Adaptation and Validation of the Hamburg Quality of Life Questionnaire in Multiple Sclerosis (HAQUAMS) for Use in Iranian Patients

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Abstract

Purpose: Quality of life (QoL) is considered as an important criterion for therapeutic effectiveness. Therefore, the present study aimed to validate the Persian version of the Hamburg Quality of Life Questionnaire in Multiple Sclerosis (HAQUAMS) for use in Iranian people with MS.

Methods: In a cross-sectional study, 158 people with MS were selected through the census sampling method. The construct validity of the Persian version of HAQUAMS was first evaluated by a confirmatory factor analysis (CFA) in AMOS-22 software, and then the internal consistency reliability and the item-total score correlations were calculated for each subscale by the SPSS-22.

Results: The CFA and output results indicated that the HAQUAMS with a five-factor structure among the Iranian MS patients had a good construct validity if an item was eliminated and a number of covariance errors between items were released (RMSEA=0.069). The internal consistency of HAQUAMS subscales was acceptable to excellent (α=0.81 to 0.91). The analysis of item-total score correlation for determining the construct validity of HAQUAMS indicated that all items of the questionnaire had a moderate to strong positive correlation with their subscales (P<0.0001, r=0.41 to 0.89). The correlation of total scores of HAQUAMS and the Beck Depression Inventory-short form (BDI-13) was equal to 0.74 (P<0.0001), indicating good concurrent criterion validity.

Conclusion: The Persian version of the HAQUAMS with a five-factor construct had acceptable validity and reliability and could be used for measurement of the health related QoL in Iranian people with MS.

Keyword: Multiple Sclerosis (MS); Quality of Life (QoL); Hamburg Quality of Life Questionnaire in Multiple Sclerosis (HAQUAMS); Validity; Reliability

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INTRODUCTION

Multiple sclerosis (MS) is the most common chronic inflammatory and neurodegenerative disorder in young adults characterized by brain and spinal cord involvement, and has affected more than 2 million people worldwide [1,2]. Its prevalence is increasing and it is one of the leading cause of disability worldwide [3]. Iran is a country with high prevalence of MS (51.52 per 100000 people) in the Middle East [4]. The prevalence of MS increased from 24.26 per 100,000 to 44.53 per 100,000 in Iran from 2006 to 2011 [5]. MS can lead to a wide range of physical, psychological and cognitive disorders [6]. These problems limit patients' participation in health activities [7], and involve young people in the most productive years of their lives with an unpredictable period, limited treatment options, and the psychosocial impact of the disease.

The general purpose of the MS treatment is reducing the negative impact of this disease on patients' functions and quality of life (QoL). Therefore, the evaluation of patients' functions and quality of life should be included in the evaluation of treatment effectiveness [8]. According to studies, MS has negative effects on quality of life of people, especially in its early years [9]. Health-Related Quality of life (HRQoL) is a multidimensional construct that includes physical, mental, and social health, and is increasingly considered as an important outcome of health policy studies as well as a determinant of the effectiveness of health interventions. Moreover Subjective (self-report) HRQoL measures may serve to alert clinicians to areas that would otherwise be overlooked [10]. Physicians' evaluations are different from patients' perceptions of effects of MS on their lives [11]. As patients consider rates of vitality, role limitation, and mental health as important determinants of their overall quality of life, these parameters should be considered in studies on MS-related factors. Thus, apart from clinical measures, quality of life (QoL) has evoked increasing recognition as a supplement to clinical endpoint measures [12].

The QoL measurement in MS patients can have a particular value in routine care and provides valuable information for clinicians in achieving therapeutic goals [13]. The ultimate goal of all available MS treatments is to achieve a significant improvement in the disease and its complications; hence, it is essential to apply a tool that is easy to use and can provide a comprehensive assessment of the patients' health and life status. However, the major challenge is to explain the content of QoL dimensions for an accurate measurement, so that the participants' perceptions can be correctly estimated [14].

Hamburg Quality of Life Questionnaire in Multiple Sclerosis (HAQUAMS) is a specific tool for measuring HRQoL for people with MS and it is prepared and published based on research literature and interviews with physicians and MS patients in Germany. Major components of the HRQoL in MS patients include fatigue, cognitive function, mobility/lower limb problems, mobility/upper limb problems, social functioning/ relationships and mood. The HAQUAMS provides additional information on sensory symptoms, urine control, stools, sexual function, major symptoms, recent changes in patient health, vision impairment, and overall rating of disability, and has excellent to satisfactory psychometric criteria, internal consistency coefficients, and test-retest reliability [12]. The HAQUAMS has also been found responsive to change in observational and intervention studies in people with MS [15].

Based on studies in Iran, there is a research gap in the investigation of psychometric properties of the Persian version of the HAQUAMS in MS patients despite evaluating psychometric properties of other QoL-related questionnaires for use in MS patients such as the Short Form 36 Health Survey Questionnaire (SF-36) [16], Fatigue Severity Scale (FSS) [17], Multiple Sclerosis Impact Scale (MSIS-29) [18], Comprehensive Fatigue Assessment Battery For Multiple Sclerosis (CFAB-MS)[19], and Multiple Sclerosis Quality of Life (MSQOL-54) instrument [20,21]. In addition, there are problems in current Persian tools for measuring the QoL of MS patients. For instance, FSS, CFAB-MS, and MSIS-29 have a remarkable emphasis on measuring fatigue in MS patients, which does not cover all aspects of QoL. The MSQoL-54 is also limited (unable) to covering visual function and bladder and bowel problems that are common in MS patients. With fewer items, HAQUAMS provides more accurate and specific measurement for the QoL of MS patients. Therefore, the present study aimed to validate the Hamburg Quality of Life Questionnaire in Multiple Sclerosis (HAQUAMS) for using in Iranian people with MS.

MATERIALS AND METHODS

The present cross-sectional study was conducted on Iranian people with relapsing-remitting multiple sclerosis (RRMS), referred to specialized neurology clinics of Guilan University of Medical Sciences in 2018. Patients were selected by a census sampling and diagnosed based on the 2010 version of McDonald Criteria [22], by using available specific paraclinical signs and symptoms and MRI findings of the patients by a neurologist. Inclusion criteria were as follows: at least six months after diagnosis of MS; The existence of an acceptable level of language, cognitive ability and dominant hand function to answer items of the questionnaire. Exclusion criteria also included having severe psychiatric disorders such as psychotic disorders, major depression, schizophrenia, obsessive-compulsive disorder, as well as in addiction, including drugs abuse, alcoholism, according to criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) [23] These severe disorders resulting in serious functional impairment, which substantially interferes with or limits one or more major life activities.

Instrument

Beck Depression Inventory- Short Form (BDI-13): It is an instrument for facilitating the rapid measurement of depression symptoms in clinical and research settings [24]. Each item of the BDI-13 consists of a four-item scale ranging from zero to 3, with minimum and maximum scores ranging from zero to 39. Lower scores indicate less depressive symptoms. The BDI-13 has necessary criteria for application in psychological research and depression screening in the normal Iranian society [25]. The Cronbach's alpha coefficient of the questionnaire was 0.86 in the present study.

Hamburg Quality of Life Questionnaire in Multiple Sclerosis (HAQUAMS): It is a specific instrument for measuring HRQoL for patients with MS [12]. The HAQUAMS has 38 items, 28 of which are used to calculate subscale scores. The following subscales, which are major components of health-related quality of life in people with MS, are as follows: fatigue and cognitive function (four items), mobility/lower limb problems (five items), mobility/upper limb problems (five items), social function/ relationships (six items) and mood (eight items). The items of each subscale are scored on a 5-point Likert scale; and lower scores indicate better quality of life [12]. The scores of each item are added, and then divided by the number of items on the sub-scale to obtain total score of that sub-scale. Therefore, the total score of HAQUAMS is calculated, and ranged from 1 to 5. Meanwhile, items 34, 35, 36, and 37, which are involved in the calculation of total score, are reversely scored. 10 more items are not used for calculating total score of HAQUAMS, but they provide additional information about sensory symptoms, urine control, stool, and sexual function, major symptoms of disease, recent changes in patient health, loss of vision, and overall rating of disability [12]. HAQUAMS was validated in a sample of 237 patients. Its psychometric criteria, internal consistency and test-retest reliability coefficients were excellent and satisfactory. The convergent and discriminant validity of this instrument were also confirmed by correlating its scores with other health measures in terms of direction, amount, and pattern of correlation [12,15]. Another study indicated that the internal consistency, test-retest reliability, and validity of HAQUAMS were not affected by cognitive deficits in MS patients [26], and it was an advantage of HAQUAMS.

Procedure

All patients provided written informed consent before the test. They were told that their responses would be released as a general response of the group, their names would be kept confidential, they could relinquish the research at any time, and their withdrawal from the study would not affect the treatment process. The patients' severity of disability was evaluated by the Expanded Disability Status Scale (EDSS) [27]. The EDSS scale ranges from 0 to 10 in 0.5-unit increments that represent higher levels of disability. Scoring is based on an examination by a neurologist. Each functional system among MS patients is scored on a scale of 0 (no disability) to 5 or 6 (more severe disability) [27]. In the present study, the severity of disability was operationalized by the following categories: 0): No disability, 1 to 3): Mild disability, 4 to 6): Moderate disability, 7 and above: Severe disability.

Demographic data, number of their attacks in the past six months self-reportedly measured, and comorbid diseases with MS such as diabetes and hypertension were registered by hospital medical records and included in

the questionnaires. The English version of HAQUAMS [12] were translated into Persian using a translation and back-translation procedure by a neurology professor and assistant professor of psychology. An expert committee (the translators, the researchers, neurologists and psychologists) supervised all translation and cultural adaptation processes. The committee verified that the Persian version of HAQUAMS was culturally, semantically, experientially, and conceptually equivalent to the original. The pre-final Persian versions of the HAQUAMS were given to 10 Persian-speaking individuals with no history of psychiatric and neurological disease/disorder as a pre-test to identify any spelling or equivocation errors. Subsequently, the Persian version of HAQUAMS was finalized, and its psychometric properties tested. Based on a guide introduced by the International Quality of Life Association, the protocol steps included the cross-cultural adaptation of the questionnaire, the content validity and reliability survey, and the evaluation of the construct and criterion validity [28].

The Persian form was then given to 10 faculty members specialized in neurology, neuroscience and psychology for determining the content validity index and ratio (CVI and CVR). The CVR value was 0.80 (which was greater than the acceptable value, i.e. 0.62) for all questions according to Lawshe's table [29], except for a question (question 25) in which the CVR was equal to 0.62, and it was reviewed in the Persian translation. The CVI value was also 0.93 in the examination of the simplicity and clarity of all questions, indicating that the content validity index of HAQUAMS was confirmed. In the present study, the concurrent criterion validity of the HAQUAMS was obtained by correlating its scores with BDI-13.

The approximate time for completing the questionnaire was about 15-25 minutes for each patient, and it was completed in interviews by two research physicians (a female and a male) on specialized days in neurology clinics of Guilan University of Medical Sciences at 3 to 8 pm for 5 hours. Researchers were housed in the adjacent neurologist's room on days of visit, and patients were referred to the room after the neurologist's visit.

The Ethics Committee of Guilan University of Medical Sciences approved the study protocol (No. IR.GUMS.REC.1396.70). All data were classified as confidential and would be published as the study population.

Statistical analyses

Data were processed by SPSS-22 after collecting questionnaires. The construct validity of the HAQUAMS was evaluated by the confirmatory factor analysis (CFA), and determining the correlation of scores of questions with its subscales. The reliability analysis of subscales and the whole test was performed by calculating Cronbach's alpha coefficient. The correlation of HAQUAMS scores with BDI-13 was used to determine its concurrent criterion validity. The dimensionality of the HAQUAMS was evaluated according to the CFA by the maximum likelihood estimation (ML) in AMOS 22.0. In other words, the 5 factors (dimensions) model of HAQUAMS was adopted from the original study/design [12], and was "evaluated" in the current research. In the present study, the chi-square (χ^2), Chi-square per degrees of freedom (χ^2/df), Root mean square error of approximation (RMSEA), Goodness of fit Index (GFI), Bonett- Bentler (BBI) or normed fit index (NFI), Tucker Lewis index (TLI), Incremental Fit Index (IFI), and Comparative fit index (CFI) were used to evaluate the goodness of fit of the five-factor model and 28 questions of the HAQUAMS as introduced by its creators [12,30].

RESULTS

One hundred and fifty-eight people with MS were evaluated and there was no dropout in patients' participation. Their mean age was 37 years, ranging from 17 to 64 years. 72.2% of the patients were female and 27.8% were male. 85.4% of patients were in urban and 13.3% in rural areas. Table 1 lists other demographic characteristics of samples. As shown in Table 1, 32.9% of patients were prescribed Fingolimod (with brand name: fingolimod Zahravi), 34.2% were prescribed Interferon beta-1a [30 microgram] (with brand name: Cinnovex), 19.6% were prescribed Glatiramer acetate (with brand name: Copamer), and 13.3% used other drugs. 75.9% of patients were without comorbid diseases and 24.1% had comorbidities.

Table 1: Patients' demographic and disease characteristics (n= 158)

characteristics		n	%
Gender	Male	44	27.8
	Female	114	72.2
Marital Status	Married	32	20.3
	Single	103	65.2
	Widow	15	9.5
	Divorced	5	3.2
	Unreported	2	1.3
Education	Elementary	10	6.4
	General	20	12.7
	High school	6	3.8
	Diploma	38	24.1
	Academic	84	53.2
Residence	Rural	21	13.3
	Urban	135	85.4
	Unreported	2	1.3
Number of MS attacks in the last 6 months	0	103	65.2
	1	31	19.6
	2	8	5.1
	3	3	1.9
	4	3	1.9
	5	1	0.6
	6	6	3.8
	Unreported	3	1.9
Type of drug used	Fingolimod	52	32.9
	Cinnovex	54	34.2
	Copamer	31	19.6
	other	21	13.3
Disability	No	73	46.2
	Mild	31	19.6
	Moderate	36	22.8
	Severe	18	11.4
Comorbid diseases	NO	120	75.9
	Yes	38	24.1

AMOS 22 was used for the confirmatory factor analysis (CFA) and evaluation of HAQUAMS dimensionality with 5 latent factors and 28 questions and measuring values of fit indices of the model in a sample of 158 people with MS. Table 2 presents fit indices corresponding to the CFA. The modification indices based on AMOS outputs were used to obtain a more appropriate model in the sample. The examination of these outputs indicated that values of the indexes could be partially improved by releasing a number of covariance errors between items and deleting a single item (item 15) (see Figure 1). When the model fit indices are incomplete or at an unacceptable range (30), it is possible to improve the model fit by deleting items with a weak factor loading (question 15 was eliminated in this study), and as well as saturating the model by releasing or connecting error terms that have a shared root. For instance, according to Figure-1, error terms in items 13 and 14 are released under the mobility/upper limb subscale.

DISCUSSION

More than 20 tools have been designed for assessing HRQoL in people with MS. The most common tools include MSQoL-54, Disability and Impact Profile (DIP), Functional Assessment of MS (FAMS), Leeds MS QoL (LMSQoL), Multiple Sclerosis Impact Scale (MSIS-29), MS QoL inventory (MSQLI), and HAQUAMS (10). The present study aimed to validate the HAQUAMS test for using in Iranian people with MS.

Results of the CFA for evaluating the dimensionality of the 5-factor structure of the HAQUAMS and measuring values of fit indices of the model indicated that values of fit indices could be improved by removing a single item (item 15) and releasing a number of covariance errors between items (modified CFA). One interpretation is that the method of answering item 15 is different from the previous and subsequent questions in HAQUAMS, which can confuse patients. This item also requires more answers from patients in another extra clause. Although this method of evaluating Mobility/Lower Extremities gives more useful information to clinicians and rehabilitation specialists, but in the Persian version, it has reduced the factor loading of item 15. Consequently, the results indicated that the dimensionality of the questionnaire with 27 items and the five-factor structure had more acceptable construct validity in Iranian people with MS.

Results of the present study on item-subscale correlation indicated that all items of the HAQUAMS had a strong and direct correlation at a range of 0.41 to 0.89 with their subscales; and the correlation was above the minimum desired level of ≤ 0.40 [33,34]. In other words, the HAQUAMS had good internal consistency and construct validity.

In the present study, the concurrent criterion validity of the Persian version of the HAQUAMS was examined according to the correlation of its scores with the Beck Depression Inventory- Short Form (BDI-13) that was expected to have a positive and significant relationship with HAQUAMS. The results indicated direct and strong relationships between total scores of HAQUAMS and BDI-13 (r= 0.74). Furthermore, there were positive and significant relationships between subscales of the HAQUAMS and Beck Depression Inventory (between 0.42 to 0.69 at a significance level of P<0.0001). The highest relationships were found between subscale of

Table 2: Values of fit indices of confirmatory factor analysis of Hamburg Quality of Life Questionnaire in Multiple Sclerosis (n= 158)

Indices of fitness	observed Values in the 5-factor model (original CFA)	observed Values in the improved 5-factor model (modified CFA)
χ^2	930.110	517.701
df	340	298
p-value	0.0001	0.0001
χ^2/df	2.736	1.737
Goodness of Fit Index (GFI)	0.677	0.817
Adjusted Goodness of Fit Index (AGFI)	0.614	0.768
Normed Fit Index (NFI)	0.667	0.812
*Tucker-Lewis Index (*TLI)	0.728	0.892
Incremental Fit Index (IFI)	0.762	0.910
Comparative Fit Index (CFI)	0.756	0.908
Akaike information criterion (AIC)	1062.110	677.701
Root Mean Square Error of Approximation (RMSEA)	0.105	0.069

Bentler and Chou [31], and Bentler [32], noted that the non-correlation of all errors in a model was rarely seen in the actual data. Therefore, the inclusion of such errors in the CFA models not only did not damage the factor validity of the HAQUAMS, but it also provided a more realistic representation of the observed data; hence, it was decided to use the method to improve the CFA model in the HAQUAMS. According to modification indices, the results indicated that dimensionality of the HAQUAMS among MS patients generally had acceptable construct validity.

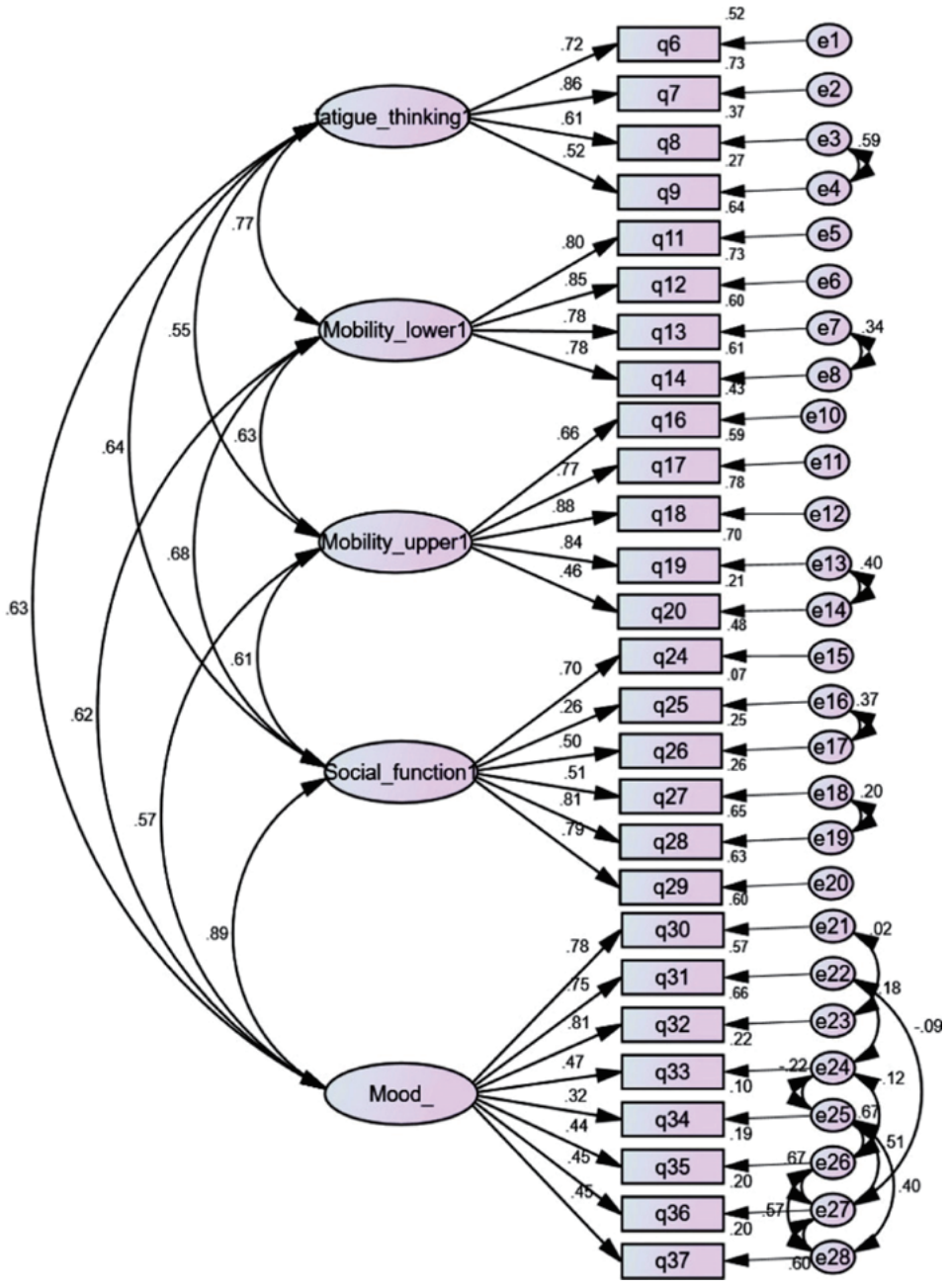

Figure 1. Factor loadings and error of measurement of items in the HAQUAMS in Iranian patients with MS (n= 158)

The ellipses contain latent variables or factors; and the rectangles represent items in the HAQUAMS. The two-way arrows indicate the correlation between factors; and the one-way arrows from ellipses to squares indicate which items are on which factors loadings. The written values on these arrows indicate correlation coefficients of items with each factor; and numbers on the squares represent the amount of variance of each item that can be explained by the factor. Small arrows from circles to squares represent residual variance (error) that cannot be explained by the factor. The error values are obtained by subtracting the explained variances from 1.

Table 3: Correlation of item- total subscale score for five-factor version of the HAQUAMS (n= 158)

Subscales	Items	1	2	3	4	5
Fatigue/thinking	6	**0.73**	0.61	0.35	0.54	0.45
	7	**0.84**	0.62	0.46	0.58	0.52
	8	**0.82**	0.39	0.38	0.43	0.48
	9	**0.80**	0.26	0.26	0.33	0.39
Mobility (lower limb)	11	0.61	**0.83**	0.53	0.54	0.48
	12	0.49	**0.81**	0.43	0.60	0.50
	13	0.45	**0.76**	0.58	0.52	0.44
	14	0.48	**0.83**	0.53	0.58	0.49
Mobility (upper limb)	16	0.34	0.47	**0.77**	0.39	0.61
	17	0.49	0.51	**0.83**	0.52	0.70
	18	0.48	0.55	**0.89**	0.54	0.75
	19	0.38	0.52	**0.88**	0.51	0.71
	20	0.25	0.26	**0.60**	0.27	0.48
Social function	24	0.45	0.46	0.38	**0.76**	0.52
	25	0.32	0.31	0.36	**0.41**	0.21
	26	0.40	0.37	0.47	**0.69**	0.31
	27	0.29	0.23	0.25	**0.67**	0.29
	28	0.47	0.55	0.52	**0.83**	0.60
	29	0.42	0.48	0.32	**0.79**	0.59
Mood	30	0.46	0.53	0.33	0.62	**0.69**
	31	0.48	0.52	0.41	0.59	**0.69**
	32	0.43	0.53	0.39	0.67	**0.68**
	33	0.26	0.29	0.27	0.34	**0.45**
	34	0.28	0.18	0.19	0.24	**0.66**
	35	0.42	0.35	0.27	0.30	**0.81**
	36	0.35	0.34	0.27	0.33	**0.80**
	37	0.36	0.38	0.34	0.33	**0.77**

The Pearson correlation analysis determined the relationship between HAQUAMS and BDI-13 scores, suggesting a strong, direct relationship (r= 0.74, P <0.0001) (see Table 4). This finding confirms the concurrent criterion validity of the HAQUAMS. Table 4 presents descriptive indices and reliability coefficients of HAQUAMS and BDI-13 subscales.

mood and depression. Consistent with this finding, Gold et al. [12] in Germans found positive and significant relationships between total score of the HAQUAMS and depression subscale of Hospital Anxiety and Depression Scale (HADS) (r= 0.63). Furthermore, there were positive and significant relationships between subscales of the HAQUAMS and depression-HADS score (0.40 to 0.74) and the highest correlation between mood subscale of HAQUAMS and depression-HADS score (r = 0.74).

In the current study BDI-13 correlated with the total HAQUAMS score better than the mood subscale of HAQUAMS (r=0.74 and 0.69, respectively, see table-4). However, in the original study [12], it was the mood subscale of HAQUAMS that correlated with BDI better. One reason for these different correlation coefficients is the utilization of different instruments to measure depressive symptoms. In the present study, BDI-13 was used, nevertheless Hospital Anxiety and Depression Scale (HADS) was employed in the original study [12].

Results of Cronbach's alpha coefficients indicated that the HAQUAMS had a high internal consistency (α= 0.91), so that items on the scale were homogeneous and consistent. Furthermore, Cronbach's alpha coefficient was over 0.70 for determining the internal consistency

Table 4: Descriptive indices and correlation coefficients matrix of research variables (n= 158)

Variables	Mean	SD	Skewness	Kurtosis	Cronbach's alpha	1	2	3	4	5	6	7
1- Fatigue/ thinking	2.42	0.88	0.54	0.053	0.81	1						
2-Mobility (lower limb)	2.31	1.16	0.54	-0.92	0.90	0.61**	1					
3-Mobility (upper limb)	1.70	0.81	1.28	1.30	0.86	0.49**	0.62**	1				
4-Social function	1.95	0.82	0.76	-0.65	0.79	0.60**	0.70**	0.57**	1			
5-Mood	2.43	0.88	0.14	0.067	0.85	0.57**	0.57**	0.45**	0.63**	1		
6-HAQUAMS total	2.06	0.74	0.69	-0.20	0.91	0.78**	0.88**	0.80**	0.86**	0.80**	1	
7-Depression (BDI-13)	7.77	7.07	0.94	0.067	0.92	0.57**	0.51**	0.42**	0.42**	0.69**	0.74**	1

** All correlations were significant at P <0.0001 level.

Based on the data of Table 4, the maximum and minimum mean subscales of the HAQUAMS belong to the mood subscale (2.43±0.88) and mobility/upper limb problems (1.70±0.81) respectively. Cronbach's alpha coefficients indicate the internal consistency of items of each subscale of the HAQUAMS. Furthermore, the Cronbach's alpha coefficient was 0.91 for the remaining 27 items in the CFA model. Correlation analyses between BDI-13 scores with scores of each HAQUAMS subscale indicated moderate to strong relationships (P <0.0001).

reliability of all subscales of the HAQUAMS. The highest alpha of 0.90 belonged to the mobility/lower limb problems subscale. Therefore, the HAQUAMS subscales had great homogeneity and consistency and examined a same concept. There were also studies on psychometric properties of the HAQUAMS with similar results. For instance, Schäffler et al. [35] in Germans reported the Cronbach's alpha coefficient of 0.94 for the HAQUAMS and Cronbach's alpha coefficients of 0.74 to 0.94 for the subscales. Gold et al. [26] studied the reliability of the HAQUAMS in MS patients with cognitive impairment (n= 80) and without cognitive impairment (n= 107), and their results indicated the internal consistency reliability was greater than 0.70 using Cronbach's alpha coefficient for all subscales, except for social functions/ relationships (α = 0.65) in MS patients with cognitive impairment; and reliability coefficients were from 0.73 to 0.91 for all subscales in MS patients without cognitive impairment. Moreover, the overall alpha coefficient of the HAQUAMS was 0.91 for both groups [26]. Gold et al. [12] evaluated psychometric properties of the HAQUAMS in 237 people with MS and found that the internal consistency reliability of all subscales, except for social functions/relationships (α =0.68), ranged from 0.85 to 0.92; and Cronbach's alpha coefficient of the HAQUAMS was generally equal to 0.93, that was consistent with the present study.

Psychometricians considered the correlation between subscales of a test as a reason for the internal consistency and construct validity of a test [34]. The study of correlation between subscales the HAQUAMS indicated that the correlations were in the range of 0.45 to 0.70, suggesting that the questionnaire generally measured the interrelated constructs; and since it assessed five factors of a single construct (i.e. MS patients' quality of life), the factors may have a fundamental correlation. Furthermore, the correlation was seen between subscales and overall score of the HAQUAMS in a range of 0.78 to 0.88. In a research by Gold et al. [12] there was a correlation between subscales of the HAQUAMS with each other in the range of 0.27 to 0.73; and correlation of subscales with overall score of the HAQUAMS was in the range of 0.62 to 0.85.

In present study, the maximum and minimum mean of

HAQUAMS subscales belonged to mood (2.43±0.88) and mobility/upper limb problems (1.70±0.81) respectively. In a study by Gold et al. [12] on 107 MS patients without cognitive impairment, the highest mean subscale was related to mood subscale (2.10±0.80) and mobility/lower limb problems (2.10±1.16); and the lowest mean was seen in the mobility/upper limb problem subscale. (1.50±0.71). However, in 80 MS patients with the cognitive impairment, the maximum mean belonged to the mobility/ lower limb subscale (3.70±1.11), and the minimum mean was for social functions/ relationships subscale (2.28±0.83) [26]. In a study by Schäffler et al. [35], the minimum mean was found in the mobility/upper limb subscale (1.61±0.84), but the maximum mean was in the mobility/lower limb problem subscale (2.48±1.27).

This research has limitations. The test-retest reliability was not determined due to limited availability to MS patients, as well as utilization of a depression test (BDI-13) cannot be a perfect estimate of concurrent criterion validity, due to the multidimensional nature of QoL. Resolving these restrictions could be a suggestion for future research.

CONCLUSION

In general, the results indicated that the Persian version of HAQUAMS had satisfactory psychometric properties in the MS patient population and it could be used as a tool for therapists and rehabilitation specialists in research and therapeutic interventions to measure and monitor the quality of life in Iranian people with MS.

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Compliance with Ethical Standards: The proposal draft was approved by the ethics committee and research council of Guilan University of Medical Sciences (GUMS) [No. IR.GUMS.REC.1396.70]. All data were classified as confidential and would be published as the study population. Written informed consent was obtained from all patients.

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