factor analysis on DISQOL module was verified by the Kaiser-Meyer- Olkin (KMO) to measure the sampling adequacy (0.820), and Bartlett's test ($p < 0.001$); both criteria supported the use of this analysis (Table 7). The exploratory analysis revealed the same model from the original cross-cultural model developed by the WHOQOL-DIS group (Power & Green, 2010). There are three factors with eigenvalues greater than one, which were exactly the same as the original model. About 63% of the total variance was explained by the three factors commonly known as discrimination, autonomy and inclusion.

Table 6

Comparison of WHOQOL-DIS domain between PWDs health condition

Domain	Self-evaluate Health Condition		Mean difference (95% CI)	p-value
	Healthy (n = 193) Mean (SD)	Unhealthy (n = 107) Mean (SD)		
Physical Health	15.03 (2.04)	13.33 (2.32)	1.69 (1.18, 2.20)	0.001
Psychological health	15.68 (1.98)	13.68 (2.26)	1.99 (1.50, 2.49)	0.001
Social Relationship	16.04 (2.75)	14.46 (2.60)	1.58 (0.93, 2.22)	0.001
Environment	15.37 (2.49)	13.49 (2.08)	1.87 (1.31, 2.43)	0.001
DISQOL module	14.10 (2.10)	12.97 (1.82)	1.13 (0.64, 1.61)	0.001

Table 7

Exploratory factor analysis of DISQOL module

Item	Component			Orginal factor in DISQOL international
	1	2	3	
37 - Interaction	0.885			F3
36 - Respect	0.861			F3
38 - Inclusion	0.808			F3
35 - Acceptance	0.808			F3
39 - Potential	0.662			F3
34 - Communication	0.467			F3
30 - Future prospects		0.811		F1
29 - Advocacy		0.777		F1

Table 7 *(Continued)*

Item	Component			Orginal factor in DISQOL international
	1	2	3	
28 - Discrimination		0.653		F1
32 - Choice			0.906	F2
33 - Autonomy			0.826	F2
31 - Control			0.704	F2
KMO: 0.820 Bartlett's test: $p < 0.001$ Explained variance: 63.02%				

Figure 1 shows the result of the measurement model fit for the three domains. The three-domain structure model with a higher-order factor fit well (GFI = 0.918, AGFI = 0.874, CFI = 0.917 and RMSEA = 0.08, χ^2 =160.29, df = 51, $p < 0.001$) in line with the WHOQOL-DIS module's development.

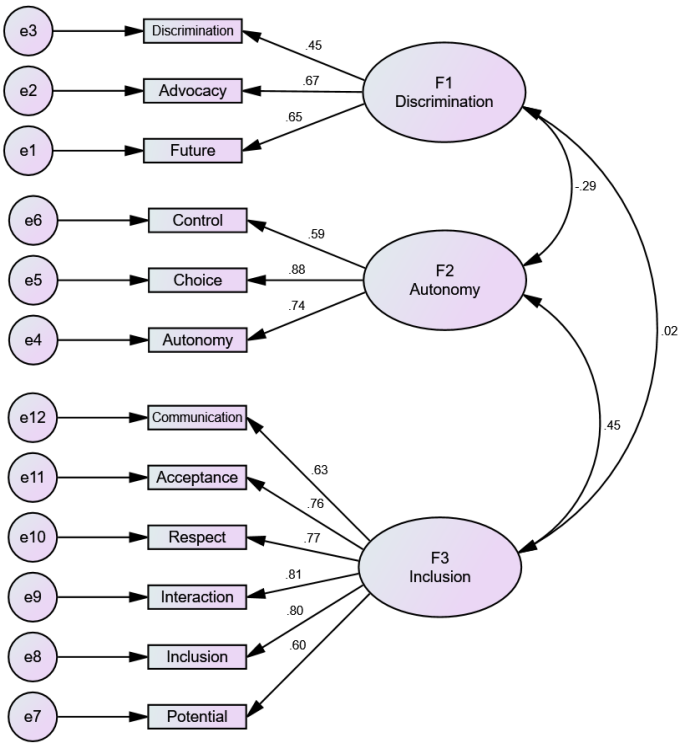

Figure 1. CFA analysis of the three-factor model for the DISQOL module

DISCUSSION

The aim of this paper was to examine the psychometric properties of the WHOQOL-DIS in terms of internal consistency and validity on PWDs in Malaysia. The result suggested that the WHOQOL-DIS is a valid and reliable instrument to assess the quality of life of people with physical impairment, hearing impairment and visual impairment in Malaysia, although some areas warrant more analysis and attention. The study reported Cronbach's alpha of minimum 0.60 and maximum of 0.83 for five domains of the WHOQOL-DIS. Cronbach's alpha value greater than or equal to 0.6 are considered acceptable and has adequate internal consistency (Bandar et al., 2014; Loewenthal, 2004). Low Cronbach's alpha value for the social relationship domain was also found in other research and may be related to the number of items included (Bandar et al., 2014; Chung et al., 2012; Saddki et al., 2009; Skevington et al., 2004).

Examining construct validity through convergent validity analysis showed the item-scale correlation matrix for the five domains had a significant correlation coefficient with their respective items, except for two items in the DISQOL module domain. Further analysis using EFA and CFA support that 12 items in DISQOL module can be divided into three different domains; discrimination, autonomy and inclusion. Moreover, the validity of the WHOQOL-DIS instrument in this study was also supported by the discriminant validity. The analysis of data indicated that PWDs in a healthy condition have a better quality of life compared with their unhealthy counterparts. The condition of health is closely related to status of health and the definition of the quality of life is specifically extended to issues related to the condition of health and health related issues on the quality of life (HRQoL) (Abdullah & Jamal, 2011).

CONCLUSION

In conclusion, we can ratify that the WHOQOL-DIS has adequate psychometric properties and is, therefore, an appropriate instrument in assessing the quality of life of the PWD population in Malaysia. Nonetheless, the major limitation of this WHOQOL-DIS instrument is the measurement of physical health with different types of impairment which requires further research in determining the items in the respective domain. This study may be expanded further by identifying items reflecting the local items such as job opportunities and education opportunities that could be added to this generic WHOQOL-DIS instrument in order to measure the QoL of persons with disabilities.

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