



## Development and validation of the coping with multiple sclerosis questionnaire



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### ABSTRACT

**Background:** Development of a self-report measure of coping with multiple sclerosis is required based on cultural factors, which can advance our understanding of the level of coping for care planning and improvement of coping and quality of life. The current study aimed to develop and validate the scale of coping with Multiple Sclerosis.

**Methods:** This methodological study was conducted in three phases. In the first phase, the concept of coping with MS was defined by the hybrid model. In the second phase, the item pool was generated from findings of the first phase. In the third phase, psychometric properties of the scale were evaluated including face, content and construct validity as well as reliability.

**Results:** 192 items in primary item pool were finally reduced to 35 items after evaluating the validity (face, content and construct validity) and reliability. Factor analyses revealed five factors: self-efficacy, self-regulation, accepting the current situation, treatment seeking and adherence to it, and emotional balance. Internal consistency and stability of the developed questionnaire confirmed with 0.93 and 0.96 respectively that indicated excellent reliability.

**Conclusion:** The 35-item developed questionnaire is valid and reliable for assessment of levels of coping in Iranian people with MS.

### 1. Introduction

This article reports development and validation of a multi-dimensional coping inventory to assess level of coping with multiple sclerosis (MS). MS is a chronic progressive disease that destroys the central nervous system myelin which thereby affects the sensory and motor function (Kinnett-Hopkins et al., 2017). It can be determined with periods of worsening (exacerbation of symptoms) and recovery in 85–90% of patients (Buljevac et al., 2003). MS is one of the most common neurological diseases and cause of disability in young people (Dehghani et al., 2013). It is also one of the most important life-changing diseases, because it damages the best time of the individuals' life and lead them gradually to inability (Belbasis et al., 2015). The number of people with MS is about 40,000 people in Iran (Etemadifar et al., 2013). Patients experience various physical and mental disorders that need to be coped with (Ostojic et al., 2016).

Coping is defined as “constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person” (Lazarus and Folkman, 1984). There are two major functions of coping referred as problem-focused and emotion-focused functions. Problem-focused function refers to how a patient obtains information and how he/ she act to handle the disease. Emotion-focused function is strategies that aim at regulating emotions tied to living with the disease (Lazarus, 2000). The most studies have focused on how patients adjust to and cope with their disease (McCabe et al., 2004; Montel et al., 2007). However the lower to levels of coping in these patients has.

Pakenham (2001) has developed a questionnaire as the Coping with MS Scale (CMSS) that measures ways of coping with MS. The other questionnaires there in this context including Ways of Coping Checklist (WCC) and Multiple Sclerosis Functional Composite (MSFC) that measure arm, leg and cognitive function (Folkman and Lazarus, 1988).

**Abbreviations:** MS, multiple sclerosis; MSCQ, multiple sclerosis coping questionnaire; PCS, perception of control scale; QuAT-MS, questionnaire adaptive tasks in multiple sclerosis; MND, motor neuron disease; CMSS, coping with multiple sclerosis scale; one way ANOVA, one-way analysis of variance; ICC, intraclass correlation coefficient; PCA, principal component analysis; KMO, kaiser-meyer-olkin; CVR, content validity ratio; CVI, content validity index; WCC, ways of coping checklist

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Have criticized these questionnaires because of inadequate test development strategies and psychometrics properties such as content validity and expert panel, test - retest reliability and cross-validation data for development of questionnaire fully not was applied. On the other hand, based on clinical observation and researcher experiences, MS patients use differential coping strategies such as treatment seeking that not presented in the CMSS or other questionnaire (Dehghani et al., 2013; Montel et al., 2007), and (Pakenham, 2001). Since the details are not available about levels of coping in these patients. Research on coping with MS indicated that the data were preliminary and inconclusive and more research is required in this area. Hence, in the absence of an MS-specific measure of coping levels based on socio-cultural condition, researchers have relied on coping scales developed for non-specified situations (Pakenham, 2001).

In addition, Iranian people are faced with some problems including lack of easy access to needed drugs, lack of support for rehabilitation, medical expenses, lack of understanding of the society about the disease and etc. that are specific to the Iranian context. Therefore, it is necessary to measure levels of coping in order to plan for improvement of quality of life and more coping with the disease (Ghandehari et al., 2010). Most researchers have recommended that disease-specific coping questionnaire is needed to understand level of coping with chronic disease. Some questionnaires have been developed for assessment of coping in diseases including cancer, AIDS, arthritis and chronic fatigue syndrome (Pakenham, 2001). These questionnaires are used in different cultures and communities without considering cross-cultural appropriateness. Indeed, specific questionnaire for assessment of coping with MS has not designed.

The purpose of the present study was to develop a valid and reliable questionnaire that assesses level of coping with MS, MS Coping Questionnaire (MSCQ). Currently, there is no standardized questionnaire in the context of Persian culture, and most of used questionnaires in Iran are originally developed in other countries and have not been cross-culturally adapted with Persian culture. Hence, since the measuring coping with disease in patients with MS, can appropriate information for identification and future decisions such as education, care interventions, reformation and improvement provide. On the other hand, the used questionnaire must adapt with socio-cultural context in Iran. Hence, the present study with this purpose was conducted.

## 2. Materials and methods

### 2.1. Study design and participants

This study was a mixed method study (methodological study) that was conducted in two sections of qualitative and quantitative. A methodological study essentially includes the following steps:

- 1) Defining the concepts
- 2) Formulating the items of the questionnaire
- 3) Developing the questionnaire
- 4) Testing validity and reliability of the questionnaire (LoBiondo-Wood and Haber, 2014)

Data were collected at the MS Society in Tehran, Iran. The current study was conducted in three phases as follows (Fig. 1):

### 2.2. The first phase

In this phase, the concept of coping with disease was defined using the three-step hybrid model (Schwartz-Barcott and Kim, 2002). In the first theoretical step, a systematic review was conducted based on the guidelines of York University and Cochrane Collaboration (Khan et al., 2008; Furlan et al., 2015). The databases were searched including PubMed, PROQUEST, OVID, SCOPUS, WEB OF SCIENCE, SCIENCE DIRECT, and GOOGLE SCHOLER. without time limit until the end of

2016. A total of 32 texts from 1350 early title for achieve to a clear and comprehensive definition of the concept coping with MS was analyzed.

In the second steps (field work step), the aimed for definition and refine of the concept by empirical data. In this step, 11 MS patient were recruited using purposive sampling. The data were collected through semi-structured and in-depth interviews. Each interview lasted between 60 and 110 min. Participants' age ranged from 24 to 46 years. Data collection was performed from 2014 to 2016. This step was taken concurrently with the theoretical step. Interviews continued to data saturation. Interviews were tape-recorded, transcribed verbatim in MAXQDA software, Ver10. Data were analyzed through qualitative content analysis by conventional method and Graneheim and Lundman model (Graneheim and Lundman, 2004). In the third step (the final analytic phase), the results of previous two phases were combined and provided a final definition of the concept of coping with MS (Schwartz-Barcott and Kim, 2002).

### 2.3. The second phase

In this phase, based on the results of the first phase, six domains were extracted for the MSCQ including: accepting the current situation, self-regulation, self-efficacy, Dynamic, complex and multi-dimensional nature, maintenance of emotional balance and maintenance and development of human interactions. Then, an item pool was generated by domains and sub-domains for the scale.

### 2.4. The third phase

Psychometric properties of the MSCQ were evaluated including face, content and construct validity as well as reliability. The process of psychometric properties of the MSCQ questionnaires is as follows:

- A) **Face validity:** face validity of the MSCQ was taken in the two parts of qualitative and quantitative. The qualitative part was performed through face – face interview with ten MS patients. The patients were asked about difficulty, relevancy and ambiguous of the items; their comments on the items were applied. In the quantitative part, the item impact method was used for the importance each of item and remove incorrect phrase. Then, the developed questionnaire was completed by ten MS patients. The impact score of 1.5 and higher was considered appropriate and was preserved (Lacasse et al., 2002).
- B) **Content validity:** Content validity of the MSCQ was taken in the two parts of qualitative and quantitative. The qualitative part was performed using a panel of 13 experts. In the panel, the experts were asked to assess grammar, wording, item allocation and scaling of the items. In the quantitative part of content validity, content validity ratio (CVR) and content validity index (CVI) were calculated for each item. The CVR of each item calculated through scoring the items in a three-point scale; “essential”, “useful but not essential” and “not essential” by 13 experts, according to Lawshe (1975) and modified table by Ayre and John Scally (2014). Given the number of 13 experts, items with a CVR value of 0.53 or higher were preserved. Then, the CVI of each item was calculated using the Waltz and Bussels criteria (Waltz and Bausell, 1981). Thus 13 experts were asked to assess relevancy of the items based on a four-point likert scale (not relevant: 1; a little relevant: 2; somewhat relevant: 3; and extremely relevant: 4). The CVI of each item was calculated through dividing the number of expert who for each item score 3 or 4 had considered to total number expert (Polit et al., 2007). Items with the CVI of 0.79 or higher were preserved (Hyrkäs et al., 2003). As well as, scale-level CVI /averaging as mean CVI of all the items calculated and according to Polit et al. (2007) recommended S-CVI/Ave of 0.9 or higher was considered with excellent content validity.
- C) **Initial reliability:** before construct validity, initial reliability was conducted in order to determine correlation between items and

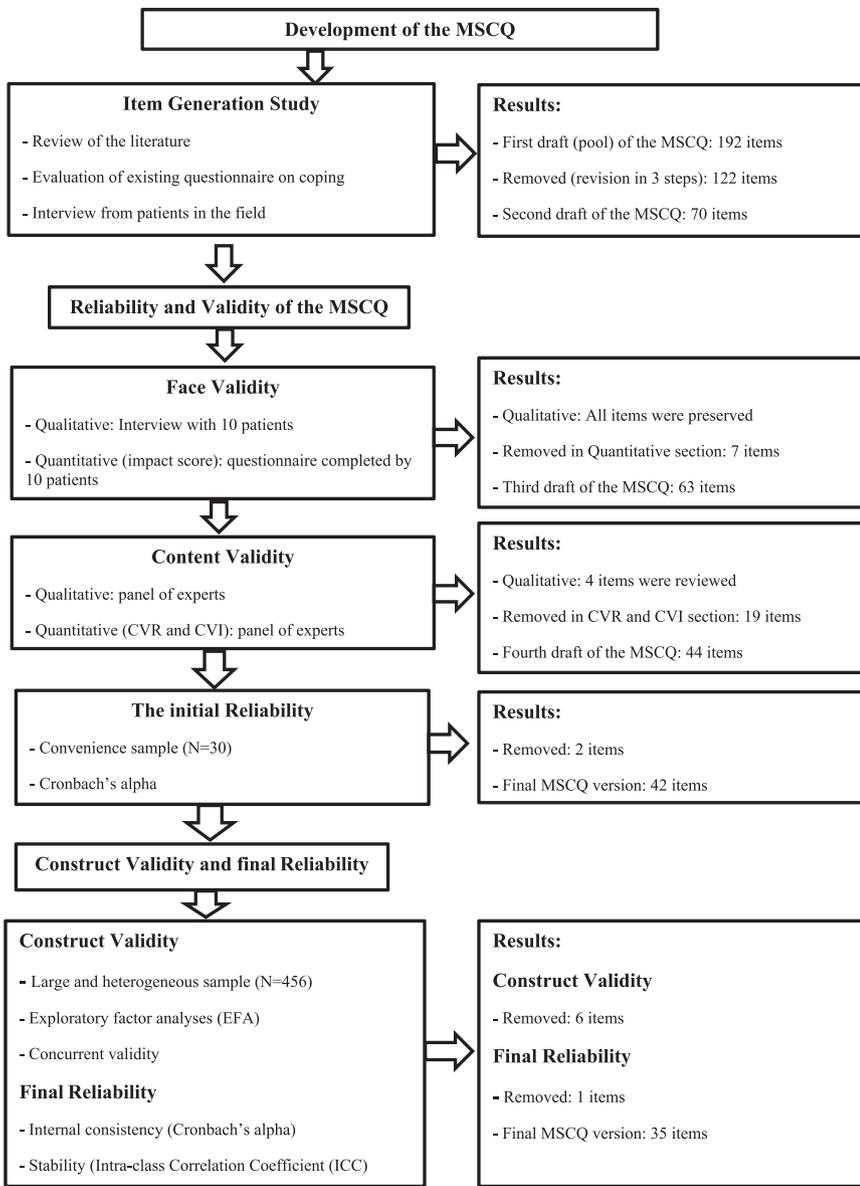


Fig. 1. Flow diagram of the development and validation of the coping with disease Questionnaire in multiple sclerosis patients (MSCQ).

correlation items with the whole questionnaire with 30 MS patients through Cronbach's alpha Coefficient and inter-item correlation.

D) **Construct validity:** in this part, exploratory factor analysis, known-groups comparison and convergent validity was performed for construct validity of the MSCQ. Factor analysis examines the inter relationship between items and categorizes the inter-related items (Rubio et al., 2003). In the factor analysis, Principal Component Analysis (PCA) for extraction of factors, Kaiser- Meyer- Olkin sampling index (KMO) for sampling adequacy, Bartlett's Test for determination appropriateness of the factor analysis model, factor rotation (varimax rotation) for simplify and interpretability of the factor structure and as well as the scree plot and eigenvalues for the number of factors and as well as the scree plot and eigenvalues for the number of factors was used. The number of samples required in factor analysis is 3–10 samples for each item (Munro, 2012). In the present study, more than 10 samples were considered for each item for exploratory factor analysis (456 MS patients). The study subjects were recruited using convenience sampling from the eight MS Society, Iran. Inclusion criteria were having a definite diagnosis of MS and desire to participate in the study. The minimum factor load of 0.3 was applied for maintaining item in factor extraction (Table 1). After the factor analysis, the known-groups comparison was used for evaluating the test's ability to discriminate between groups based on

Table 1 Demographic characteristics of the participants in quantitative section (n = 456).

Variables		N (%)
Age (years)	Mean (SD)	35.15 ± 9.95
Duration of MS (years)	Mean (SD)	8.47 ± 6.48
Gender	Male	135 (29.6)
	Female	321 (70.4)
Education	Under diploma	94 (20.6)
	Diploma	177 (38.8)
	Upper diploma	185 (40.6)
Number of recurring during the past year	No recurring	165 (36.2)
	Once	150 (32.9)
	Twice	71 (15.6)
	More than 2 times	70 (15.4)
Drugs	Moderator	233 (51.1)
	Combinatorial	180 (39.5)
	No drugs	43 (9.4)

different mean scores on the test (Patrick et al., 2002). The known groups in this study were groups of MS patients with different educational status. Thus, coping with MS score was measured and compared in three groups of education using one-way analysis of

variance (one way ANOVA) test. As well as, the convergent validity was used for correlation between the results of two questionnaires that measure the same variable that theoretically should be related, are in fact related (Robins et al., 2015). The Persian version of the Snyder's Hope Scale (Snyder et al., 1991) was employed to assess the convergent validity of the MSCQ. Thus, 256 MS patients were concurrently completed both the Snyder's Hope Scale and the MSCQ. Then, the correlation between scores of the two scales was compared with Pearson test.

- E) **Final reliability:** Reliability of the MSCQ was evaluated using internal consistency and stability. The internal consistency was calculated by Cronbach's alpha Coefficient. A Cronbach's alpha Coefficient of 0.7 or higher reflects an acceptable internal consistency (Krishna and Kumar, 2013). The stability was calculated by test-retest technique. Important note in this way is the time interval between the test and retest. Burns and Grove (2005) recommended the time interval of two-week to one month for test-retest. In the current study, MS patient were completed the MSCQ scale twice in a two-week interval. Then, correlation between scores of test and retest was calculated by Intraclass Correlation Coefficient (ICC). The ICC is two types of ICC<sub>agreement</sub> and ICC<sub>consistency</sub> (Baumgartner and Chung, 2001). In this study was performed ICC<sub>agreement</sub> with Two-way random model. The If ICC was 0.8 or higher, the stability would be desirable (De Boer et al., 2004).

#### 2.4.1. Statistical analysis

Statistical analyses were carried out using the SPSS version 16.0. Normal distribution of data was confirmed by Kolmogorov-Smirnov test. Descriptive analysis test, factor analysis, Cronbach's alpha, Intraclass Correlation Coefficient (ICC), one way ANOVA and Pearson test were used for data analysis.

#### 2.5. Ethical considerations

The study was approved by the ethics committee of Tehran University of Medical Sciences in Iran (Ethics approval number IR.Tums.Rec.1394.1171). Before the data collection, MS patients signed an informed consent letter. They were ensured about the anonymity and confidentiality of the data, and voluntary participation.

### 3. Results

#### 3.1. The first phase

In this phase, the concept of coping with MS was defined based on the literature review and patients' experiences using the hybrid model analysis. Coping with MS was found a dynamic, complex and multi-dimensional concept which has subjective and objective dimensions and with features including accepting the current situation, self-regulation, self-efficacy, maintenance of emotional balance and maintenance and development of human interactions. Antecedents of coping with MS include supportive systems, cognition and understanding, religious-ideological factors, attitude to disease, perceptual – emotional factors, trying to manage of disease, nature of disease and economic and environmental factors. The main consequences of coping include remission of disease, independence in living and social relations, mental function disorder, and family, social and economic and biological consequences in patients.

#### 3.2. The second phase

In this phase, the findings of the first phase were used to generate an item pool for the MSCQ. The primary item pool consists of 192 items in six domains of accepting the current situation, self-regulation, self-efficacy, dynamic, complex and multi-dimensional nature, maintenance of emotional balance, maintenance and development of human

interactions and some consequences of coping generate for the MSCQ. The item pool was assessed and reviewed by the research team in three sessions. Repetitive or overlapping items were removed. Finally, 70 items formed the questionnaire format and were entered into psychometric phase.

#### 3.3. The third phase

- A) **Face validity:** in this part, 7 items were removed due to the score of less than 1.5, based on comments of experts panel were reviewed some of the items.
- B) **Content validity:** in the qualitative content validity part, four items were revised according to comments of expert's panel. Eighteen items were deleted because of a low CVR of 0.53. In addition, one item was deleted due to an item-level CVI (I-CVI) of less than 0.79. In this part, the average content validity index (S-CVI/Ave) was 0.95 for the whole MSCQ questionnaire. Finally, 44 items remained for the MSCQ.
- C) **The initial reliability:** the findings showed that internal consistency was 0.93 for the MSCQ. The correlation between items No. 14 "I consulted with others about my disease" with the whole MSCQ was 0.16, and item No. 31 "I injected drugs of MS at home" was – 0.6. Hence, these two items were deleted due to a correlation of less than 0.2. Finally, 42 items remained for the MSCQ. The items of the MSCQ were rated on a five-point Likert-type scale, 1 = never, 1 = rarely, 2 = sometimes, 3 = often and 5 = always. Items No. 2 and 3 were scored reversely, i.e. 5 = never and 1 = always. Thus, the total score of the MSCQ ranges from 42 to 210. So that, the higher score is reflects better coping with disease.
- D) **Construct validity:** 42 items of the MSCQ were subjected to a principle-components factor analysis using varimax rotation. The overall Kaiser-Meyer-Olkin measure of sampling adequacy was adequate (0.926). The Bartlett's test shows significant relationship between the items at level of p-value = 0/001. This analysis shows nine factors with eigenvalues greater than 1.0. Thus, the scree plot extracted five factors for the MSCQ scale. The 42 item correlation matrix was subjected to principle components factor analyses, and five factors were rotated to oblique positions. Table 2 shows the eigenvalues, percentage of variance for each factor and factor loadings for the items that met retention criteria (Table 2). Criteria for item retention were 0.5 or greater factor loadings. Thus, items 7, 12, 13, 21, 34, 39 and 42 were deleted due to factor loading less than 0.5. Items were allocated to the factors which had the greatest factor loading. After the construct validity and factor analysis, 35 items remained for the MSCQ. Five factors of the MSCQ include factor one "self-efficacy" (17 items), factor two "self-regulation" (six items), factor three "accepting the current situation" (six items), factor four "treatment seeking and adherence to it" (four items), and factor five "emotional balance" (two items). The five rotated factors accounted for 52% of the total variance which compares well to other coping scales (Pakenham, 2002). So that after the varimax rotation, respectively factor one to five explained with 21.400%, 10.376%, 8.156%, 7.630% and 4.157% of the total variance. Educational status was used in order to evaluate discriminating of the MSCQ in known-groups comparison. According to some studies (Martz and Livneh, 2007; Patti et al., 2007), MS patients with lower educational status have lower coping with disease. In the current study, patients were categorized in three groups: under diploma, diploma and upper diploma. The one way ANOVA showed a significant difference among these groups (P value = 0.001). The Turkey's post-hoc test showed coping with MS in patients with the level of education under diploma is lower than other two groups. The result of correlation between the MSCQ and the Persian version of the Snyder's Hope Scale by Pearson test was 0.664 (P value < 0.001) that indicated acceptable convergent validity.

**Table 2**  
Results of principal components analysis of 35 coping items (n = 456).

Subscales	Item number and description	Factors				
		1	2	3	4	5
Self-efficacy	I feel satisfied with life.	0.617				
	I feel of control over my life.	0.662				
	I can take care of myself.	0.619				
	In spite of the disease, I do my career or job activity.	0.687				
	I think positively about the disease and future.	0.731				
	I set my expectations based on my condition,	0.561				
	Despite the disease problems, I have a success sense	0.777				
	I try to use all positive aspects of my ability	0.747				
	I have the ability to cope with the disease.	0.737				
	I feel effective and useful.	0.758				
	I am looking for success In the presence of disease	0.671				
	I am able to meet my needs.	0.696				
	I manage my own negative emotions.	0.599				
	I have good relationships with family members.	0.500				
	I have good social relations.	0.533				
I do my normal activities.	0.639					
I follow my favorite activities.	0.605					
Self-regulation	I set time of my work and activity accordance with disease.		0.619			
	I stopped my activity before the onset of fatigue.		0.639			
	I set of living and working environments in accordance with the disease conditions		0.570			
	I try to avoid stressful situations due to the disease attacks.		0.683			
	I try to avoid exposure to extreme heat and cold because of worsening of symptoms.		0.678			
Accepting the current situation	I use relaxation techniques to reduce stress		0.645			
	I am habited to living with disease.			0.571		
	I accepted that I may occasionally have MS attack			0.665		
	I accepted that I may experience loss of balance, double vision and memory impairment.			0.660		
	I accepted chronic and incurable nature of my disease.			0.718		
	I accepted that the disease has occurred and cannot be changed.			0.719		
	I accepted the Society view about MS.			0.580		
treatment seeking and adherence to it	I'm looking for disease treatment				0.577	
	I try to minimize the speed of disease progression.				0.588	
	I am taking medications on time.				0.728	
	I do medical examinations on time.				0.765	
Emotional balance	I do not show sensitivity toward others talking about the disease.					0.772
	I do not hide my disease from others.					0.776
Eigenvalue		13.670	2.587	2.325	1.652	1.489
% of variance		21.400	10.376	8.156	7.630	4.157

**Table 3**  
The Cronbach's alpha and The ICC values for the MSCQ scale and its factors.

Factors	Subscales	Number of items	Internal consistency	Stability
1	Self-efficacy	17	$\alpha = 0.94$	ICC = 0.97
2	Self-regulation	6	$\alpha = 0.80$	ICC = 0.88
3	Accepting the current situation	6	$\alpha = 0.78$	ICC = 0.90
4	Treatment seeking and adherence to it	4	$\alpha = 0.79$	ICC = 0.95
5	Emotional balance	2	$\alpha = 0.71$	ICC = 0.85
	MSCQ	35	$\alpha = 0.93$	ICC = 0.96

E) **The final reliability:** Cronbach's alpha for the 35-item MSCQ scale was 0.93 that indicated excellent internal consistency. As well as Cronbach's alpha was also determined for five factors (Table 3). The ICC between test and retest measurements for 35-items MSCQ scale was 0.96 (P value = 0.001) that indicated appropriate stability of the MSCQ scale during the time. As well as the ICC was determined for five factors (Table 3).

#### 4. Discussion

This paper reports the development and validation of the MSCQ, which assesses levels of coping in people with MS. The final version of the MSCQ has 35 items in five domains including: self-efficacy, self-regulation, accepting the current situation, treatment seeking and

adherence to it and emotional balance factors. The study findings also showed that the MSCQ had acceptable reliability and validity. Cronbach's a coefficients of the domains varied in the survey sample between 0.71 and 0.94 that is good compared to the reliability found for general coping scales such as WCC (Folkman and Lazarus, 1988) and the COPE (Patti et al., 2007), and suggests acceptable reliability for group comparisons (Miller et al., 1992). However, lower coefficients emerged in the intervention groups, particularly in the domain for emotional balance. That was lower than 0.70, thus one of the items removed Cronbach's coefficients achieved to higher than 0.70. The convergent validity data suggest that the MSCQ inventory differs from the Snyder's Hope Scale; however, it does share certain conceptual similarities with this scale. In the first part of the study, the concept of coping with MS was defined.

The first domain of the MSCQ scale, self-efficacy, consists of 17 items. One of the domains of Questionnaire Adaptive Tasks in MS (QuAT-MS) (Bensing et al., 2002) was giving up ordinary activities with 12 items. Some items of the self-efficacy domain in the MSCQ are comparable with 12 items of the QuAT-MS. Miller et al. (1992) study the domain of handling physical discomfort was extracted as the counterpart domain of self-efficacy. Of all the coping domains, self-efficacy was the most strongly and consistently related to better coping.

The second domain of the MSCQ was self-regulation that had six items. These items indicate that patients, who completely cope with their illness, are able to regulate their living conditions and environment independently. The six items of the MSCQ are comparable with the three items of the energy conservation domain of the Coping with MS Scale (CMSS) in Pakenham (2001) study. In the study of Cohen and

Lazarus (1979), the tolerate or adjust to negative events and realities domain and in the study of Miller et al. (1992) the adjusting life-style domain was extracted that could be counterpart of self-regulation domain extracted from the current study.

The third domain of the MSCQ was accepting the current situation with six items. Most participants in the current study, coping with disease noted as the equivalent and same name with accepting the disease. One of the domains extracted in the Pakenham (2001) study, was “acceptance” with five items. As well as in the Moss and Schaefer (1984) study dealing with symptoms domain and in the Miller et al. (1992) study complying with prescribed regimen domain was extracted as counterpart domain with acceptance of disease. Higher levels from accepting of disease in patients with MS, predicts positive changes for better coping to the disease and satisfaction (Pakenham and Samios, 2013). Similarly, Brooks and Matson found acceptance of MS predictive of better self-concept seven years later (Brooks and Matson, 1982). The acceptance domain of coping has emerged in some generic coping measures (Carver et al., 1989).

The fourth domain of the MSCQ was treatment seeking and adherence to it that had four items. The items of this domain indicated that patients who cope with the disease, is following their medication and treatment and are adherence from what has been effective for their disease. One of the domains extracted in motor neuron disease questionnaire (MND) in Lee et al. (2001) study, was “information seeking” with two items and Cronbach's alpha 0.53. These items indicated patients to better coping with the disease are seeking more information about the disease and its treatment. As well as One of the domains extracted in the Aalto et al. (2002) study, was “information seeking” with four items and Cronbach's alpha 0.72. one Of the distinction between the current study and study Aalto is that in the study Aalto et al., from the deductive approach and only through available questionnaires is used to design the questionnaire and as well as psychometrics properties including CVR and CVI index's not used. The last domain of the MSCQ was related to emotional balance that had two items. One of the domains of Questionnaire Adaptive Tasks in MS (QuAT-MS) was maintain emotional equilibrium that had eight items (Bensing et al., 2002). In the study of Cohen and Lazarus (1979) the maintain emotional equilibrium domain and in the study of Moss and Schaefer (1984) the preserving a reasonable emotional balance domain was extracted that could be counterpart of emotional balance domain extracted from the current study.

In a pilot study conducted by Sinnakaruppan (2000) on development of a coping scale for chronic illnesses, especially MS-, Chronic Illness-Perception of Control Scale (PCS) with eight items designed that assess coping with chronic illness to generally. In contrast, the MSCQ was developed with 35 items to assess coping with MS to specifically. On the other hand, unlike the MSCQ scale, in development of PCS scale only used from inductive approach and as well as from psychometric properties including face, content and construct validity was not used to items valid. However, the MSCQ dimensions provided better the predictive power of the coping. This may be due to the fact that the MSCQ taps coping dimensions such as self-efficacy, self-regulation, accepting the current situation, treatment seeking and adherence to it, and emotional balance coping which are important to coping with MS, but are not assessed by the CMSS and other questionnaires. Likewise some of the MSCQ dimensions are not presented in other coping questionnaire. Furthermore, the MSCQ is likely to have fewer inapplicable items than generic coping questionnaire when assessing coping with MS. It is for these reasons that the MSCQ is likely to be a more valid measure of coping with MS than other coping questionnaires.

One of The strengths of current study is that the MSCQ was developed the both inductive and deductive approach and as well as have been used psychometrics properties including face, content, and construct validity, convergent validity, known-groups comparison and reliability. As well as the MSCQ is a short (35 items) questionnaire that can be responded by MS patients in about 15 min. The presence of

reversely-scored items in the MSCQ minimizes some kinds of response biases and increases the probability of acquiring more accurate responses (Shahvari et al., 2015). The greatest strength of this study was the development of a context-bound coping with disease to assess Iranian MS patients coping. In the final, the MSCQ Scale seems to be a promising instrument showing acceptable validity and reliability. The scale is feasible to use in survey settings and also as an outcome measure in rehabilitation interventions. Whereas, the CMSS scale has psychometric weakness including fairly low internal reliability, the absence of test-retest reliability and cross-validation data, completion of questionnaire by mail which reduces control over how and who completes the questionnaire, and low responsive with a 20–30%.

The lengthy and ongoing processes in development, validation and evolution of a new questionnaire and as well as suffering questionnaire of self-report scales are from the current study limitations.

## 5. Conclusion

In the current study, the five-dimension MSCQ was developed as a short self-report scale for measurement of coping with disease in Iranian people with MS. This questionnaire is a consistent, simple, valid, reliable and context-based scale which can be used in different situations including education, research, management, situation analysis and needs assessment, providing of care and support services and community health nursing services.

## Authors' contributions

Conception, design, Analysis and interpretation of the data: Ali Dehghani, Nahid Dehghan Nayeri and Abbas Ebadi. Data collection: Ali Dehghani and Nahid Dehghan Nayeri. Writing the article: Ali Dehghani, Nahid Dehghan Nayeri and Abbas Ebadi. Critical revision of the article: Nahid Dehghan Nayeri and Abbas Ebadi. Final approval of the article: Ali Dehghani, Nahid Dehghan Nayeri and Abbas Ebadi.

## Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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## References

- Aalto, A.-M., Härkäpää, K., Aro, A.R., Rissanen, P., 2002. Ways of coping with asthma in everyday life: validation of the asthma specific coping scale. *J. Psychosom. Res.* 53 (6), 1061–1069.
- Ayre, C., John Scally, A., 2014. Critical values for Lawshe's content validity ratio: revisiting the original methods of calculation. *Meas. Eval. Couns. Dev.* 47 (1), 79–86.
- Baumgartner, T.A., Chung, H., 2001. Confidence limits for intraclass reliability coefficients. *Meas. Phys. Educ. Exerc. Sci.* 5 (3), 179–188.
- Belbasis, L., Bellou, V., Evangelou, E., Ioannidis, J.P., Tzoulaki, I., 2015. Environmental risk factors and multiple sclerosis: an umbrella review of systematic reviews and meta-analyses. *Lancet Neurol.* 14 (3), 263–273.
- Bensing, J.M., Schreurs, K.M., de Ridder, D.T., Hulsman, R.L., 2002. Adaptive tasks in multiple sclerosis: development of an instrument to identify the focus of patients' coping efforts. *Psychol. Health* 17 (4), 475–488.
- Brooks, N.A., Matson, R.R., 1982. Social-psychological adjustment to multiple sclerosis: a

- longitudinal study. *Soc. Sci. Med.* 16 (24), 2129–2135.
- Buljevac, D., Hop, W., Reedecker, W., Janssens, A., Van Der Meché, F., Van Doorn, P., et al., 2003. Self reported stressful life events and exacerbations in multiple sclerosis: prospective study. *Bmj* 327 (7416), 646.
- Burns, N., Grove, S.K., 2005. Using statistics to examine relationships. In: Burns, N., Grove, S.K. (Eds.), *The Practice of Nursing Research: Conduct, Critique and Utilization*, 5th ed. Elsevier, St. Louis, MO, pp. 486–487.
- Carver, C.S., Scheier, M.F., Weintraub, J.K., 1989. Assessing coping strategies; a theoretically based approach. *J. Personal. Soc. Psychol.* 56, 267–283.
- Cohen, F., Lazarus, R.S., 1979. Coping with the stresses of illness. In: Stone, G.C., Cohen, F., Adler, N.E. (Eds.), *Health Psychology*. Jossey-Bass, San Francisco, pp. 217–254.
- De Boer, M.R., Moll, A.C., De Vet, H.C., Terwee, C.B., Völker-Dieben, H.J., Van Rens, G.H., 2004. Psychometric properties of vision-related quality of life questionnaires: a systematic review. *Ophthalmic Physiol. Opt.* 24 (4), 257–273.
- Dehghani, A., Hojati, H., Shamsizadeh, M., 2013. The effect of peer-led education on depression of multiple sclerosis patients. *Iran. J. Psychiatr. Nurs.* 1 (1), 63–71.
- Etemadifar, M., Sajjadi, S., Nasr, Z., Firoozeei, T.S., Abtahi, S.-H., Akbari, M., et al., 2013. Epidemiology of multiple sclerosis in Iran: a systematic review. *Eur. Neurol.* 70 (5–6), 356–363.
- Folkman, S., Lazarus, R.S., 1988. *Manual for the Ways of Coping Questionnaire*. Consulting Psychologist Press, Palo Alto, CA.
- Furlan, A.D., Malmivaara, A., Chou, R., Maher, C.G., Deyo, R.A., Schoene, M., Van Tulder, M.W., 2015. 2015 updated method guideline for systematic reviews in the Cochrane Back and Neck Group. *Spine* 40 (21), 1660–1673.
- Ghandehari, K., Riasi, H.R., Nourian, A., Boroumand, A.R., 2010. Prevalence of multiple sclerosis in north east of Iran. *Mult. Scler.*
- Graneheim, U.H., Lundman, B., 2004. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ. Today* 24 (2), 105–112.
- Hyrkäs, K., Appelqvist-Schmidlechner, K., Oksa, L., 2003. Validating an instrument for clinical supervision using an expert panel. *Int. J. Nurs. Stud.* 40 (6), 619–625.
- Khan, K.S., Ter Riet, G., Glanville, J., Sowden, A.J., Kleijnen, J., 2008. Undertaking Systematic Reviews of Research on Effectiveness: CRD's Guidance for Carrying Out or Commissioning Reviews. Centre for Reviews and Dissemination, University of York.
- Kinnett-Hopkins, D., Adamson, B., Rougeau, K., Motl, R.W., 2017. People with MS are less physically active than healthy controls but as active as those with other chronic diseases: an updated meta-analysis. *Mult. Scler. Relat. Disord.* 13, 38–43.
- Krishna, H., Kumar, K., 2013. Reliability estimation in generalized inverted exponential distribution with progressively type II censored sample. *J. Stat. Comput. Simul.* 83 (6), 1007–1019.
- Lacasse, Y., Godbout, C., Series, F., 2002. Health – related quality of life in obstructive sleep apnoea. *Eur. Respir. J.* 19 (3), 499–503. <http://dx.doi.org/10.1183/09031936.02.00216902>.
- Lawshe, C.H., 1975. A quantitative approach to content validity. *Pers. Psychol.* 28 (4), 563–575.
- Lazarus, R., 2000. Evolution of a model of stress, coping and discrete emotions. In: Rice, V.H. (Ed.), *Handbook of Stress, Coping and Health: Implications for Nursing Research, Theory and Practice*. Sage Publication, California, pp. 195–222.
- Lazarus, R.S., Folkman, S., 1984. *Coping and Adaptation: The Handbook of Behavioral Medicine*. pp. 282–325.
- Lee, J., Rigby, S., Burchardt, F., Thornton, E., Dougan, C., Young, C., 2001. Quality of life issues in motor neurone disease: the development and validation of a coping strategies questionnaire, the MND Coping Scale. *J. Neurol. Sci.* 191, 79–85.
- LoBiondo-Wood, G., Haber, J., 2014. *Nursing Research: Methods and Critical Appraisal for Evidence-based Practice*. Elsevier Health Sciences, Louis (USA) Mosby.
- Martz, E., Livneh, H., 2007. *Coping with Chronic Illness and Disability: Theoretical, Empirical, and Clinical Aspects*. Springer Science & Business Media, pp. 295.
- McCabe, M.P., McKern, S., McDonald, E., 2004. Coping and psychological adjustment among people with multiple sclerosis. *J. Psychosom. Res.* 56, 355–361.
- Miller, D.H., Hornabrook, R.W., Purdie, G., 1992. The natural history of multiple sclerosis: a regional study with some longitudinal data. *J. Neurol. Neurosurg. Psychiatry* 55 (5), 341–346.
- Montel, S.R., Bungener, C., 2007. Coping and quality of life in one hundred and thirty five subjects with multiple sclerosis. *Mult. Scler.* 13, 393–401.
- Moss, R.H., Schaefer, A.J., 1984. The crisis of physical illness. An overview and conceptual approach. *Coping Phys. Illn.* 2, 3–25.
- Munro, B.H., 2012. *Statistical Methods for Health Care Research*. LWW; Sixth, Revised Reprint edition September 14.
- Ostojic, S., Stevanovic, D., Jancic, J., 2016. Quality of life and its correlates in adolescent multiple sclerosis patients. *Mult. Scler. Relat. Disord.* 10, 57–62.
- Pakenham, K., 2002. Development of a measure of coping with multiple sclerosis caregiving. *Psychol. Health* 17 (1), 97–118. <http://dx.doi.org/10.1080/08870440290001557>.
- Pakenham, K.I., 2001. Coping with multiple sclerosis: development of a measure. *Psychol. Health Med.* 6 (4), 411–428.
- Pakenham, K.I., Samios, C., 2013. Couples coping with multiple sclerosis: a dyadic perspective on the roles of mindfulness and acceptance. *J. Behav. Med.* 36 (4), 389–400.
- Patrick, D.L., Edwards, T.C., Topolski, T.D., 2002. Adolescent quality of life, part II: initial validation of a new instrument. *J. Adolesc.* 25 (3), 287–300.
- Patti, F., Pozzilli, C., Montanari, E., Pappalardo, A., Piazza, L., Levi, A., Onesti, E., Pesci, I., 2007. Italian study group on quality of life in MS. Effects of education level and employment status on HRQoL in early relapsing-remitting multiple sclerosis. *Mult. Scler. J.* 13 (6), 783–791.
- Polit, D.F., Beck, C.T., Owen, S.V., 2007. Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Res. Nurs. Health* 30 (4), 459–467. <http://dx.doi.org/10.1002/nur.20199>.
- Robins, R.J., Zhang, Y., Anderson, M.B., Presson, A.P., Burks, R.T., Greis, P.E., 2015. Convergent validity of the patient reported outcomes measurement information system's (PROMIS) physical function computerized adaptive test (PF-cat) for the knee and shoulder injury sports medicine patient population. *Orthop. Sports Med.* 3 (2 suppl.), 2325967115S00147.
- Rubio, D.M., Berg-Weger, M., Tebb, S.S., Lee, E.S., Rauch, S., 2003. Objectifying content validity: conducting a content validity study in social work research. *Soc. Work Res.* 27 (2), 94–104. <http://dx.doi.org/10.1093/swr/27.2.94>.
- Schwartz-Barcott, D., Kim, H.-S., 2002. An expansion and elaboration of the hybrid model of concept development. *Concept Dev. Nurs. Found. Tech. Appl.* 2, 161–192.
- Shahvari, Z., Raisi, F., Yekta, Z.P., Ebadi, A., Kazemnejad, A., 2015. Married women's sexual satisfaction questionnaire; a developmental and psychometric evaluation. *Iran. Red. Crescent Med. J.* 17 (4).
- Sinnakaruppan, I., 2000. Development of a coping scale for use with chronic illnesses, especially multiple sclerosis—a pilot study. *Int. J. Rehabil. Res.* 23 (3), 155–161.
- Snyder, C.R., Harris, C., Anderson, J.R., Holleran, S.A., Irving, L.M., Sigmon, S.T., Yoshinobu, L., Gibb, J., Langelle, C., Harney, P., 1991. The will and the ways: development and validation of an individual-differences measure of hope. *J. Personal. Soc. Psychol.* 60 (4), 570.
- Waltz, C., Bausell, B.R., 1981. *Nursing Research: Design Statistics and Computer Analysis*. Davis FA, Philadelphia.