Psychometric Properties of the World Health Organization Disability Assessment Scale 2.0 among Iranian Cancer Patients

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Abstract

Background: The WHODAS-2 is a disability assessment tool built according to the conceptual framework of the international classification of functioning, disability, and health. This tool is a standard measure of disability dedicated to six specific domains. The aim of this study was to examine the psychometric properties of the World Health Organization Disability Assessment Scale 2.0 among Iranian cancer patients.

Method: This study included cancer patients who referred to the Cancer Institute of Imam Khomeini Hospital, Tehran, Iran. For this purpose, we enrolled 320 patients and asked them to complete the questionnaires. Cronbach's α assessed the internal consistency. Pearson's correlation coefficient evaluated the divergent and convergent validity and correlation of WHODAS 2.0 with EORTC QLQ-C30, difficulty of emotion regulation, and co-rumination scales. Moreover, we assessed constructive validity by confirmatory factor analysis using smart PLS software.

Result: The results showed that Cronbach's α was 0.91 for the questionnaire and higher than 0.75 for all domains. Furthermore, there was a significant correlation among the WHODAS 2.0 with Cancer EORTC QLQ-C30 (r = 0.85), DERS (r = 0.78), and co-rumination scales (r = 0.71).

Conclusion: The version of the WHODAS 2.0 instrument had suitable psychometric properties in the sample of cancer patients. Therefore, it can be used in different populations and samples of cancer patients.

Keywords: Cancer, Disability, Psychometric, Scale

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Introduction

A fundamental concept associated with cancer is the disability, which can be observed in one or more aspects of the cancer patients' lives.[1] The long-term effect of cancer and cancer treatments are key factors for developing disability in several aspects of life, such as mobility, participation in society, and self-care.[2] Over the past decades, the definition of disability has changed from a social and biological concept to a biopsychological one, with an emphasis on dynamic and bilateral relationships between health status and contextual factors.[3] The World Health Organization (WHO) proposed the international classification of functioning, disability, and health (ICF) to obtain the universally accepted conceptual framework for defining and categorizing disability.[4] In ICF, disability is defined as the existence of problems at physical, personal, or social levels created in one or more areas of life.[5] Neo et al. reported that nearly one-third (37%) and more than half (55%) of those studied, experienced the difficulty of demanded assistance to finish their daily activities.[6] Guldiken et al. observed that 50%-70% of patients reported at least one physical complaint in their body.[7] Mohile et al. and Stafford et al. reported that 41% and 44% of people with cancer experienced difficulty in their functions, respectively.[8, 9] WHO Disability Assessment 2.0 (WHODAS 2.0) is a standard method for measuring the disability of adults in different cultures. This method comprises six areas of cognition, mobility, self-care, getting along, life activities, and social participation.[10] This scale was developed based on the International Classification of Functioning, Disability, and Health.[11] WHODAS 2.0 can be used for a wide range of health conditions; moreover, the researchers who study the diagnostic and statistical manual of mental disorders, fifth edition (DSM-5), consider this scale as the most common tool for evaluating the disability and daily clinical practices.[12] While most of the tools available for examining disability generally address the basic functions of people such as walking, eating, and dressing, WHODAS 2.0 further underlines individual functions in various social activities.[13] This tool is also able to measure disability in a facile and comprehensive manner.[11] Accordingly, WHODAS 2.0 was designed to measure the individual difficulties in daily and social activities.[14] WHODAS 2.0 psychometric features were investigated in many countries and among people with different health conditions, including musculoskeletal disorders, chronic diseases, psychiatric illnesses, injuries, and hearing loss.[15-19] The psychometric properties of the main version of the tool were well evaluated in other countries and on different patients; however, no research has considered the psychometric properties of the tool among cancer patients. Therefore, considering the concept of structural and content validity,[20] the main objective of the present study was to investigate the psychometric properties of the WHO disability assessment scale 2.0 among Iranian cancer patients.

The aim of this study was to determine the psychometric properties of the WHODAS 2.0 among Iranian cancer patients.

Patients and Methods

Study design

This cross-sectional study was conducted over a period of two months from March to April 2018. The subjects were patients with cancer attending the Cancer Institute located in Imam Khomeini Hospital in Tehran, Iran. This research was made possible by presenting announcements and invitations among cancer patients receiving cancer treatments, such as chemotherapy, surgery, and radiotherapy. Among all the patients, 325 participated in the current study through face-to-face and the available sampling method, completing the research tools. Five questionnaires were excluded due to the incomplete information recorded in the data analysis process. A total of 320 participants were involved in all stages of validity and reliability. The inclusion criteria were 20 to 60 years of age, sufficient literacy at the reading and writing levels, and willingness to participate in the study. The exclusion criteria were chronic diseases diagnosed by physicians, serious psychiatric disorders, such as schizophrenia, bipolar disorder, and major

depression diagnosed by a psychiatrist and not completing the study instruments. Prior to the study, the patients declared their agreement to participate in the research through written informed consents.

Measuring instruments
WHO disability assessment schedule 2.0

WHO developed WHODAS 2.0 which comprises 36 items examining the function and disability of individuals over a 30-day period.[21] The instrument includes six domains: 1) cognition (six questions), 2) mobility (five questions), 3) self-care (four questions), 4) communicating with others (five questions), 5) life activities (eight questions), and 6) social participation (eight questions). Responses are based on 5-point Likert scale: 0 (No problem), 1 (slight), 2 (moderate), 3 (severe), and 4 (very difficult). WHODAS 2.0 scores are within the 0-144 range, with higher scores indicating a higher rate of disability. The WHODAS 2.0 was reported to have high internal consistency (Cronbach's α: 0.86), stable factor structure, high test-retest reliability (interclass correlation coefficient: 0.98), and good concurrent validity in patient classification compared with other recognized disability measurement instruments.[10]

Difficulty of emotion regulation scale

Gtarz et al. developed DERS which measures the levels of individuals' emotion regulation difficulty and deficits. DERS is a 36-item tool in a 5-point Likert scale from 1 (almost never) to 5 (almost always) in six areas of non-accept, goal, impulse, awareness, strategies, and clarity. higher scores suggest greater problems with emotion regulation. The clinical and non-clinical samples of various studies confirmed the psychometric features of regulation difficulty scale; in these studies, Cronbach's α ranged between 0.84 and 0.89 for subscales, indicating the high internal consistency of this tool.[22] Mazaheri examined the psychometric properties of the Persian version of DERS.[23] Since subscales had satiable Cronbach's α ranging between 0.84 to 0.89, he concluded that the instrument has appropriate internal consistency.

European Organization for Research and Treatment of Cancer QLQ-C30

European Organization for Research and Treatment of Cancer developed EORTC QLQ-C30 which assesses the quality of life in cancer patients, measuring five functional scales (physical, role, emotional, cognitive, and social), three symptom
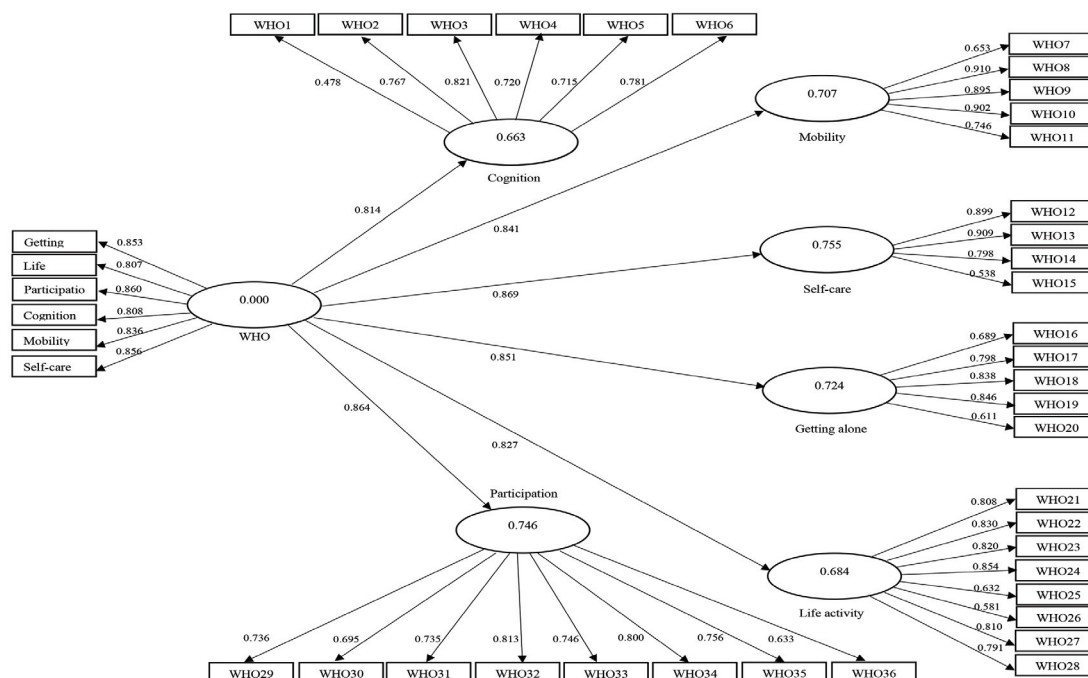

Figure 1. The measuring model of psychometric properties of the World Health Organization (WHO) Disability Assessment Scale 2.0 among Iranian cancer patients.

scales (fatigue, pain, nausea, and vomiting), and the overall quality of life and health scale. Higher scores in functional domains and overall quality of life score indicate a better status in that area; however, regarding the symptom domains, a higher score represents the presence of more symptoms and problems associated with the disease in the individual. The Cronbach's α was observed between 0.54 and 0.89 for subscales, indicating the high internal consistency of this tool.[24] Montazeri et al. examined the validity and reliability of this questionnaire in the Iranian Cancer Society.[25] Results showed that Cronbach's α was between 0.54 and 0.89 for subscales, suggesting excellent internal consistency.

Co-Rumination Questionnaire

Davidson et al. developed Co-Rumination Questionnaire which includes 27 items related to the assessment of the relationship between subjects and friends with a Co-Rumination.[26] This questionnaire measures the triple problems of talking items, namely rehashing, mulling, and encouraging. The participants respond to each item based on the 5-point Likert scale from 1 (completely disagree) to 5 (completely agree). The Cronbach's α was observed between 0.90 and 0.92, suggesting the high internal consistency of the instrument.[27] Alimoradi et al. showed that among Iranian students, Cronbach's α varied between 0.74 and 0.86 for subscales, indicating the appropriate internal consistency of the questionnaire.[28]

Translation

The standard method of "forward-backward" translated WHODAS 2.0 from English into Persian. Primarily, two experts translated the English version of the scale from English into Persian. Second, the research team compared and matched two forward translations in a unique version. A bilingual specialist oblivious to the English version of WHODAS 2.0 translated this version. Authors compared two English versions and corrected the small differences between them. The research team asked 30 patients to complete the preliminary version of WHODAS 2.0 and made the pilot version available for this research.

Table 1. Demographic characteristics of the study sample

Variables	Categories	n* (%)
Gender		
	Female	184 (57.5)
	Male	133 (42.5)
Education level		
	High school	92 (28.8)
	Bachelor's degree	152 (47.5)
	Higher degrees	137 (37.4)
Marital status		
	Single	40 (12.5)
	Married	244 (76.3)
	Divorced	24 (7.5)
	Widowed	12 (3.8)
Cancer type		
	Breast	55(27.5)
	Ovarian	40 (12.5)
	Skin	32 (10)
	Prostate	40 (12.5)
	Liver	8 (2.5)
	Brain	16 (5)
	Gastric	64 (20)
	Testicular	8 (2.5)
	Lung	24 (7.5)

n= Samples size

Statistical analysis

First, we evaluated the mean scores and standard deviations of the items in the questionnaires. We employed Cronbach's α to study the internal consistency of the instrument. The structural equations method with smart PLS performed the confirmatory factor analysis (CFA). We further applied Pearson correlation coefficient and Fornell and Larcker method to verify the convergent and divergent validities of the tool. In this study, the *P* value of 0.7 was statistically significant. To analyze the obtained results, we utilized SPSS V.21 and Smart PLS softwares version V.3.

Ethical consideration

Primarily, we received the permission of WHO to commence the process of translating and publishing the questionnaire in Farsi. Additionally, we did all processes based on copyright rules. The study was approved by the Ethics Committee of Tehran University of Medical Sciences, Tehran, Iran (ethics code: IR.TUMS.VCR.REC. 1397.905). All patients provided written consent to enter the research. They were reassured that participation was voluntary and that anonymity

Table 2. Convergent validity coefficients, Cronbach's α, and combined reliability of the scales

Latent Variable	Convergent Validity	Cronbach's α	Combined Reliability
Cognition	0.5218	0.8114	0.8647
Mobility	0.6852	0.8804	0.9146
Self-care	0.6403	0.8020	0.8730
Getting Along	0.5805	0.8140	0.8721
Life Activities	0.5952	0.9018	0.9206
Participation	0.5493	0.8818	0.9065
WHO*	0.7004	0.9134	0.9334

*WHO= World Health Organization

and confidentiality would be guaranteed. We stopped or continued the interview, if the patients desired so at any point in the study.

Results

According to table 1, 57.5% of the participants were women and 42.5% were men with an average age of 20-60 years. In terms of education, most participants had a bachelor's degree (47.5%). The study sample consisted of eight different cancer types, with the most and least common types being breast (27.5%) and liver cancers (2.5%), respectively.

The validity of 36-item WHODAS 2.0

According to table 2, we measured Cronbach's α to assess the internal consistency. This assessment indicates the correlation between the structure and its related indexes. All alpha values were higher than 0.80 that represents the significant reliability of the tool and the highest alpha belonged to life activities.

Validity

Table 2 presents the results of factor analysis regarding each dimension and its divergent validity with other tools. In this table, questions above 0.5 were considered significant.

Table 3 provides the divergent validity results indicating an appropriate correlation between WHODAS 2.0 dimensions and other tools concerning each dimension of the questionnaires. The correlation of the indices with their own structures (matrix color numbers) was greater than their correlation with other structures. This proves the appropriateness of the divergent validity of the cross factor loads.

Table 4 presents the desirable convergent validity between WHODAS 2.0 and co-rumination (0.50), EORTC QLQ-C30 (0.63), and the difficulty of emotion regulation scale (0.71). Based on these results, the correlation varied between 0.71 and 0.85, indicating a desirable convergent validity. The highest correlation was observed between WHODAS 2.0 and EORTC QLQ-C30, while the lowest belonged to WHODAS 2.0 and the Co-Rumination Questionnaire. The convergent validity square root of each component was greater than the maximum correlation of that component with other components; the indicated numbers represent a proper divergent validity in the Fornell and Larcker method.

Table 5 shows the results pertaining to the confirmatory factor analysis and the factor load of each question related to the structure. The findings showed that the standard loading factor and t significance were at 95% confidence level for each question of each construct. The evaluation index of the relationship between each question and its underlying structure showed a significant relationship between the questions.

According to table 5, the factor loads and significance coefficients between the indices of each structure showed a significant relationship between the questions and components.

As observed in figure 1, the final model had a good fit. This means that the final model supported the six-domain structure of WHODAS-2.0 and had good psychometric properties among Iranian cancer patients.

Discussion

The Adequacy of the Persian version of WHODAS 2.0

We evaluated the psychometric properties of the Persian version of WHODAS 2.0 among

Table 3. Cross-loading factor

		WHO*	Co-Rumination	QLQ**	DERS***
WHO	Life Activities	0.83	-0.24	0.68	0.36
	Participation	0.87	-0.23	0.63	0.62
	Cognition	0.80	-0.15	0.49	0.53
	Mobility	0.85	-0.23	0.65	0.28
	Self-care	0.84	-0.15	0.53	0.52
Co-rumination	Encouragement	0.07	0.45	0.08	-0.08
	Mulling	-0.14	0.91	-0.13	-0.09
	Rehashing	-0.01	0.70	0.02	0.14
QLQ	Operational	0.66	-0.23	0.92	0.45
	Signs	0.67	-0.20	0.92	0.45
	Total	0.48	-0.17	0.72	0.32
DERS	Awareness	0.31	0.16	0.28	0.60
	Clarity	0.43	0.02	0.42	0.69
	Goals	0.53	-0.16	0.46	0.85
	Impulse	0.36	-0.08	0.27	0.81
	Non-acceptance	0.48	0.00	0.36	0.89
	Strategy	0.43	-0.10	0.43	0.82

*WHO= World Health Organization; **QLQ = Quality of life questionnaire; ***DERS = Difficulty of emotion regulation scale

Iranian cancer patients. The results revealed the appropriate psychometric features of the instrument and its better results compared with the European version.[29] These findings are in the line with the results of previous studies.[29, 30] One of the main reasons behind such results is the impact of cancer and the side-effects of its treatment on the disability of these patients. Such impact affects the performance of patients at personal, family, and social levels.

Internal consistency

The Cronbach's α was between 0.80 and 0.90, indicating the optimum internal consistency of this tool. Our research results are consistent with the studies conducted on Chinese adults and disabled Brazilian Portuguese women.[30, 31] In the United States, the Cronbach's α ranged from 0.86 to 0.91 and from 0.70 to 0.97 among the elderly with hair loss and patients with chronic pain, respectively.[19, 32] It seems that the reliability of this tool is in the desired range in different cultures. However, it can be assumed that people's awareness of their disability and illness is a contributing factor in these results. In addition, this study is not completely parallel to the previous research because this tool was primarily evaluated

in a population of women with cancer. According to previous studies, half of the patients sustained significant disability in three to four domains, while 43% had a moderate or severe disability in five to nine areas. Therefore, WHODAS 2.0 can accurately illustrate cancer patients' disability, because it includes a wide range of functions in personal, social, and family domains.[33]

Divergent validity

We employed Fornell and Larker methods to investigate the divergent validity of WHODAS 2.0 with other scales. According to the results, there was no significant correlation between WHODAS 2.0 components with EORTC QLQ-C30, DERS, and co-rumination components, confirming the desirable divergent validity of the questionnaire. In addition, consistent with the findings of previous studies, the results of this study showed the high validity associated with the components of WHODAS 2.0.[30,31,34] Given the specificity of using WHODAS 2.0 in assessing disability and distinguishing it from other tools, the results obtained from divergent validity were not unexpected and showed the high divergent validity of the instrument.[16]

Table 4. Correlation matrix and convergent and divergent validities of Fornell and Larcker

Component	Convergent Validity	1	2	3	4
WHO*	0.7053	0.83			
Co-Rumination	0.5048	-0.24	0.71		
QLQ**	0.7370	0.71	-0.23	0.85	
DERS***	0.6130	0.55	-0.05	0.48	0.78

*WHO= World Health Organization; **QLQ = Quality of life questionnaire; ***DERS = Difficulty of emotion regulation scale

Convergent validity

To verify the convergent validity of this tool, we studied its correlation with the EORTC QLQ-C30, DERS, and co-rumination based on Fornell and Larcker method. The results showed that the correlation of this test with co-rumination, EORTC QLQ-C30, and DERS were 0.50, 0.63, and 0.71, respectively. This shows the higher convergent validity of this tool. The results of the present research are in agreement with the results of other studies in terms of the correlation between WHODAS 2.0 and the DERS.[33-35] The main reason for such consistency is the negative impact of the subscales of DERS (such as, limited access to emotion regulation strategies in purposeful behavior) on patients' functions, which leads to the inability of these patients in personal, family, and social affairs.[35, 36] The results of the present research are consistent with the findings of previous studies in terms of the correlation between WHODAS 2.0 and co-rumination.[37,38] The main reason for this consistency is the negative impact of subscales of the co-rumination (such as, contemplating the cause, consequences, and vague parts of a problem and focusing on negative emotions) on patient functions. This ultimately leads to the inability of patients to perform their daily routines, thereby reducing their life quality.[37, 38] Concerning the correlation between WHODAS 2.0 and EORTC QLQ-C30, the results of the research are in line with the findings of previous studies.[25,39, 40] The low scores of functional areas and overall life quality indicated the subjects unfavorable condition, justified by the findings of our research.[25, 41] In this regard, people with disabilities in personal, family, and social functions cannot have a good life quality due to the failure to perform their own affairs.[42] Indeed, cancer patients suffer from low levels of life quality due to the pain associated with chemotherapy and radiotherapy and the inability to function on different levels.[43]

Construct validity

Table 5 shows high factor loadings associated with the questions of the model, supporting the six-domain structure of WHODAS-2. These results are consistent with the findings of previous studies.[17, 31] Based on the CFA, these findings can be confirmed by the inter-correlations of the questions in various factors. In all six dimensions, two questions (1, 15) did not have a good loading factor. Question 1 was about the patient's concentration over the past 30 days. As a result, this question was not applicable to this research since the subjects attended the therapy processes, followed all professional instructions as much as possible and were always concentrated. Question 15 was about the patient's difficulties in staying alone over the past 30 days. According to the results, this question was not applicable to present study because these patients participated in society, had children, friends, and family demands and were barely alone.[31] Moreover, items with a higher factor loading on the CFA were questions 8 and 13. We believe that Question 8, which was about "standing up from sitting", was applicable to this research since pain and fatigue are two of the most important side-effects of cancer therapies.[44] Therefore, it can be concluded that these two problems render it difficult for the patient to stand up from sitting. We also hold that question 13, which was about "getting dressed", could be applied to our study population. The explanation for this result is that the majority of our study samples were breast cancer patients (27.5%); moreover, former studies showed these patients had a problem in shoulder and arm, making it harder for them to get dressed.[45]

This study had some limitations. First, since we carried the data collection, using a convenience sampling method, the generalization should be carried out with caution. Furthermore, this study

Table 5. Loading factor and significance of the questions of the model

	Items	Loading Factor	T Significant
Cognition	1	0.48	8.41
	2	0.77	28.12
	3	0.82	54.52
	4	0.72	24.11
	5	0.72	22.34
	6	0.78	32.29
	7	0.65	16.10
Mobility	8	0.91	104.20
	9	0.89	82.96
	10	0.90	63.86
	11	0.75	20.98
	12	0.90	76.92
Self-care	13	0.91	100.19
	14	0.80	28.19
	15	0.54	8.73
	16	0.69	20.32
Getting Along	17	0.80	28.61
	18	0.84	45.96
	19	0.85	40.99
	20	0.61	13.38
	21	0.81	41.14
Life Activities	22	0.83	42.14
	23	0.82	33.33
	24	0.85	53.95
	25	11.98	0.63
	26	0.58	9.48
	27	0.81	32.88
	28	0.79	35.20
	29	0.74	24.56
Participation	30	0.70	20.04
	31	0.74	27.48
	32	0.81	33.70
	33	0.75	28.70
	34	0.80	31.92
	35	0.76	24.59
	36	0.63	12.47
WHO*	Cognition	0.81	32.39
	Mobility	0.84	55.29
	Self-care	0.86	64.45
	Getting Along	0.85	62.76
	Life Activities	0.86	32.59
	Participation	0.81	54.20

*WHO= World Health Organization

used the self-report form of WHODAS-2 which the participants may not have properly answered. Future studies are to be provided with the proper confirmation of their reported data in their design.

Conclusion

The results provide significant support for utilization of WHODAS-2 as a valid instrument for measuring disability among patients with cancer. Furthermore, this tool is of special

relevance because it is the only measure based on the ICF biopsychosocial model.

Acknowledgement

Conflict of Interest

None declared.

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