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Spanish Version of the Pain Vigilance and Awareness Questionnaire: Psychometric Properties in a Sample of Women with Fibromyalgia

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Abstract. Excessive attention to pain is a common psychological characteristic among people who suffer from chronic pain. The Pain Vigilance and Awareness Questionnaire (PVAQ) is an internationally accepted tool to assess this feature, although there is no validated version of this measure for Spanish people with fibromyalgia. Since this pain syndrome mainly affects women, the aim of this study was to determine the psychometric properties of the PVAQ in Spanish women with fibromyalgia. A group of 242 women diagnosed with fibromyalgia aged between 20 and 66 years participated in the study. The goodness of fit of several structures of the PVAQ reported in previous studies was compared via confirmatory factor analysis. A two-factor solution (active vigilance and passive awareness) of the 9-item shortened version (PVAQ-9) was identified as the most appropriate (RMSEA = .08, NNFI = .96, CFI = .97, GFI = .87). It showed good reliability (internal consistency α = .82), convergent validity and divergent validity ($p < .01$). The optimal cutoff point for identifying fibromyalgia women with worse daily functioning was a score of 24.5, with a sensitivity of .71 and a specificity of .75. The relevance of vigilance to pain for clinical research in fibromyalgia is discussed.

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Fibromyalgia (FM) is characterized by widespread musculoskeletal pain for at least three months and pain on pressure in at least 11 of the 18 tender points (Wolfe et al., 1990). In addition to pain, FM patients experience other disturbing symptoms such as fatigue/tiredness, insomnia, muscle weakness, irritable bowel syndrome, nervousness, depression, and thinking/remembering problems (Wolfe et al., 2010). In Spain, FM has a prevalence of 2.3–4% (Branco et al., 2010) and the mean annual direct ambulatory cost per patient is higher in the FM group (908.67€) than in the reference medical group (555.58€) (Sicras-Mainar, Blanca-Tamayo, Navarro-Artieda, & Rejas-Gutiérrez, 2009).

Pain hypervigilance (i.e., excessive attention to pain and constant scanning of the body for annoying sensations) is a cognitive feature that intensifies pain perception and maladaptive responses to chronic musculoskeletal pain. Pain hypervigilance is an automatic and efficient process that emerges when painful sensations are appraised as dangerous, the fear system is activated, and the current goal is related to avoidance of/escape from pain (Crombez, Van Damme, & Eccleston 2005). Attentional processing of pain stimuli is a dynamic process that is modulated by competing demands, and pain may be given less priority when other competing and highly valued goals are present (Van Damme, Legrain, Vogt, & Crombez, 2010). In patients with chronic pain, the level of attention to pain has been associated with pain-related anxiety, depression, pain severity, physical and psychosocial disability, and number of physical visits due to pain (McCracken, 1997), pain severity, pain catastrophizing, and fear of movement/(re)injury (Goubert, Crombez, & Van Damme, 2004), and pain catastrophizing and pain anxiety (Martínez, Sánchez, Miró, Medina, & Lami, 2011). In the influential fear-avoidance model of chronic pain (Leeuw et al., 2007; Vlaeyen & Linton, 2000), pain hypervigilance is considered to explain the exacerbation of pain experience in musculoskeletal pain. According to this model, individuals who interpret pain catastrophically tend to experience fear of and anxiety about pain. This leads them to pay excessive attention to bodily signals and to show avoidance/escape behaviors toward activities that they believe increase the pain. These processes lead to deterioration of the muscular system and the ability to function and to the development of depressive symptoms. All this exacerbates the pain experience, contributing to a spiral that increases fear and avoidance. There is important empirical evidence supporting

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the validity of this model (for a review, see Leeuw et al., 2007; Pincus, Smeets, Simmonds, & Sullivan, 2010).

One of the main instruments used to assess pain hypervigilance is the Pain Vigilance and Awareness Questionnaire (PVAQ), a 16-item self-report measure developed by McCracken (1997). In 80 American patients with low back pain, the PVAQ showed adequate internal consistency, test-retest reliability, construct validity, and criterion validity (McCracken, 1997). An exploratory factor analysis (EFA) conducted with 256 Canadian university students revealed a hierarchical model with three lower-order factors (awareness of change, intrusion, and monitoring) and a single higher-order pain vigilance and awareness factor; the scale was found to have acceptable internal consistency and criterion validity (McWilliams & Asmundson, 2001). In 271 Dutch college students, an EFA showed a two-factor structure (attention to pain and attention to changes in pain), suitable internal consistency, test-retest reliability, and convergent and divergent validity (Roelofs, Peters, Muris, & Vlaeyen, 2002). In that study, a confirmatory factor analysis (CFA) conducted with 207 Dutch college students indicated good fit of the two and three-factor models; yet, the intrusion factor showed low internal consistency in the three-factor model. An EFA performed with 200 Dutch FM patients replicated the two-factor solution with 14 items (PVAQ-14), and a CFA conducted with 276 American patients with various chronic pain syndromes and 201 Dutch FM patients showed good fit of the two and three-factor solutions; however, the intrusion and monitoring subscales (i.e., three-factor model) were highly intercorrelated, suggesting that they represent the same construct (Roelofs, Peters, McCracken, & Vlaeyen, 2003). In that study, the PVAQ-14 showed adequate internal consistency and convergent validity in Dutch patients. In 227 American patients with chronic pain, an EFA revealed a two-factor structure (active vigilance and passive awareness) with 13 items (PVAQ-13), and this scale showed adequate internal consistency (McCracken, 2007). In 242 Chinese patients with chronic pain, a CFA and a comparison between different factor solutions (i.e., two- and three-factor, hierarchical and non-hierarchical) identified the two-factor structure proposed by McCracken (2007) as having the best data-model fit, and this scale showed acceptable internal consistency and construct and predictive validity (Wong, McCracken, & Fielding, 2011). Finally, in 468 Spanish patients with chronic low back pain, a comparison of various structures (i.e., single-, two-, and three-factor structures) via CFA identified the two-factor structure proposed by Roelofs et al. (2003) as the most suitable (Esteve, Ramírez-Maestre, & López-Martínez, 2013). In that study five items were excluded in order to optimize model fit, resulting in a 9-item version (PVAQ-9) with active vigilance and passive awareness factors, and this scale showed adequate internal consistency and convergent validity.

Previous research has shown that the PVAQ is a valid and reliable measure and that the two-factor model is the most replicated structure. However, no psychometric studies of the PVAQ have been conducted with Spanish patients with FM. The only study with a Spanish population was conducted with subjects with low back pain, a pain condition that greatly differs from FM. Since FM is more prevalent in women than in men (Branco et al., 2010) and women suffer from greater clinical pain and pain-related distress than men (Paller, Campbell, Edwards, & Dobs, 2009), it may be important to develop a Spanish version of the PVAQ for use in FM women. Therefore, this study included FM women and was aimed at analyzing the following: (a) The goodness of fit of several two-factor structures of the PVAQ identified in previous studies. The proposed hypothesis was that the PVAQ-9 would show the best fit; (b) The reliability (i.e., internal consistency) and construct validity (i.e., convergent, divergent, and predictive validity) of the most appropriate PVAQ structure. The proposed hypothesis was that the PVAQ would show high correlations with pain-related cognitive-affective variables (i.e., pain catastrophizing and pain anxiety) and moderate correlations with pain intensity, impairment, and emotional distress (i.e., anxiety and depression).

Method

Participants and Procedure

The sample was composed of 242 FM women recruited through consecutive sampling from the Pain Unit and Rheumatology Service of Hospital Universitario Virgen de las Nieves in Granada, Spain, and several associations of FM patients in Andalusia, Spain. Inclusion criteria were: (a) being a woman aged between 18 and 67 years, (b) having adequate reading comprehension, and (c) having been diagnosed with FM according to the criteria of the American College of Rheumatology (ACR, Wolfe et al., 1990). Exclusion criteria were: (a) presence of other chronic pain conditions, (b) presence of serious medical illness, (c) presence of a major depressive disorder with severe symptoms or suicide ideation or other major Axis I disorders of the DSM-IV-TR (APA, 2000), and (d) a history of alcohol or drug abuse. Patients were administered a semi-structured interview collecting socio-demographic and clinical data (i.e., onset and course of FM symptoms, life history, lifestyle, work, personal relationships, the family and the patient's attitudes about illness, and psychological status). In this interview, the possible presence of psychological problems was assessed through a shortened

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and adapted screening test derived from the structured clinical interview for DSM-IV Axis I disorders (SCID-I) (First, Spitzer, Gibbon, & Williams, 1999). After that, they were given several questionnaires to complete at home and deliver within a week.

A total of 325 FM women from the hospital and the FM associations were invited to participate in a study about the relationships between perceived health status and pain-related behaviours and attitudes. As 46 subjects did not meet the criteria to participate in the study, 21 subjects refused to participate in the study, and 16 subjects did not return the questionnaires, the final sample was composed of 242 subjects.

The mean age of participants was 48.29 years (*SD* = 8.23). Most of them were married (81%) and had secondary studies (38.4%), elementary studies (33.8%) or university studies (27.9%). As regards labor status, 41.3% were active workers, 24.6% were off work on disability, 20.4% were unemployed, and 13.8% were retired/students. Mean time since FM diagnosis was 5.43 years (*SD* = 4.41). Most participants (88.54%) were receiving drug treatment. All patients signed informed consent to participate in the research. The study was approved by the Ethics Committee of the Universidad de Granada.

Instruments

The McGill Pain Questionnaire-Short Form (MPQ-SF, Melzack, 1987) assesses the pain experience via 15 verbal descriptors of pain, an index of current pain intensity, and a visual analog scale to assess pain intensity during the last week (from 1 = no pain to 10 = extreme pain). Several studies (e.g., Lázaro et al., 2001) have reported the reliability and validity of the Spanish version of the MPQ.

The Fibromyalgia Impact Questionnaire (FIQ, Burckhardt, Clark, & Bennett, 1991) consists of 10 items assessing health status in FM patients. Item 1 explores daily functioning ability (scored from 0 to 3), items 2 and 3 evaluate the days per week that the subject feels well/unable to work, and items 4 through 10 assess physical and emotional symptoms (scored from 0 to 10). The Spanish version has shown adequate reliability, validity and sensitivity to change (Rivera & González, 2004).

The Hospital Anxiety and Depression Scale (HADS, Zigmond & Snaith, 1983) assesses symptoms of anxiety and depression in non-psychiatric hospital settings with 14 items (scored from 0 to 3). It includes two subscales: Anxiety and Depression. The Spanish version has shown appropriate internal consistency in chronic pain patients (Vallejo, Rivera, Esteve-Vives, Rodríguez-Muñoz, & ICAF Group, 2012).

The Pain Vigilance and Awareness Questionnaire (PVAQ, McCracken, 1997) evaluates awareness, consciousness, vigilance, and observation of pain through 16 items measured on a Likert scale from 0 (never) to 5 (always). The PVAQ has shown acceptable reliability and validity (see the Introduction section).

The Pain Anxiety Symptoms Scale (PASS-20, McCracken & Dhingra, 2002) explores fear, escape/avoidance, physiological anxiety, and cognitive anxiety. It includes 20 items scored from 0 (never) to 5 (always) on a Likert scale. The PASS-20 has shown good internal consistency, reliability, and predictive and construct validity (McCracken & Dhingra, 2002).

The Pain Catastrophizing Scale (PCS, Sullivan, Bishop, & Pivik, 1995) consists of 13 items assessing rumination, magnification, and helplessness scored from 0 (not at all) to 4 (all the time) on a Likert scale. The Spanish version has shown adequate internal consistency, test-retest reliability, and sensitivity to change (García-Campayo et al., 2008).

The PVAQ was translated into Spanish, and then translated back into English in order to ensure semantic equivalence. Only small semantic differences between both translations were identified in several items and these differences were reconciled by a professional English translator.

Data Analysis

Considering the subject-item ratio of 10:1 recommended for factor analysis (Thorndike, 1982), and since the PVAQ includes 16 items, a minimum sample size of 160 subjects was required, so the sample recruited (242 FM women) was adequate. Data were computed with SPSS 20.0 and LISREL 8.80. Significance levels lower than .05 were considered. In order to identify the most suitable factor model of the PVAQ, a CFA with the Robust ML method was applied. The following indexes were computed: Satorra-Bentler χ^2 statistic, Root Mean Square Error of Approximation (RMSEA), Non-Normed Fit Index (NNFI), Comparative Fit Index (CFI), Goodness of Fit Index (GFI) and Expected Cross Validation Index (ECVI). Values < .08 in the RMSEA (Thompson, 2004), and > .90 in the NNFI, CFI and GFI (Stevens, 2002) indicated acceptable model fit.

Reliability (internal consistency) of the PVAQ was examined with Cronbach's alpha, considered as suitable minimum values between .70 and .80 (Nunnally & Bernstein, 1995). The standard error of measurement was also estimated. The convergent and divergent validity of the PVAQ was determined by the magnitude of the relationship with other variables using the Pearson correlation coefficient. Correlations were considered low (from .10 to .29), medium (from .30 to .49), or high (.50 or higher) (Cohen, 1988). An ROC curve was obtained to examine the predictive validity of the PVAQ in identifying FM patients with clinical/high levels of pain,

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FM impact, anxiety, and depression. For the instrument to be predictive, the area under the curve must be higher than .50. The cutoff score with the best sensitivity and specificity was identified.

Results

Descriptive Statistics

As expected, pain intensity in the last week (M = 7.48, SD = 1.56) was relatively high in FM patients. FM impact (M = 61.05, SD = 14.70) was severe (score ≥ 59) (Bennett, Bushmakin, Cappelleri, Zlateva, & Sadosky, 2009). Anxiety (M = 11.03, SD = 4.48) indicated clinical range (score ≥ 11), and depression (M = 9.93, SD = 4.69) was indicative of a doubtful clinical problem (score between 8 and 10) (Zigmond & Snaith, 1983). Pain vigilance (M = 45.32, SD = 12.64), pain catastrophizing (M = 25.79, SD = 12.48), and pain anxiety (M = 48.64, SD = 20.31) were similar to those reported in previous studies (e.g., Roelofs et al., 2003). Table 1 shows the descriptive statistics for each item of the PVAQ.

Confirmatory Factor Analysis

As a previous step to the CFA, multivariate normality was examined and atypical observations in the PVAQ were identified. Missing values (0.36%) were imputed with the expected maximization method. Seven cases were excluded due to outliers, so the final sample was composed of 235 subjects. The multivariate normality test showed non-normal values for both asymmetry (z = 17.97, p < .001) and kurtosis (z = 10.52, p < .001), so a CFA with the Robust ML method was computed.

Table 2 shows the CFAs corresponding to the two-factor models proposed in previous research. Results showed good fit of the three models based on NNFI and CFI indexes, while GFI and RMSEA indexes were not adequate. The PVAQ-9 was identified as the best structure, with slightly better indexes than the others. The standardized factor loadings of the PVAQ-9 items were significant (p < .05) (see Figure 1). The remaining analyses were conducted using the structure of the PVAQ-9.

Reliability and Validity

The reliability (internal consistency) of the PVAQ-9 was adequate in the total scale (α = .82) and subscales (active vigilance, α = .76, and passive awareness, α = .82). In the PVAQ-9, the standard error of measurement was 3.64. The PVAQ-9 showed significant and low correlations with anxiety (r = .22, p < .01) and depression (r = .20, p < .01), indicating divergent validity, and significant and high correlations with pain anxiety (r = .55, p < .01) and pain catastrophizing (r = .53, p < .01), indicating convergent validity. The PVAQ-9 showed significant and moderate correlations with pain intensity in the last week (r = .30, p < .01) and FM impact (r = 0.36, p < .01).

An ROC curve was used to study the predictive validity of the PVAQ-9 and several groups were established to examine this psychometric characteristic. Two groups were created based on current pain intensity (MPQ-SF): patients who estimated pain as low (absent, mild, or uncomfortable) (n = 103) and patients who estimated pain as high (intense, terrible, or unbearable) (n = 123). Based on the cutoff points of < 39 (mild impact) and ≥ 59 (severe impact) in the FIQ (Bennett et al., 2009),

Table 1. *Mean (M), Standard Deviations (SD), Item-Total Correlation (r_{tot}) and Internal Consistency (α) if the Item is Deleted of the PVAQ*

Items	*M*	*DT*	r_{tot}	α
1. I am very sensitive to pain	2.87	1.48	.48	.79
2. I am aware of sudden or temporary changes in pain	3.89	1.29	.54	.79
3. I am quick to notice changes in pain intensity	3.91	1.25	.55	.79
4. I am quick to notice effects of medication on pain	2.34	1.50	.27	.81
5. I am quick to notice changes in localization or extent of pain	3.67	1.24	.50	.79
6. I focus on sensations of pain	2.12	1.49	.56	.79
7. I notice pain even if I am busy with another activity	3.82	1.41	.38	.80
8. I find it easy to ignore pain	2.55	1.73	−.01	.83
9. I know inmediately when pain starts or increases	3.68	1.50	.59	.79
10. When I do somethig that increases pain, the first thing I do is check to see how much pain was increased	1.70	1.65	.47	.80
11. I know inmediately when pain decreases	3.29	1.59	.43	.80
12. I seem to be more conscious of pain than others	2.14	1.75	.45	.80
13. I pay close attention to pain	1.85	1.46	.58	.79
14. I keep track of my pain level	2.20	1.54	.53	.79
15. I become preoccupied with pain	2.76	1.60	.47	.79
16. I do not dwell on pain	2.45	1.51	−.02	.83

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Table 2. *Goodness of Fit Indexes of the Structural Models Proposed for the PVAQ*

Model	*Satorra-Bentler* χ^2	*df*	RMSEA	ECVI	NNFI	CFI	GFI
Two-factors model, PVAQ-14 (Roelofs et al., 2003)	216.21	76	.08	1.17	.94	.95	.80
Two-factors model, PVAQ-13 (Wong et al., 2011)	160.01	64	.08	0.91	.95	.96	.83
Two-factors model, PVAQ-9 (Esteve et al., 2013)	69.83	26	.08	0.46	.96	.97	.87

101 women with severe FM impact and 12 women with mild FM impact were identified. Considering a cutoff score of ≥ 11 in the HADS as an indicator of a clinical problem (Zigmond & Snaith, 1983), 129 patients with a clinical problem of anxiety and 106 without this problem, and 98 patients with a clinical problem of depression and 137 without such problem were identified. Table 3 shows the best cutoff points of the PVAQ-9 to classify these groups. The score that reflected acceptable sensitivity and sensitivity was 24.5; it correctly classified 71% of cases of severe FM impact (and 75% of cases of mild FM impact).

Discussion

In this study we examined the reliability and validity of the Spanish version of the PVAQ. This is the first instrumental study of this questionnaire in Spanish women with FM. The findings support the psychometric suitability of the 9-item short form (PVAQ-9; Esteve et al., 2013) in this clinical population. The PVAQ-9 showed appropriate internal consistency, convergent validity, divergent validity, and predictive validity, which means that it is a good instrument to measure attention to and awareness of painful sensations. It is relevant to have a validated Spanish version of this self-report for use in our community context, especially considering the relationship between pain hypervigilance and pain experience, emotional distress, and disability in chronic pain patients (Goubert et al., 2004; McCracken, 1997).

CFAs were conducted to examine the goodness of fit of several two-factor structures of the PVAQ identified in previous studies with chronic pain patients

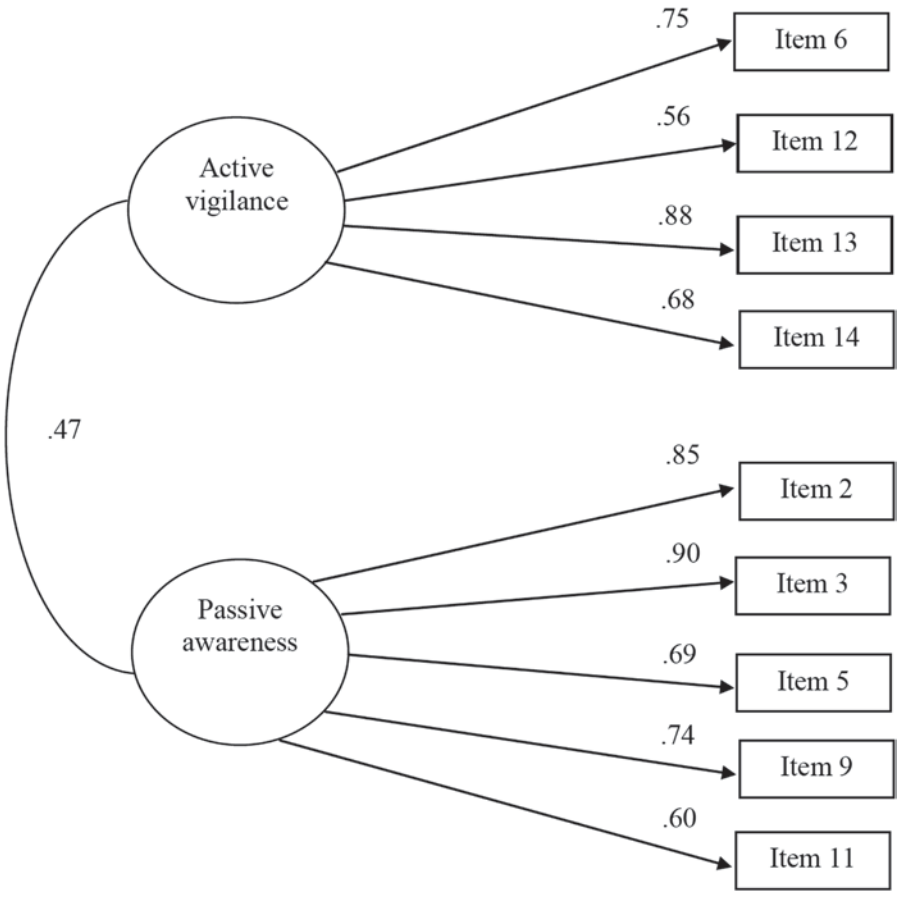

Figure 1. Standardized solution for the two-factor model of the PVAQ-9 (Esteve et al., 2013).

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Table 3. *Area Under the Curve, Better Cutoff, Sensitivity and Specificity of the PVAQ-9 (Esteve et al., 2013)*

			95% CI				
	Area	*p*	Lower limit	Upper limit	Better cutoff	Sensitivity	Specificity
High pain intensity (positive)	.60	.007	.53	.67	25.5	.63	.54
High impact of fibromyalgia (positive)	.70	.021	.54	.86	24.5	.71	.75
Clinical anxiety (positive)	.63	.001	.56	.70	25.5	.63	.55
Clinical depression (positive)	.59	.012	.52	.66	26.5	.60	.55

(Esteve et al., 2013; Roelofs et al., 2003; Wong et al., 2011). Results revealed that all models (PVAQ-14, PVAQ-13 and PVAQ-9) represented the data well according to several fit indexes (NNFI and CFI), with the PVAQ-9 model (Esteve et al., 2013) showing the best fit. The PVAQ-9 had good internal consistency in both the total scale and the active vigilance and passive awareness subscales.

The PVAQ-9 showed satisfactory convergent validity, as indicated by the high correlations between this measure and other cognitive-affective constructs of pain such as pain anxiety and pain catastrophizing. These findings are in line with previous studies (Esteve et al., 2013; Goubert et al., 2004; Martínez et al., 2011; Roelofs et al., 2003). The PVAQ-9 was associated with other clinical measures considered, although we found moderate correlations with pain intensity and FM impact and low correlations with anxiety and depression, suggesting adequate divergent validity. These results are consistent with those reported in previous studies (McCracken, 1997, 2007; Wong et al., 2011). Regarding predictive validity, the PVAQ-9 was found to be useful in identifying cases with severe FM impact. A cutoff score of 24.5 reflected higher sensitivity (71%) and specificity (75%). There are no studies with which to compare these results.

The present study has some limitations. Participants were Spanish FM women, so it may not be possible to generalize its results to FM men, other cultural/ethnic groups, or other chronic pain syndromes. Using a pressure algometer to assess the pain tolerance threshold and the Stroop task to examine selective attention to pain-related stimuli would have enriched the data collected. It would also have been relevant to include measures of self-efficacy beliefs and coping strategies, given their important contribution to the pain experience (Ramírez-Maestre, Esteve, & López, 2012; Sánchez, Martínez, Miró, & Medina, 2011). No other psychometric properties such as test-retest reliability and sensitivity to change were explored.

This study shows that the PVAQ-9 has satisfactory psychometric properties in Spanish FM women. This instrument is suitable for use in clinical settings, given its simplicity and reduced application time. The PVAQ-9 makes it possible to determine the attention level that FM patients direct to their painful sensations, which may be indicative of higher affective suffering and impaired functioning. This self-report may also be useful as an index of improvement, reflecting the degree to which individuals with chronic pain can live without cognitively focusing on pain and prioritizing it over other valuable life goals.

Several studies have provided evidence that psychological treatments aimed at promoting changes in vigilance and awareness of pain are beneficial for patients with chronic pain. Cognitive-behavioral treatment (i.e., education about pain, graduated exercises, applied relaxation training, training in pacing and goal setting, problem solving, and cognitive restructuring) can increase pain self-efficacy and reduce pain severity, catastrophizing, fear of re-injury, depression, stress, and attentional bias towards sensory pain words in chronic pain conditions (Dehghani, Sharpe, & Nicholas, 2004). Attention management strategies (via attention diversion, imagery, and mindfulness exercises) are useful for reducing pain-related anxiety, hypervigilance, and interference of pain in chronic pain patients (Elomaa, Williams, & Kalso, 2009). Attentional bias modification (a modified version of the dot-probe task to implicitly train subjects to attend away from pain-related stimuli) has been found to reduce anxiety sensitivity, fear of pain, and pain severity in patients with FM (Carleton, Richter, & Asmundson, 2011). Mindfulness-based treatment (aimed at helping patients to become aware of their present-moment experience without judging it, accepting it as it is through meditative body scan, meditation focused on breathing, and mindful yoga) facilitates a more flexible use of attention. Mindfulness training enhances attention modulation of 7–14Hz alpha rhythms that play an important role in filtering inputs to the primary sensory neocortex, and such training in chronic pain may work by "debiasing" the sensory attentional system and freeing up resources to attend to other demands (Kerr, Sacchet, Lazar, Moore, & Jones, 2013). In this regard, a recent study has shown that a multimodal mindfulness-oriented intervention including

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complementary aspects of mindfulness training, cognitive-behavioral therapy, and techniques used in positive psychology was able to reduce selective attention to pain-related stimuli, increase perceived control over pain, and attenuate reactivity to distressing thoughts and emotions in patients with chronic pain (Garland & Howard, 2013). Considering these therapeutic approaches, a good self-report instrument such as the PVAQ-9 can be helpful to estimate clinical improvements regarding excessive attention to pain in FM patients.

In conclusion, the Spanish version of the PVAQ seems to be an adequate instrument to identify FM patients who show an increased tendency to observe, monitor, and focus on pain, which contributes to a maladaptive response to disease.

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