The Arabic Arthritis Self-Efficacy Scale-8 (ASES-8): A valid and reliable measure of evaluating self-efficacy in Palestinian patients with rheumatoid arthritis

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# ****ABSTRACT****

**Background:** The Arthritis Self-Efficacy Scale-8 (ASES-8) is one of the most commonly used scales to measure patient-reported arthritis-specific self-efficacy. However, evidence about the validity and reliability of ASES-8 in an Arabic-speaking arthritis population is lacking.

**Objective:** This study aimed to cross-culturally adapt and assess aspects of validity and reliability of the Arabic version of the ASES-8.

**Methods.** The ASES-8 was translated into the Arabic language using the back-translation method, and administered to 67 patients with rheumatoid arthritis (RA). Construct validation methods used exploratory factor analysis and correlating the ASES-8 scores with disease-related variables expected to be related to the arthritis self-efficacy construct. An internal consistency test was conducted. Floor and ceiling effects were considered present if more than 15% of patients achieved high (=10) and low (=1) scores on the Arabic ASES-8 for both the scale and item scores.

**Results:** Exploratory factor analysis demonstrated a one-factor solution (factor loadings: 0.54-0.81). ASES-8 scores were correlated with all measures assessed (*r*=−0.24 to −0.57 and *r*=0.06 to 0.66), demonstrating construct validity. Internal consistency was acceptable for measures of Cronbach’s alpha (0.86 to 0.88). The scale did not exhibit ceiling or floor effects.

**Conclusion:** The Arabic version of ASES-8 is valid and reliable for evaluating self-efficacy in patients with rheumatoid arthritis.

**Keywords**: Rheumatoid arthritis, Self-efficacy, Psychometric properties, Validity, Reliability

# Introduction

Self-efficacy is a psychosocial variable which has been defined as the individual's confidence to perform a specific task [1]. It is related to a person’s beliefs in his/her ability, rather than actual ability. Many arthritis management interventions focus on enhancing self-efficacy because of its influence on health status and treatment outcomes and because it is potentially modifiable [2]. In rheumatoid arthritis (RA), there is a robust evidence that higher reported self-efficacy is associated significantly with lower levels of functional impairment, emotional distress and reported pain severity [3]. In addition, increased adherence with medications has also been linked with higher levels of self-efficacy [4]. As such, interventions targeting self-efficacy in the rheumatology population including patient education and self-management courses have been developed and are widely used in countries with highly developed healthcare systems to improve patients’ health outcomes [5,6].

A recent systematic review study of instruments assessing self-efficacy in patients with rheumatic diseases failed to provide recommendations on the most appropriate self-efficacy instrument to use in the clinical and research field [7]. However, compared with other self-efficacy measures the Arthritis Self-Efficacy Scale (ASES) [8] has been around longer, is more applicable to arthritis [3], and has some evidence from previous studies for its validity and reliability [7,9]. The original scale was developed as part of the Stanford Arthritis Self-Management Study to evaluate perceived self-efficacy and measure change resulting from a health education intervention [8]. It contained 20 items contributing to three subscales of self-efficacy related to physical function, pain and other symptoms. Subsequently, a more practical 8-item version (ASES-8) was developed [10] which comprises two items from the ASES pain subscale, four items from the ASES other symptoms subscale, and two new items relating to preventing fatigue and pain from interfering with daily activities. The items of the ASES-8 measure the patients’ confidence on a scale of one (very uncertain) to 10 (very certain). The score for the scale is the mean of the eight items (range=1-10), so that higher score indicates greater self-efficacy.

Although the ASES-8 is widely used and validated in different languages [11-15], to our knowledge, an Arabic version of the ASES-8 has not been cross-culturally adapted and verified for validity and reliability in people with RA. The application of patient-reported outcome measures (PROMs) in different language and culture populations necessitates following a specific methodology to assure adequate linguistic translation and maintain the content validity of the instrument [16,17]. In addition, to develop effective and culturally relevant interventions targeting self-efficacy for Arabic-speaking RA patients, researchers require valid and reliable instruments that are culturally sensitive. Thus, without assessing the validity and reliability of a PROM, it is unknown if the instrument provides meaningful measures. The Consensus-based standards for the selection of health status measurement instruments (COSMIN) provided definitions of validity and reliability aspects for PROMs [18]. Some of the relevant aspects involved are described in table 1.

This paper aims to report the cross cultural adaption of the ASES-8 and examine some aspects of validity and reliability of the Arabic version of the ASES-8. Specific objectives were to: (1) examine the construct validity of the Arabic ASES-8 by using exploratory factor analysis and correlating it with measures for which the literature supports a relationship, (2) assess the reliability (internal consistency) of the Arabic ASES-8 by calculating the Cronbach’s alpha, and (3) identify any ceiling or floor effects for the Arabic ASES-8.

# Methods

## Study design

This was a prospective, multicenter cross-sectional study to cross-culturally adapt and assess aspects of construct validity and reliability of the ASES-8 in RA.

## Ethical approvals

This study was approved by both the University of Southampton School of Health Sciences Ethics panel and the Palestinian Ministry of Health. All patients provided written informed consent prior to enrolment.

## Translation and cross-cultural adaption

Translation and cross-cultural adaption of the ASES-8 followed recommended guidelines for the cross-cultural adaption of health status measures [16,17]. Permission to translate the ASES-8 was obtained via email from Prof. Dr. Kate Lorig the original author and developer of the ASES-8. Two bilingual researchers who are rehabilitation specialists (HA & JD) translated the ASES-8 items into simplified Arabic. Another two independent bilingual linguistic professionals who were blind to the original ASES-8 back translated the generated Arabic version. All translation experts involved in the process of forward and backward translation then met and resolved any inconsistencies to produce the pre-final version of the Arabic ASES-8. Finally, face validity of the Arabic ASES-8 was assessed by seeking feedback from RA patient partner collaborators (PPI). For that reason, cognitive debriefing interviews [19] were conducted with five Palestinian RA patient partner collaborators (2 men and 3 women) with a range of educational levels, ages and disease duration to evaluate the ease of completion, relevance and clarity of the Arabic ASES-8. Modifications to the language were made according to the patients’ feedback and understanding and checked with them afterward. After reaching an agreement in term of the Arabic ASES-8 wording, clarity and cultural equivalence between the researchers and the patients it was then utilized in this present study.

## Participants and procedure

Potential participants were recruited from three rheumatology outpatients’ clinics situated within governmental hospitals in the northern region of Palestine from March –July 2019. The inclusion criteria were: a confirmed diagnosis of RA as defined by the American College of Rheumatology (ACR) criteria [20], aged 18 years or over, willing to take part in the study and with sufficient language skills to complete assessments. Participants with an inability to complete questionnaires due to cognitive impairments, psychiatric conditions, or who were unable to read or write Arabic were excluded. Data collection sessions were conducted on the same day as the participants’ medical follow ups at their rheumatology outpatients’ clinic. Initially, the lead author, a qualified rehabilitation specialist and a researcher, distributed the clinical questionnaires to the eligible participants and was present to answer any questions regarding the measures and answer objectively so as not to influence the participant’s responses. Following completion of the clinical research questionnaires, functional capacity tests were administrated in a standardized order.

## Measures

This study was a minor element of a larger project to evaluate hand function in Palestinian people with RA. The data were collected by both self-reported and clinician assessed performance (objective) measures as detailed in the following subsections:

* + 1. *Demographic*:Socio-demographic and disease-related variables were documented using a patient demographic questionnaire which consisted of questions about the patients’ age, gender, employment status, marital status, living arrangement, education level (above or below secondary education), and disease duration.
    2. *Arthritis Self-Efficacy*: Self-efficacy concerning pain and other disease-related symptoms was measured using the Arabic ASES-8 [8].
    3. *Functional capacity*:Hand strength is an objective measurable, functional capacity indicator which is frequently assessed in RA. Therefore, bilateral power grip was assessed following recommended assessment protocols [21] using the Jamar Dynamometer.
    4. *RA symptoms*:Participants were asked to rate their hand pain at rest (for both hands) over the past week using the valid and reliable Arabic pain numerical rating scale (NRS) [22]. In addition, participants were asked to report their hand pain experienced during grip strength tests (pain during activity) on the Arabic NRS. The Short Form 36 (SF-36) [23] vitality subscale was used to assess perception of fatigue. This scale consists of four items with standardized scores range from zero to 100, with lower scores indicating greater fatigue. The vitality subscale of the SF-36 was reported to have reasonable validity in measuring fatigue in RA [24]. Results from studies conducted in Arab countries showed that the Arabic SF-36 has satisfactorily validity and reliability in a variety of population samples [25-27].
    5. *Psychological distress*:The four-item patient health questionnaire (PHQ-4) for anxiety and depression which combines the Patient Health Questionnaire-2 (PHQ-2) and the Generalized Anxiety Disorder-2 (GAD-2) was used to assess physiological distress [28]. The response options for each item range from zero “not at all” to three “nearly every day” and the total score ranges from 0 to 12 (a high score indicates that there is an underlying depressive disorder). The advantages of using the PHQ-4 is the ability to measure both depression and anxiety and provide a summary score for each one of them as well as measuring psychological distress reflected as a total score of both scales. All scales (PHQ-2, GAD-2 and PHQ-4) have well established psychometric properties to support their use with primary care patients and the general population [29-31]. The validity and reliability of the original scales (i.e. PHQ-9 and GAD-7) from which the PHQ-4 was derived have been demonstrated in the Arabic language [32].
    6. *Disability:*Functional disability was measured using the short version of the Disabilities of the Arm, Shoulder and Hand (QuickDASH) questionnaire [33]. The QuickDASH is designed to assess generalised upper limb functional ability with a wide variety of upper limb disorders. It uses 11 of the original 30 items to assess impairments and activity limitations and participation restrictions of the upper extremity. Each item is scored on a five-point Likert scale, and the scores for all items are used to calculate a scale score ranging from zero (no disability) to 100 (most severe disability). The QuickDASH is now available in several languages including Arabic, and reported to have good construct validity, test–retest reliability and responsiveness to change in people with RA [34,35].
    7. *Coping*:The Brief Coping Inventory (BCI) [36] was used to evaluate the coping strategies. It comprises 14 subscales that can be grouped into three scales: (1) problem-focused (active coping, planning, use of instrumental support), (2) emotion-focused (use of emotional support, positive reframing, acceptance, religion, humor), and (3) dysfunctional coping (venting, denial, substance use, behavioral disengagement, self-distraction, self-blame) [37]. Each subscale of the BCI contains two items (i.e. total number of items are 28 items) and each item is scored on a Likert scale from one “I haven’t been doing this at all” to four “I have been doing this a lot”. The score for each scale of the BCI is calculated by summing the relevant subscales scores. The BCI is widely used coping measure to identify the nature of coping strategies implemented by individuals for many health-relevant situations [38] and has been used with RA population [39]. The subscales of the brief BCI has reported reliability (Cronbach’s alpha) ranging from 0.50 to 0.90 [36]. The brief BCI Arabic version internal consistency (Cronbach’s alpha) ranged from 0.63 to 0.94 and divergent validity results suggested good construct validity [40]. The substance use scale of the BCI may introduce cultural biasness; since the statements of this scale are asking about alcohol or recreational drug use, which are not culturally accepted in Palestine. Therefore, the substance use subscale of the BCI was not included in the measure of coping for this study’s Palestinian sample population.

## Statistical analysis

Data were stored in a Microsoft Excel database and processed with SPSS version 26 (IBM Corp, Armonk, NY, US). Prior to statistical analysis the data distributions were checked for normality using a combination of visual inspection (histograms), and formal normality tests (Shapiro-Wilks test). Frequencies and percentages were presented for categorical data. Study variables were presented as mean and standard deviations for normally distributed variables and median and interquartile range for non-normally distributed variables. Internal consistency of the Arabic ASES-8 was examined by calculating the Cronbach’s alpha. A value more than 0.7 has been reported as an acceptable internal consistency [41]. In addition, item internal consistency was assessed by computing a corrected item-total scale correlation (the correlation of the item designated with the summated score for all other items); a value of 0.4 and above has been recommended for supporting item internal consistency [42]. The proportion of participants with high and low scores on the Arabic ASES-8 were explored for both the scale and item scores, and a proportion >15% has been taken as an indication of the presence of floor and ceiling effect [41].

Construct validity was investigated by testing associations between ASES-8 and variables identified from previous literature as expected to be related to the Arthritis self-efficacy construct. Accordingly, Pearson’s and Spearman’s tests were used to examine the association between ASES-8 and disability (QuickDASH), Fatigue (SF-36 vitality subscale), coping (BCI), pain measurements (NRS), psychological distress (PHQ-4), and functional capacity measurements (grip strength). Exploratory factor analysis (EFA) was also used to examine the construct validity (structural validity) of the Arabic ASES-8. Prior to the extraction of the factors Bartlett’s test of Sphericity was performed to examine whether the correlation matrix significantly differed from the identity matrix (i.e. there is a relationship among the items). Additionally, the Kaiser-Meyer-Olkin test (KMO) was used to evaluate sampling adequacy for carrying out factor analysis. The value of KMO test ranges from zero to one. It was reported that the KMO value should be above the acceptable threshold of 0.50 for carrying out factor analysis [43]. EFA was conducted using principal component analysis. Multiple criteria were used to determine the number of factors (factor retention): (1) Eigenvalues (an indication of the proportion of total variance accounted for by a factor) had to be greater than 1.0; (2) visual examination of the screen plot to determine number of eigenvalues preceding the “elbow”; (3) a loading factor of >0.4 was the cut-off point for item retention.

# Results

## Translation and adaptation of ASES-8

Modifications for the original ASES-8 were not required, since no conceptual or cultural difference was found. Therefore, no extensive content adaptation of the items was necessary. Based on the comments from the PPI group, the Arabic ASES-8 was clear and easy to understand. Similarly, the scale was clearly understood and was easy to administer and completed by participants within 6 minutes.

## Sample characteristics

This study recruited sixty-seven participants with an age range between 29 to 77 years (*M*=53.4, *SD*=11.4) and median disease duration of 7 years (IQR 2.0-15.0). The majority of participants were female (*n*=53, 79%), married (*n*=59, 88%), living with others (*n*=57, 85%), not working at the time of the interview (*n*=54, 81%), and educational level was below post-secondary (*n*=47, 70%). Sample characteristics are summarized in table 2.

## Descriptive scale characteristics

The mean of ASES-8 scores was 5.51 (*SD*=1.69) and median was 5.63 (IQR 4.13-7.13). Individual results relative of each item were distributed throughout a full-scale range (1-10). For both the scale and item scores no floor or ceiling effects were found. With regard to the scale mean score the maximum (best score) of 8.5, as well as minimum (worse score) of 1.9 was met by 3% of the participants. Item 2 (“keeping the pain from interfering with sleep”) and item 5 (“keeping the fatigue from interfering with activity”) had the highest floor effect (11.9% and 10.4% respectively). Item 6 (“do something to feel better when feeling blue”), had the highest ceiling effect (10.4%) (table 3).

## Reliability

Internal consistency of the scale was good (α=0.88). The corrected item-total correlation ranged from 0.44 to 0.73, indicating that all items represent the underlying one dimensional construct. The Alpha value remained good (range=0.86-0.88) if single items were deleted, indicating no individual item is redundant or lowering the scale’s internal consistency (table 3). The inter-item correlations were also evaluated and the results showed that no inter-item correlation exceeded the value of 0.7 (range=0.15-0.68) indicating the absence of possible item redundancy [44].

## Validity

The KMO value was 0.86, which is considered “meritorious” [45] and Bartlett’s test of sphericity was significant (*χ2*= 255.57, *p* < 0.001) in an exploratory factor analysis, indicating that factor analysis was feasible. Factor analysis indicated only one eigenvalue above 1.0 (4.42) and all eight items were found to load on a single factor with loadings from 0.54 to 0.81. Item number 4 “regulate your activity so as to be active without aggravating your arthritis” had the highest loading (0.81) and Item 6 “do something to help yourself feel better if you are feeling blue” had the lowest loading (0.54) (table 3). The common variance (amount of variance that is shared among the eight items) explained by the single-factor solution was 55.29%.

Table 4 presents the correlations of the Arabic ASES-8 scores. These were significantly associated, in the anticipated directions, with arthritis symptoms (pain and fatigue), psychological distress (depressive and anxiety symptoms), disability and coping. ASES-8 scores showed moderate correlations with disability measure (QuickDASH- high score indicates more disability) (*r*=-0.57, *p<*0.001), and fatigue (SF-36 vitality subscale - high score indicates less fatigue) (*r*=0.66, *p<*0.001). Associations between hand pain intensity and the Arabic ASES-8 scores were small but significant for both hands (range: *r*=-0.29 to -0.38). Anxiety and depression symptoms either correlated negatively with self-efficacy, achieving the highest coefficient in anxiety (*r*=-0.50, *p<*0.001). Regarding the associations with coping strategies, dysfunctional coping strategies showed negative significant association (*r*=-0.24, *p=*0.05), whereas problem-focused and emotion- focused strategies both showed positive associations but did not reach statistical significance. Finally, the associations between self-efficacy and grip strength for both hands were significant (right hand: *r*=0.28, *p=*0.02*;* left hand*: r=*0.30*, p=*0.01).

# Discussion

The main purpose of this secondary data analysis was to examine the factor structure, validity and reliability of the Arabic ASES-8. Kimberlin and Winterstein [46] suggested that secondary data analysis to examine the psychometric properties of outcome measures can be used, and is an acceptable method if the data set appropriately measures the variables required for the analysis. For the present analysis, a diverse set of measures collected and coded by the researcher were available to examine the construct validity including both self-reported and clinician assessed performance (objective) measures. Although this study sample included more female participants than males, this is reflective of the general RA population (women to men ratio=3:1) [47].

There were positive experiences regarding the translation and cross-cultural adaption of the ASES-8. The initial phase was to ensure a valid content translation with respect to cultural equivalence and fluent wording of each item. During the translation phase, no problems were encountered in translation and no conceptual or cultural difference was found. The Arabic ASES-8 was well accepted by all participants, confirming the comprehensibility of the instrument. These positive experiences confirm already reported positive experiences reported with validation of the Spanish [15], German [14] and Chinese [12] version of ASES-8, suggesting the suitability of this scale for assessing disease-related self-efficacy in RA patients in different cultural settings.

Statistically significant correlations between the Arabic ASES8 scores and measures of pain, fatigue, psychological distress level (anxiety and depressive symptoms), self-reported disability, functional capacity and coping were reported. These findings are in line with cumulative evidence from rheumatology literature demonstrating that arthritis self-efficacy is a strong explanatory factor of valued physical and psychological health outcomes among people with arthritis [48]. The comparison of the ASES-8 with other validated outcome measures provided satisfactory evidence in support of the construct validity of the Arabic version of the ASES-8. It is noted, that in terms of magnitude, few statistically significant correlations were weak. However, similar correlations were reported in previous validation studies of ASES-8 [12-14]. In contrast to the previous psychometric studies of ASES-8 [12-14], hand-specific data of pain, disability and functional capacity were used in this current analysis to establish the construct validity. The strength of associations between the ASES-8 and hand pain and disability measure was similar to the preceding studies which have used generic pain and disability outcome measures [12-14]. In addition, the strength of association reported in our study between the ASES-8 and functional capacity measure (i.e. grip strength) was higher than those studies, which have used generic functional capacity measures [13,14]. These results suggest that the scale has sufficient sensitivity to reflect specific self-efficacy related to the hand and upper limb problems experienced by RA populations. Notwithstanding these issues, the correlations between the ASES-8 and coping scales were very weak and did not reach statistical significance for the problem- and emotion-focused scale of the BCI. These results were not expected since reasonable correlations (range: *r*= 0.35-0.45) were reported between the German ASES-8 version and coping strategies [14]. This seemingly paradoxical result may be explained by the small sample size in the present study and the difference in coping outcome measures between our study and the German study [14].

Exploratory factor analysis results indicated that the Arabic version of the ASES-8 comprised a one-factor structure, consistent with reports of the English [13] German [14] and Chinese [12] ASES-8, with all items loading heavily on this factor. Factor loading values for each item (range=0.54-0.81) demonstrated that they were sufficient indicators of the one single factor. Factor analysis is usually performed on a “large” sample sizes. However, there is no consensus regarding the appropriate sample size required [49]. Watson and Thompson [50] suggested that a sample size should be between five and 10 time the number of items for the factor analysis. For the present analysis, responses on the Arabic ASES-8 collected from 67 patients with RA were used to conduct the EFA. Therefore, the sample size satisfied the requirement for the number of samples (item to participant ratio was 1:8) suggested for the factor analysis [50]. In addition, results of both Bartlett’s test of sphericity and KMO test showed that EFA was feasible.

The internal consistency in this study was very good with Cronbach’s alpha=0.88, and comparable with the English (0.89) [13], and German (0.90) [14] ASES-8 values. Almost when any one of the items was removed Cronbach’s alpha coefficient was decreased, which illustrate that each item (except item 6) was uniquely contributing to the overall conceptual framework of the scale. Further examination showed that item-total correlations were good (mean=0.65), which indicate that individual items fit appropriately the scale overall. There were no floor or ceiling effects present for the Arabic ASES-8 items or average scale scores according to the widely used definition of 15% cut-off for this phenomenon [41].

There are several limitations, which exist due to the different focus of the larger study. First, due to the use of secondary data it was not possible to evaluate the test-retest reliability and the discriminate validity of the scale. Second, the sample size of the study was relatively small and could be underpowered to detect statistically significant associations. Third, the nature of the cross-sectional study design and recruiting a convenience sample preclude the possibility to draw conclusions about the causality between variables and ensure full representation from the sample. Finally, further research is needed to assess the validity and reliability of the Arabic ASES-8 in different healthcare services and from different Arabic countries, which would add to the psychometric properties of this measure.

# Conclusion

This is the first analysis that provides systematic evaluation of validity and reliability of the Arabic ASES-8 in people living with RA. This will support greater use of this tool worldwide in clinical and research practices that include Arabic people. The present analysis showed acceptable levels of the validity and reliability of the ASES-8 among Arabic individuals with RA. Further research including the Arabic ASES-8 would provide insight about the advantages and shortcomings of this scale both in the clinical and research field.

**Conflict of interest**: The authors declare no conflict of interest or any financial support.

**Ethical approval**: The permission to cross-culturally adapt the ASES-8 for the Palestinian culture was obtained from Prof. Dr. Kate Lorig the original ASES-8 scale developer. This study was approved by both the Ethical Committees of the University of Southampton School of Health Sciences and the Palestinian Ministry of Health. All procedures performed in studies involving human participants were in accordance with the declaration of Helsinki standards.

**Informed consent**: Written informed consent was obtained from all participants prior to enrollment in this study. All participants were assured of confidentiality, anonymity, and right to withdraw at any time without giving a reason.

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**Table 1: Description of validity and reliability aspects** [18].

|  |  |
| --- | --- |
| **Aspect** | **Description** |
| Construct validity | The degree to which the scores of a PROM are consistent with hypotheses (e.g. relationships to scores of other instruments or measures) based on the assumption that a PROM validly measures the construct to be measured. |
| Structural validity | It is an aspect of construct validity that concern the degree to which scores of a PROM are an adequate reflection of the dimensionality of the construct to be measured. To examine structural validity, exploratory factor analysis (EFA) is used when there is no prior hypothesis regarding the dimensionality of a PROM. |
| Reliability  (Internal consistency) | The degree of the interrelatedness among items, assuming a PROM to be unidimensional. Cronbach’s alpha is the most commonly used statistical method for estimating internal consistency reliability based on the function of the average inter-correlation of the items and the number of items in a PROM. |

PROM: Patient-reported outcome measure

**Table 2: Patient characteristics (n=67)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Patient characteristic** | | ***n* (%)** | **Mean (SD)/**  **Median (Q1-Q3)** |
| **Gender** | | |  |
|  | Female | 53 (79%) |  |
|  | Male | 14 (21%) |  |
| **Marital status** | |  |  |
|  | Married | 59 (88%) |  |
|  | Other (single, divorced , widow) | 8 (12%) |  |
| **Education** | |  |  |
|  | < post-secondary | 47 (70%) |  |
|  | ≥ post-secondary | 20 (30%) |  |
| **Living arrangement** | |  |  |
|  | Living alone | 10 (15%) |  |
|  | Living with others | 57 (85%) |  |
| **Employment status** | |  |  |
|  | Working (full-time, self-employed) | 13 (19%) |  |
|  | Not working (retired, unable to work, looking after home) | 54 (81%) |  |
| Age (years) | |  | 53.39 (11.42) |
| Disease duration ( years) | |  | 7.0 (2.0-15.0) |
| Psychological distress (PHQ-4) | |  | 5.34 (3.52) |
| Depression symptoms (PHQ-2) | |  | 2.70 (1.95) |
| Anxiety symptoms (GAD-2) | |  | 2.64 (1.82) |
| Fatigue (SF-36 vitality subscale) | |  | 43.06 (20.09) |
| **Pain (NRS)** | |  |  |
|  | Right hand pain at rest |  | 2.63 (2.12) |
|  | Left hand pain at rest |  | 2.49 (2.21) |
|  | Right hand pain during activity |  | 4.64 (2.84) |
|  | Left hand pain during activity |  | 4.28 (2.68) |
| **Coping (BCI)** | |  |  |
|  | Problem-focused |  | 17.0 (13.0-20.0) |
|  | Emotion-focused |  | 29.0 (26.0-32.0) |
|  | Dysfunctional |  | 20.0 (16.0-23.0) |
| **Power grip strength (Kg)** | |  |  |
|  | Right hand |  | 21.47 (9.54) |
|  | Left hand |  | 20.74 (8.86) |
| Disability (QuickDASH) | |  | 45.7 (24.7) |

Q: Quartile; PHQ-4: The Patient Health Questionnaire-4; PHQ-2: The Patient Health Questionnaire-2 (depression scale); GAD-2: Generalised Anxiety Disorder (GAD-2); SF-36: Short Form 36-Item Health Survey, NRS: Numerical Rating Scale; BCI: Brief Coping Inventory; QuickDASH: Shortened version of the Disabilities of the Arm, Shoulder and Hand questionnaire

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Item no. | Item | Response options | | Factor loading | Corrected Item-total Correlation | Cronbach's Alpha if Item Deleted |
| % floor | % ceiling |
| 1 | How certain are you that you can decrease your pain quite a bit? | 9.0 | 1.5 | 0.73 | 0.64 | 0.87 |
| 2 | How certain are you that you can keep your arthritis or fibromyalgia pain from interfering with your sleep? | 11.9 | 3.0 | 0.74 | 0.65 | 0.87 |
| 3 | How certain are you that you can keep your arthritis or fibromyalgia pain from interfering with the things you want to do? | 9.0 | 4.5 | 0.78 | 0.68 | 0.86 |
| 4 | How certain are you that you can regulate your activity so as to be active without aggravating your arthritis or fibromyalgia? | 6.0 | 4.5 | 0.81 | 0.73 | 0.86 |
| 5 | How certain are you that you can keep the fatigue caused by your arthritis or fibromyalgia from interfering with the things you want to do? | 10.4 | 3.0 | 0.80 | 0.71 | 0.86 |
| 6 | How certain are you that you can do something to help yourself feel better if you are feeling blue? | 1.5 | 10.4 | 0.54 | 0.44 | 0.88 |
| 7 | As compared with other people with arthritis or fibromyalgia like yours, how certain are you that you can manage pain during your daily activities? | 1.5 | 7.5 | 0.74 | 0.64 | 0.87 |
| 8 | How certain are you that you can deal with the frustration of arthritis or fibromyalgia? | 3.0 | 4.5 | 0.78 | 0.70 | 0.86 |

**Table 3: Factor loadings for one-factor solution and item performance of the ASES-8**

**Table 4: Correlations between the Arabic ASES-8 and health-related variables.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Measure | | | 95% confidence interval | | Correlation coefficient | *p value* |
| Lower limit | Upper limit |
| Pain (NRS) | | | | | | |
|  | Right hand pain at rest | | -0.07 | -0.49 | -0.29 | 0.02 |
|  | Left hand pain at rest | | -0.05 | -0.53 | -0.31 | 0.01 |
|  | Right hand pain during activity | | -0.13 | -0.52 | -0.34 | 0.004 |
|  | Left hand pain during activity | | -0.16 | -0.55 | -0.38 | 0.002 |
| Coping (BCI) | | | | | | |
|  | Problem-focused | | -0.15 | 0.32 | 0.09 † | 0.49 |
|  | Emotion-focused | | -0.19 | 0.27 | 0.06 † | 0.67 |
|  | Dysfunctional | | 0.01 | -0.48 | -0.24 † | 0.05 |
| Psychological distress (PHQ-4) | | | -0.30 | -0.67 | -0.51 | <0.001 |
| Depression symptoms (PHQ-2) | | | -0.25 | -0.63 | -0.46 | <0.001 |
| Anxiety symptoms (GAD-2) | | | -0.24 | -0.70 | -0.50 | <0.001 |
| Fatigue (SF-36 vitality scale) | | | 0.46 | 0.79 | 0.66 | <0.001 |
| Grip strength | | |  |  |  |  |
|  | | Right hand | 0.07 | 0.48 | 0.28 | 0.02 |
|  | | Left hand | 0.07 | 0.51 | 0.30 | 0.01 |
| Disability (QuickDASH) | | | -0.40 | -0.71 | -0.57 | <0.001 |

NRS: Numerical Rating Scale; BCI Brief Coping Inventory; †: Spearman’s rank correlation coefficient; PHQ-4: The Patient Health Questionnaire-4; PHQ-2: The Patient Health Questionnaire-2 (depression scale); GAD-2: Generalised Anxiety Disorder (GAD-2); SF-36: Short Form 36-Item Health Survey; QuickDASH: Shortened version of the Disabilities of the Arm, Shoulder and Hand questionnaire

***Note***: Correlation coefficients are Pearson’s product moment correlation coefficients unless otherwise indicated.