Journal of Pain Research

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

Validation of the Arabic Version of the Fibromyalgia Survey Questionnaire

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Introduction: Fibromyalgia is a prevalent rheumatological condition that is marked by pervasive and widespread body discomfort. The diagnosis of Fibromyalgia can be challenging. For this reason, the American College of Rheumatology developed a scoring system, the Fibromyalgia Survey Questionnaire (FSQ). To address the lack of validated scales in the Arabic language for assessing fibromyalgia, this study aimed to examine the psychometric properties of the Arabic-language version of the FSQ in two Arabic-speaking populations (Lebanon and Palestine).

Methods: Our study followed cross-sectional design. It was conducted from October 2024 to January 2025, within a period of five months, enrolling Lebanese and Palestinian adults. The questionnaire included sociodemographic questions and scales including the Widespread Pain Index (WPI), Symptom Severity Scale (SSS), Patient Health Questionnaire (PHQ-4) and Insomnia Severity Index (ISI).

Results: In total, 1148 participants participated in this study, with a mean age of 29.11 ± 12.50 years and 66.90% females. Among them, 58 (5.05%) were identified as having a possible diagnosis of fibromyalgia. The fit indices of the FSQ and SSS scales were acceptable after adding correlations between items. Internal reliability was adequate for the total scale in the total sample, in Lebanese and Palestinian samples for both scales. Invariance was shown at the metric and scalar levels in terms of genders and countries for both scales. A significantly higher mean LOG WPI and LOG SSS was found in females compared to males. No significant difference was found between Lebanese and Palestinian participants in terms of WPI; however, Lebanese scored higher SSS scores compared to Palestinians. Higher WPI and SSS scores were significantly associated with higher anxiety, depression and insomnia.

Conclusion: This study supports the reliability and validity of the Arabic versions of the FSQ as robust measures for fibromyalgia. Adequate internal consistency, model fit, concurrent validity, and measurement invariance suggest that the Arabic scale is valid to utilize in both clinical and research settings.

Keywords: fibromyalgia, psychometrics, Arabic, cross-cultural comparison

Introduction

Fibromyalgia is a prevalent rheumatological condition that is marked by pervasive and widespread body discomfort.[1] In addition to the pain that is characterized as musculoskeletal, other symptoms such as emotional dysregulation, chronic exhaustion, sleep disruptions, and cognitive issues are frequently present.[2] The central nervous system is the primary cause of this complex disease, which is classified as nociplastic pain.[3] Its sophisticated pathophysiology is still being researched and debated.[4]

Fibromyalgia has a global prevalence ranging from 1 to 5%.[5,6] Fibromyalgia is described at different occurrences across the world, ranging from 1.7% in the USA, to 2.95% in Italy and 3.6% in Bangladesh.[5] This medical dilemma often concerns women in their fourth and fifth decade of life with a female to male ratio of approximately 9:1 but is described at all ages.[7–9]

Received: 20 March 2025
Accepted: 12 July 2025
Published: 30 September 2025

Fibromyalgia can be associated with other rheumatological diseases like osteoarthritis, rheumatoid arthritis and polymyalgia rheumatica.[7–12] It has also been associated with psychological disorders like general anxiety disorder, depression and chronic fatigue syndrome or even infections, irritable bowel syndrome and temporomandibular joint disorder.[13,14] No definitive cure has been described for fibromyalgia, making clinicians rely on non-pharmacological interventions like exercise, relaxation, psychotherapy and pharmacological interventions like pain medications that can be increased gradually for pain management or symptom-based medications for other associated symptoms.[15] The scarcity of data surrounding fibromyalgia, from etiology to pathophysiology and clinical evolution to treatment, prompts an intensification of research of this topic that has become a medical burden for clinical practitioners.[2] The diagnosis of Fibromyalgia can be challenging. For this reason, the American College of Rheumatology (ACR) developed a scoring system that endured several modifications through the years.[16,17]

The FSQ that is composed of the WPI and the SSS was originally elaborated in the English language and has been translated and validated in Norwegian, German, Turkish, French, Persian and Korean.[18–23] No Arabic version of the FSQ that is culturally and linguistically adapted exists.

According to the new preliminary diagnostic criteria for fibromyalgia and measurement of symptom severity issued in 2010 by the American College of Rheumatology, a patient must satisfy 3 conditions. First, the patient should have the symptoms at a similar level for at least 3 months. Secondly, the patient should not have a disorder that would otherwise explain the pain. And finally, the patient should have a WPI greater than or equal to 7 and a SS score of 5 or more, or a WPI score between 3 and 6 and an SS score that is greater than or equal to 9.[24,25]

In 2016, the ACR modified the guidelines. First, all patients that suffer from a disease that triggers musculoskeletal pain are not excluded from the study. Secondly, they consider the same conditions of calculation, but the WPI score should be between 4 and 6 and not between 3 and 6. Thirdly, pain must be present in at least 4 of 5 specific regions defined as Left and Right upper regions, axial regions, and Left and Right lower regions. The jaw, chest and abdominal pain are not included in the specific regions.[26]

The WPI uses a list of 19 body areas where the patient felt pain over the past week. The total number of body areas is equated to the score given; therefore, the WPI score can range from 0 to 19.[27,28] The SSS on the other hand is divided into two parts: levels of severity and other somatic symptoms. Concerning the first part, three categories of symptoms (fatigue, waking unrefreshed and cognitive symptoms) are graded using a scale from 0 to 3 for each category. A 0 on the scale signifies no problem; 1 a slight or mild problem but generally mild or intermittent; 2 a moderate considerable problem and is often present and/or at a moderate level and finally 3 representing a severe, pervasive, continuous and life-disturbing problem. Patients can choose one level of severity for each of the three categories according to the level of his symptoms over the past week. The total after the sum of the 3 categories varies from 0 to 9. The second part determines the extent of somatic symptoms affecting the patient's life.[29,30] Patients with fibromyalgia express a variety of symptoms that affect their daily life and should be taken into consideration during the assessment.[31]

Fibromyalgia is described in literature in almost every culture and society. In Lebanon, a small country in the middle east, there is a scarcity of data regarding fibromyalgia, its epidemiology and correlates.[32] Recent studies suggest that the prevalence of fibromyalgia in Lebanon is estimated to be 7%, one of the highest rates in the world.[33–35] A 2015 study conducted in Lebanon, and one of the first to tackle the subject, concluded that despite having more of 50% of the doctors involved in the diagnosis process as rheumatologists, the diagnosis of fibromyalgia was still missed.[34] Some studies conducted on special populations in Lebanon reported striking results. For example, Ziade et al, estimated the rate of fibromyalgia to about 9.6% in Lebanese nurses,[36] while El Hasbani et al concluded a rate of about 20% in Lebanese university students.[37] This obvious contradiction in results shows the need of a recent study that focuses on the general population to quantify the rates of fibromyalgia in Lebanon and explore the possible specificities and factors of this population. In Palestine, on the other hand, a small country situated south of Lebanon, there is scarcity of data regarding fibromyalgia. There are currently no epidemiologic numbers assessing the percentage of fibromyalgia in Palestine. A study involving 14 Palestinian physicians highlighted the challenges in diagnosing fibromyalgia in Palestine and the knowledge deficiencies as well as the negative attitudes regarding the condition,[38] thus the need of a standard scoring system that can help clinicians with diagnosing fibromyalgia. The lack of validated scales in the Arabic language for assessing fibromyalgia represents a significant barrier to accurate diagnosis and research in Arabic speaking populations like Lebanon and Palestine. Without standardized measures, professionals may struggle with underdiagnosis, misclassification and

inconsistent patient care in regard to fibromyalgia. Thus, by validating the FSQ, we aim to bridge the gap that exists today, by providing an internationally recognized tool that is reliable for clinical assessment, therefore, improving patient care and supporting early interventions.

This study sought to provide rheumatologists with an Arabic version of this scale that is culturally and linguistically adapted to the Middle East for the diagnosis and assessment of fibromyalgia. A review of the existing literature showed that the studied scales have not been previously validated or assessed for use in Arabic-speaking populations, more specifically in the target populations of Lebanon and Palestine. Rheumatologists in Arabic-speaking countries often rely on orally translating the original English versions of the scales to the patients to make a diagnosis. This lack of data highlights a serious gap in the clinical tools available to Arabic-speaking healthcare professionals. Therefore, the objective of our study was to assess the validity, reliability and factor structure of the Arabic version of the WPI and SSS. We hypothesize that the Arabic version will have high internal consistency. We expect that factor structure to resemble that of the ACR, meaning nine pain localization factors for the WPI and four factors for the SSS. Also, we hypothesize that this version will have a strong convergent validity and a good discriminant validity with insomnia, anxiety and depression.

Methods

Ethics Approval and Consent to Participate

This study adhered to the ethical guidelines established by the Ethics Committee of Notre Dame des Secours University Hospital. Participants were thoroughly informed about the study's purpose, the confidentiality of their data, their rights, and the voluntary nature of their involvement. Informed consent was obtained from all participants. This study complies with the Declaration of Helsinki.

Study Design and Participants

This survey followed the cross-sectional design. It was conducted from October 2024 to January 2025, within a period of five months, enrolling Lebanese and Palestinian adults. A 20-minute online survey link was forwarded through the snowball method using social media and messenger apps. We included participants above the age of 18, residents of Lebanon and Palestine, and those who would consent to participate in the study. People suffering from comorbidities known to be differential diagnosis for FM like polymyalgia rheumatica, spondylarthritis, inflammatory myopathy and systemic inflammatory arthropathies were excluded in this study.

Questionnaire

This survey was carried out in the Arabic language, divided into several sections: the first section contained the purpose of the study and the electronic consent form before the start of the study. The second section outlined the general information on socio-demography, including age, sex, and financial stress. The third is health-focused and covers questions on BMI, history of medical and surgical conditions, and major conditions of interest: polymyalgia rheumatica, spondylarthritis, inflammatory myopathy, systemic inflammatory arthropathies, and hypothyroidism. Smoker status was evaluated using pack years, and alcohol consumption was assessed based on questions about the number of drinks one usually consumes per week. The last section included these scales and indexes.

Physical Activity Index (PAI)

Physical activity Index was assessed by the multiplication of the frequency, intensity, and duration of the daily activity.[39]

Widespread Pain Index (WPI)

WPI is a widely used scale approved by the ACR for the assessment of fibromyalgia. It lists 19 body areas where the patient felt pain over the past week. The WPI score can range from 0 to 19, given that the score is calculated by the sum of the body areas where the patient expresses pain. The body areas that are covered by this scale include: the neck, jaw,

upper and lower arm, shoulder girdle, chest, abdomen, hip, upper and lower back, upper and lower leg. Each area counts as 1, and each side (left and right) is distinguished in the scoring system and is given a different score. [27,28]

Symptom Severity Scale (SSS)

SSS is divided into two parts: level of severity and somatic symptoms associated with the disease. Regarding the first section, a scale ranging from 0 to 3 is used to grade the three categories of symptoms: fatigue, waking unrefreshed and cognitive symptoms. No problem is represented by a score of 0; a slight or mild problem that is typically mild or intermittent is represented by a score of 1; a moderately significant problem that is frequently present and/or at a moderate level is represented by a score of 2; and a severe, pervasive, continuous, and life-disturbing condition is represented by a score of 3. Depending on how severe their symptoms have been throughout the previous week, patients can select one level of severity for each of the three categories. The sum of the three categories yields a total that ranges from 0 to 9. The second section assesses how much the patient's life is impacted by somatic symptoms.[29,40] A long exhaustive list was provided for clinicians by the ACR to check. Based on the quantity of symptoms experienced in the past week, patients scored 0 (for no symptoms), 1 (for few symptoms), 2 (for a moderate number of symptoms) and 3 (for a great deal of symptoms). It is worth noting that 0 symptoms correlate with a score of 0, a total of 1 to 10 symptoms is given a score of 1, a total of 11 to 24 symptoms correlate with a score of 2 and a number of symptoms that is greater or equal to 25 correlates with a score of 3. The list of symptoms covers digestive, respiratory, dermatological, neurological and general symptoms. The symptoms include: Muscle pain, Irritable bowel syndrome, Fatigue/tiredness, Thinking or remembering problem, Muscle Weakness, Headache, Pain/cramps in abdomen, Numbness/tingling, Dizziness, Insomnia, Depression, Constipation, Pain in upper abdomen, Nausea, Nervousness, Chest pain, Blurred vision, Fever, Diarrhea, Dry mouth, Itching, Wheezing, Raynaud's, Hives/welts, Ringing in ears, Vomiting, Heartburn, Oral ulcers, Loss/change in taste, Seizures, Dry eyes, Shortness of breath, Loss of appetite, Rash, Sun sensitivity, Hearing difficulties, Easy bruising, Hair loss, Frequent urination, Painful urination and Bladder spasms. The next step would then be to add the score of the two parts (levels of severity and other somatic symptoms) and the final score can range from 0 to 12.[29]

Translation Procedure

The WPI and SSS were translated and culturally adapted according to international guidelines as mentioned by Beaton et al.[41] A pilot study was conducted on 30 participants before the distribution to the general population to ensure correct adaptation and translation.

Forward Translation into Arabic

A single bilingual translator, an Arabic native that is fluent in English, aware of the concepts of the Widespread Pain Index and Symptoms Severity Scales proposed by the American College of Rheumatology, translated the English versions of the scales into Arabic. An expert committee, composed of healthcare professionals (psychologists, rheumatologists and orthopedic surgeons), a language professional and the original translator, had reviewed and revised the translated questionnaire to check for conceptual equivalence of the Arabic translated version.

Back Translation into English

A single Native English speaker translator, fluent in Arabic, had back translated the Arabic versions of the scales into the English language. The translator was unaware with the concepts of WPI and SSS and fibromyalgia diagnosis as well as the English versions of the scales. The expert committee reviewed the back-translated English version alongside the original version to identify and resolve inconsistencies. Repeating the forward and backward translation process eliminated all ambiguities.

Patient Health Questionnaire (PHQ-4)

Validated in Arabic,[42] the PHQ-4 is a brief 4-item scale that is used to measure symptoms of depression and anxiety throughout the past two weeks by dividing them into two subscales. With 0 representing "not at all" and 3 representing "almost every day", it uses a 4-point Likert scale. The final score is calculated by adding the scores for each of the four

items. A score of three till five represents a mild psychological anguish, six to eight indicates moderate psychological distress; and nine to twelve indicates severe psychological distress.[43]

Insomnia Severity Index (ISI)

Validated in Arabic,[44] the ISI is one of the most widely used instruments for diagnosing insomnia. It consists of a self-administered 7 item questionnaire that focuses on the DSM IV diagnostic criteria for insomnia. This scale is specifically designed to evaluate how patients perceive insomnia and how it impacts their quality of life, ability to function daily and their sleep maintenance, and their level of concern regarding their sleeping issues.[45]

Analytic Strategy

We conducted a CFA using the "Lavaan" and "SemTools" package.[46,47] We estimated a minimum sample of 380 participants based on the recommendation of 20 times per scale's variables.[48] The maximum likelihood method was used to obtain parameters estimate. Multiple fit indices were calculated: root mean square error of approximation (RMSEA) (≤ 0.08), standardized root mean square residual (SRMR) (≤ 0.05), Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI) (≥0.90 for both).[49] Additionally, convergent validity was checked via the average variance extracted (AVE) ≥0.50.[50] Multivariate normality was not verified as shown by Mardia's skewness (= 59,446.02; $p < 0.001$) and kurtosis (= 228.18; $p < 0.001$) values. Therefore, non-parametric statistical tests were used.

A multi-group CFA was conducted to examine measurement invariance of WPI and SSS scores between genders[51] at the configural, metric, and scalar levels.[52] ΔCFI ≤.010 and ΔRMSEA ≤.015 or ΔSRMR ≤.010 supported the evidence of invariance.[53] Comparison of WPI and SSS scores between genders was done using the Mann–Whitney test.

Composite reliability was assessed using McDonald's ω and Cronbach's α, with values greater than 0.70 reflecting adequate composite reliability.[54] The association between the WPI and SSS scores and other scores was evaluated using the Spearman test.

Results

In total, 1148 participants participated in this study, with a mean age of 29.11 ± 12.50 years and 66.90% females. Other descriptive statistics of the sample can be found in Table 1. In addition, 58 (5.05%) had a possible diagnosis of fibromyalgia (Table 2).

Table 1 Sociodemographic and Other Characteristics of the Sample (N = 1148)

Variable	Total (n = 1148)	Lebanon (n = 641)	Palestine (n = 507)
Sex			
Male	380 (100%)	189 (49.7%)	191 (50.3%)
Female	768 (100%)	452 (58.9%)	316 (41.1%)
Marital status			
Single	780 (100%)	355 (45.5%)	425 (54.5%)
Married	368 (100%)	286 (77.7%)	82 (22.3%)
Age (years)	29.11 ± 12.50	35.11 ± 12.67	21.52 ± 6.92
Household crowding index (person/room)	1.51 ± 1.56	1.14 ± 0.97	1.98 ± 1.98
Depression	2.44 ± 2.00	2.40 ± 1.94	2.50 ± 2.09
Anxiety	2.26 ± 2.07	2.31 ± 2.05	2.20 ± 2.10
Insomnia	10.72 ± 6.06	11.22 ± 5.96	10.10 ± 6.13

Note: Results are shown as frequency (percentage) for categorical variables and mean/standard deviation for continuous variables.

Table 2 Location of the Pain as Reported by Participants

	Total	Lebanon	Palestine
Right jaw	1148 (100%)	68 (58.6%)	48 (41.4%)
Left jaw	1148 (100%)	64 (56.1%)	50 (43.9%)
Right shoulder	1148 (100%)	169 (62.6%)	101 (37.4%)
Left shoulder	1148 (100%)	167 (62.8%)	99 (37.2%)
Upper right arm	1148 (100%)	79 (55.6%)	63 (44.4%)
Upper left arm	1148 (100%)	72 (56.3%)	56 (43.8%)
Lower right arm	1148 (100%)	71 (67.0%)	35 (33.0%)
Lower left arm	1148 (100%)	68 (63.0%)	40 (37.0%)
Right hip	1148 (100%)	77 (62.1%)	47 (37.9%)
Left hip	1148 (100%)	66 (65.3%)	35 (34.7%)
Upper right leg	1148 (100%)	71 (56.8%)	54 (43.2%)
Upper left leg	1148 (100%)	63 (56.8%)	48 (43.2%)
Lower right leg	1148 (100%)	92 (62.2%)	56 (37.8%)
Lower left leg	1148 (100%)	89 (59.7%)	60 (40.3%)
Upper back	1148 (100%)	161 (53.5%)	140 (46.5%)
Lower back	1148 (100%)	348 (64.4%)	192 (35.6%)
Neck	1148 (100%)	351 (63.0%)	206 (37.0%)
Chest	1148 (100%)	78 (43.8%)	100 (56.2%)
Abdomen	1148 (100%)	151 (50.2%)	150 (49.8%)
Possible fibromyalgia	58 (100%)	38 (65.5%)	20 (34.5%)

Note: Results are shown as frequency (percentage) for categorical variables.

Confirmatory Factor Analysis of the Widespread Pain Index

The fit indices of the original model were poor (RMSEA = 0.120 (90% CI 0.116, 0.124), SRMR = 0.076, CFI = 0.644, TLI = 0.571). However, they were acceptable after adding correlations between items (RMSEA = 0.079 (90% CI 0.075, 0.084), SRMR = 0.075, CFI = 0.849, TLI = 0.813) (Figure 1). The standardised estimates of factor loadings are shown in Figure 1. Internal reliability was adequate for the total scale in the total sample ($\omega = 0.82/\alpha = 0.83$), and in the Lebanese ($\omega = 0.78/\alpha = 0.79$) and Palestinian ($\omega = 0.87/\alpha = 0.87$) samples.

Gender Invariance of the Widespread Pain Index

Invariance was shown at the metric and scalar levels in terms of genders (Table 3, Model 1) and countries (Table 3, Model 2). A significantly higher mean LOG WPI was found in females compared to males (0.57 ± 0.31 vs 0.46 ± 0.32; $p < 0.001$, Cohen's d = 0.347) but no significant difference was found between Lebanese and Palestinian participants (0.56 ± 0.31 vs 0.53 ± 0.32; $p = 0.847$, Cohen's d = 0.020).

Confirmatory Factor Analysis of the Symptoms Severity Scale

CFA results of the Symptoms Scale indicate an acceptable model fit: (RMSEA = 0.054 (90% CI 0.024, 0.037), SRMR = 0.024, CFI = 0.985, TLI = 0.971). The standardised estimates of factor loadings are shown in Figure 2. Internal reliability was

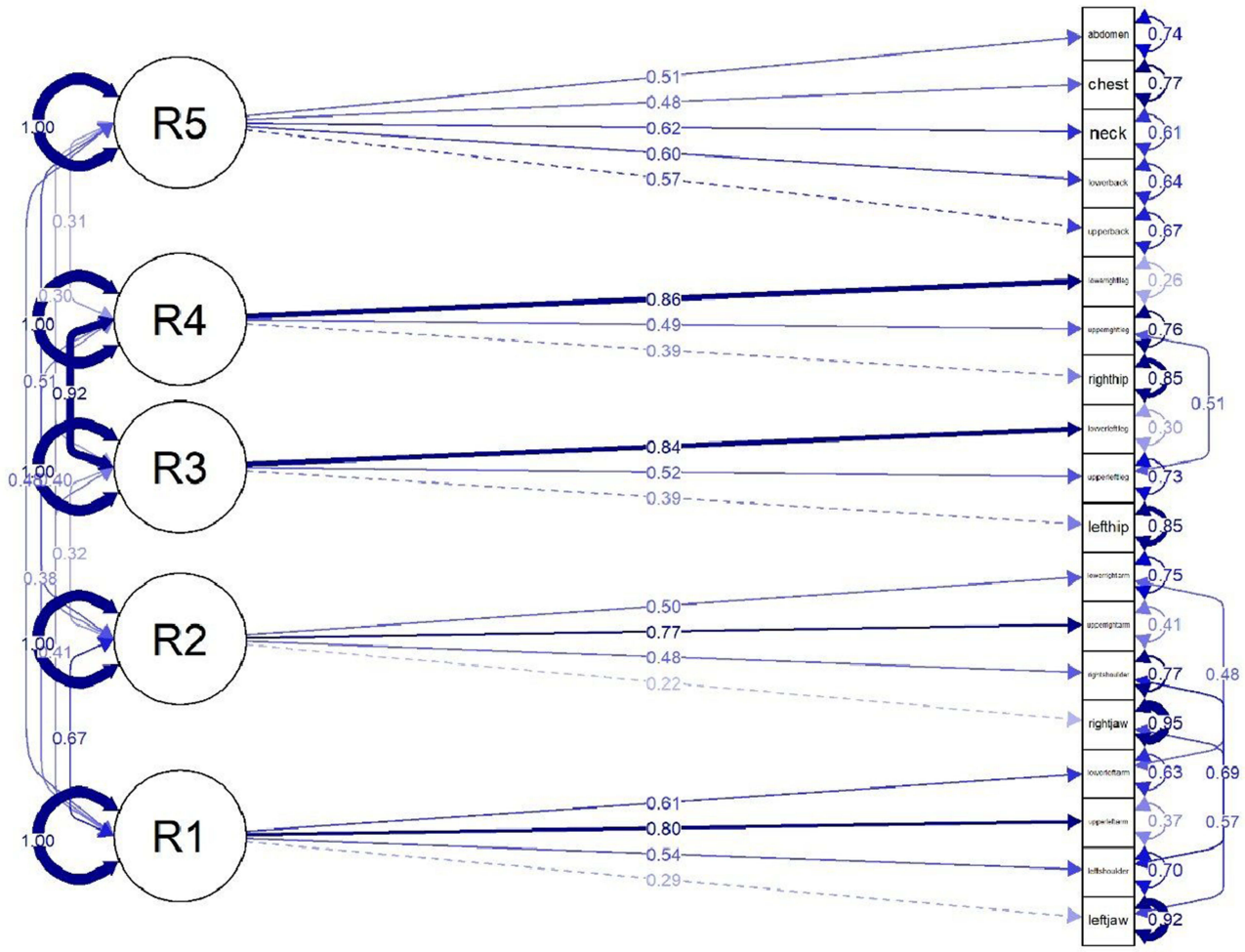

Figure 1 Standardized loading factors deriving from the confirmatory factor analysis of the Widespread Pain Index (19 items).
Notes: Region 1 (R1) = Left upper region; Region 2 (R2) = Right upper region; Region 3 (R3) = Left lower region; Region 4 (R4) = Right lower region; Region 5 (R5) = Axial region.

adequate for the total scale in the total sample (ω = 0.82/α = 0.78), and in the Lebanese (ω = 0.84/α = 0.78) and Palestinian (ω = 0.80/α = 0.77) samples.

The second-order model showed good fit as well (RMSEA = 0.059 (90% CI 0.024, 0.079), SRMR = 0.024, CFI = 0.984, TLI = 0.966).

Table 3 Measurement Invariance of the Widespread Pain Index

Model	CFI	RMSEA	SRMR	Model Comparison	ΔCFI	ΔRMSEA	ΔSRMR
Model 1: across gender							
Configural	0.839	0.082	0.076				
Metric	0.828	0.083	0.077	Configural vs Metric	0.011	0.001	0.001
Scalar	0.824	0.082	0.077	Metric vs Scalar	0.004	0.001	<0.001
Model 2: Across countries							
Configural	0.842	0.083	0.074				
Metric	0.838	0.082	0.080	Configural vs Metric	0.004	0.001	0.006
Scalar	0.823	0.084	0.082	Metric vs Scalar	0.015	0.002	0.002

Abbreviations: CFI, Comparative fit index; RMSEA, root mean square error of approximation; SRMR, Standardised root mean square residual.

https://doi.org/10.2147/JPR.S529405

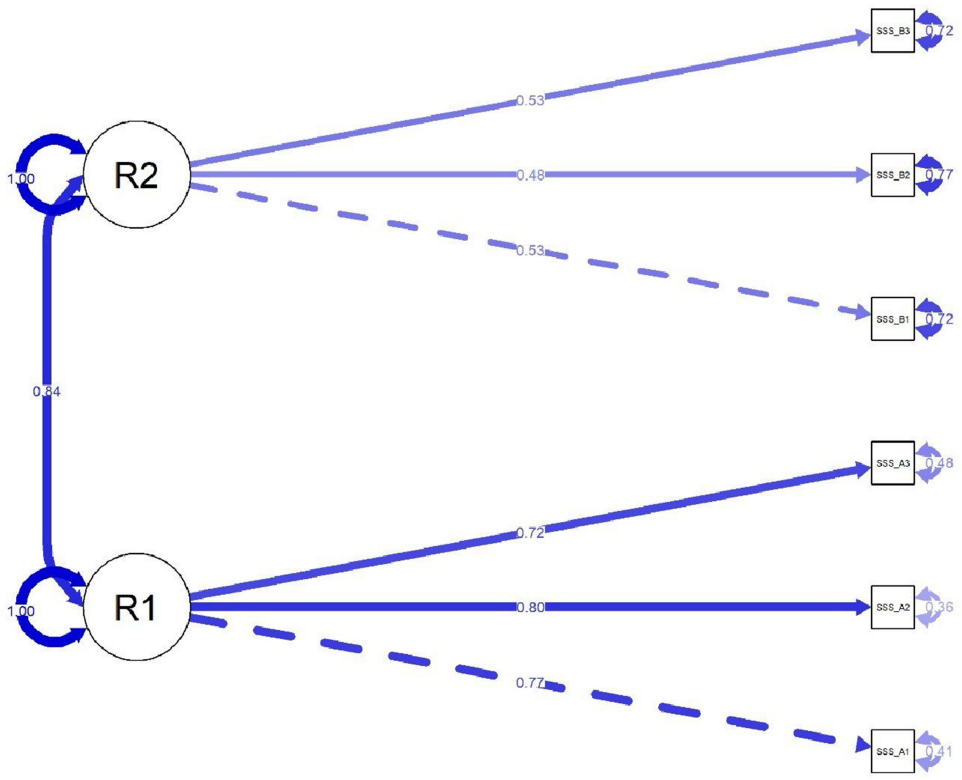

Figure 2 Standardized loading factors deriving from the confirmatory factor analysis of the Symptoms Severity Scale (6 items).
Notes: R1 represents three categories of major symptoms: fatigue, waking unrefreshed and cognitive symptoms which are the first part of the grading of the SSS. R2 represents reports of somatic symptoms: depression, pain or cramps in the lower abdomen and headaches, and they constitute the second part of the grading of SSS.

Measurement invariance was supported across gender, but partially across countries (not at the scalar level) (Table 4). A significantly higher mean LOG SSS was found in females compared to males (0.57 ± 0.31 vs 0.46 ± 0.33; $p < 0.001$, Cohen's d = 0.423) and in Lebanese vs Palestinian participants (0.56 ± 0.31 vs 0.53 ± 0.32; $p = 0.432$, Cohen's d = 0.075).

Total Score WPI + SSS = the FSQ

The mean total WPI + SSS score was 7.18 ± 5.54 in the total sample, with a good internal reliability (ω = 0.85/α = 0.85). A significantly higher mean total WPI + SSS score was found in females compared to males (8.00 ± 5.55 vs 5.54 ± 5.14;

Table 4 Measurement Invariance of the Symptoms Scale

Model	CFI	RMSEA	SRMR	Model Comparison	ΔCFI	ΔRMSEA	ΔSRMR
Model 1: across gender							
Configural	0.983	0.057	0.025				
Metric	0.971	0.065	0.044	**Configural vs Metric**	0.012	0.008	0.019
Scalar	0.971	0.060	0.045	**Metric vs Scalar**	<0.001	0.005	0.001
Model 2: Across countries							
Configural	0.987	0.051	0.023				
Metric	0.988	0.044	0.026	**Configural vs Metric**	0.001	0.007	0.003
Scalar	0.856	0.138	0.087	**Metric vs Scalar**	0.132	0.094	0.061

Table 5 Pearson Correlation Matrix

	1	2	3	4	5
1. Total WPI + SSS	1				
2. Widespread Pain Index	0.83***	1			
3. Symptoms scale	0.82***	0.42***	1		
4. Depression	0.51***	0.28***	0.48***	1	
5. Anxiety	0.52***	0.31***	0.48***	0.76***	1
6. Insomnia	0.52***	0.34***	0.47***	0.50***	0.52***

Notes: ***p < 0.001; numbers in the table indicate Spearman correlation coefficients (rho).

$p < 0.001$, Cohen's d = 0.455) and in Lebanese vs Palestinian participants (7.63 ± 5.35 vs 6.62 ± 5.72; $p = 0.002$, Cohen's d = 0.182).

Concurrent Validity of the Widespread Pain Index and Symptoms Scale

Higher WPI and SSS scores were significantly associated with higher anxiety, depression and insomnia (Table 5).

Discussion

The Arabic versions of the WPI and SSS represent a leap forward in advancing the assessment of widespread pain symptoms and fibromyalgia scores among Arabic-speaking populations. Our current analysis indicated satisfactory cross-national psychometric properties for both measures along with good concurrent validity, highlighting their reliability and robustness for research and clinical applications.

The SSS exhibited acceptable fit indices from the outset, whereas the WPI initially showed poor fit. However, after incorporating correlations between items, the WPI fit indices improved to an acceptable level. This might be related to the fact that pain in various regions tends to co-occur, reflecting both anatomical proximities, shared physiological centralized pain mechanisms.[55,56] Individuals with widespread pain also frequently report multiple pain sites simultaneously, in patterns related to either central sensitization or musculoskeletal conditions.[57] Thus, the non-correlated model could not capture pain distribution in a real-world perspective. By allowing correlations between closely related pain locations, the model was able to better reflect actual reporting patterns, reducing local misfit and improving the overall fit indices to acceptable levels. Additionally, the factors loaded in a manner consistent with the subscales in the most recent official ACR criteria, further supporting the validity of our scale.[30]

The internal reliability of the SSS was good for the overall scale (ω = 0.82, α = 0.78), while the WPI also indicated satisfactory internal reliability (ω = 0.82, α = 0.83). Additionally, the combined version of both subscales forming the FSQ exhibited good reliability (ω = 0.85, α = 0.85). A 2019 study investigation using a younger group in the USA reported an alpha indicator of 0.70 for the SSS.[19,20,58,59] A Spanish version of the WPI yielded an internal consistency of 0.678 for the SSS and of 0.846 for the FSQ.[60] A Norwegian translation provided alpha values of 0.793 for the SSS, 0.888 for the WPI, and 0.904 for the FSQ.[23] Additionally, the Cronbach's alpha values for the FSQ from translations in Germany,[18] Iran,[22] Türkiye,[19] France,[61] and South Korea[21] were 0.710, 0.814, 0.770, 0.867, and 0.942, respectively.

Invariance was supported for both the WPI and SSS across sexes, and for the WPI across countries, but only partially for the SSS. This indicates that both scales can be interpreted consistently across sexes. However, cross-country comparisons of the SSS should be approached with caution, as cultural or contextual factors may influence responses. Our findings indicate that women were scoring higher on the measures compared to males. The current consensus estimates the percentage of fibromyalgia patients to be about 60% female,[10,62–64] a significant reduction from past estimates of 90%, particularly following the establishment of the 2016 ACR criteria and the implementation of more objective research methods.[10] Previous studies across multiple nations also confirm that women are scoring higher on the SSS, WPI and FSQ.[10,65,66]

Indeed, women are more likely to report pain with greater severity and are more prone to develop chronic pain, influenced by a combination of factors ranging from physiological mechanisms and cognitive variables.[67]

Our results also indicated that higher scores on all scales were associated with higher levels of depression, anxiety and insomnia. Elevated WPI and SSS ratings are compounded by adverse mental health outcomes such as anxiety, depression, and sleep disturbances, particularly insomnia symptoms[28,68,69]— which in turn may cause further pain aggravation and general symptoms, as negative affect and fibromyalgia symptoms are very connected to each other.[70–72] Prospective research has demonstrated that disrupted sleep in fibromyalgia patients contributes to pain aggravation and can result in a chain of symptoms leading to depression.[73] Furthermore, studies have also established a bidirectional relationship between depression and fibromyalgia manifestations, raising the probability of their co-occurrence.[74] These comorbidities are also related to structural brain alterations and neurochemical shifts, which might also account for the mental symptoms experienced by patients.[75]

Our findings revealed heterogeneous results in cross-country differences. Although WPI scores were not significantly different among Lebanese and Palestinian populations, the SSS and FSQ scores were significantly higher among Lebanese participants. This would possibly mean that anatomical regions of pain as measured by the WPI may follow a universal pattern, whereas the symptoms gauged by the SSS (and thus their impact on the FSQ total score) may be more subjective and culture-dependent, such as depression, fatigue, and cognitive difficulties. Cross-national differences in prevalence can be attributed to disparities in measurement methods, age distribution, and sociocultural norms and beliefs.[76,77] Another study in 2014 supports the hypothesis that patients symptom perception varies between countries due to local factors, including minor differences in healthcare systems.[78] Moreover, measurement invariance was only partially supported for the SSS across countries, reinforcing the need for cautious interpretation of cross-national comparisons. Additional research is needed to explain cross-country differences in scale scores. It is also worth noting that demographic differences between our samples may have had an impact as well.

Clinical Implications

The validation of the Arabic translations of WPI and SSS offers researchers and clinicians a reliable tool to assess fibromyalgia symptoms in Arabic speakers. This carries significant implications in screening this disorder, monitoring the progression of symptoms, identifying comorbid conditions, and optimizing treatment in the long term. Besides, the significant correlations between the symptoms of fibromyalgia and mental health problems underscore the need for multidisciplinary treatment and diagnostic planning.

Limitations

This study may be subject to a few limitations that should consider the interpretability of our results. The cross-sectional nature of the research restricts the establishment of causality between our variables and their correlations, since data were captured at one point in time. In addition, generalizability could be affected by our sample and selection, especially since our sampling technique may have left behind an important part of the population. The reliance on self-reported measures creates the risk of biased estimates from participants due to inaccurate symptom estimations. Moreover, this study may not have accounted for all potential confounding variables, which could influence the findings. In addition, we included participants from two Arab countries, which may have subtle cultural differences compared to other Arab nations. Further cross-national research is needed to validate the scales' applicability across diverse Arab contexts. Finally, a comprehensive clinical evaluation of the pain is essential to more accurately assess and define the symptoms. While our study included a large and diverse sample (n = 1148), only 58 participants reported symptoms consistent with a possible fibromyalgia diagnosis. This relatively small proportion reflects the low prevalence of fibromyalgia in the general population and the nature of our community-based recruitment strategy. We acknowledge that this imbalance may limit the generalizability of the results specifically to clinically diagnosed fibromyalgia patients. However, the large sample allowed us to assess the structural validity and reliability of the Arabic version of the FSQ in a broad population, which may be relevant for screening and

epidemiological purposes. Future studies should aim at replicating these findings in clinically confirmed fibromyalgia patients to further establish diagnostic validity and sensitivity.

Conclusion

This study provides preliminary evidence supporting the reliability and validity of the Arabic versions of the WPI and SSS as measures for assessing fibromyalgia symptoms, with similar findings observed for the FSQ. Adequate internal consistency, model fit, concurrent validity, and measurement invariance confirm they are valid to utilize in both clinical and research settings. However, given the relatively small number of participants with probable fibromyalgia and the reliance of self-reported data without clinical diagnosis, these findings should be interpreted with caution. Additional studies with clinically confirmed samples are needed to further standardize these instruments to enhance their generalizability across Arabic-speaking populations.

Data Sharing Statement

The datasets produced and/or analyzed during this study are not publicly accessible but can be obtained from the corresponding author upon reasonable request.

Acknowledgments

Jean-Claude Lahoud, Feten Fekih-Romdhane and Souheil Hallit are last coauthors for this work. The authors would like to thank all participants and the forward and backward translators of the scales: Rana Saade and Elma Damoury.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

There is no funding to report.

Disclosure

The authors have nothing to disclose for this work.

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