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Empirical Evidence of the Validity of the Spanish Version of the Pain Vigilance Awareness Questionnaire

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Abstract
Background The Spanish version of the Pain Vigilance and Awareness Questionnaire has not been validated.
Purpose The aims of this study were to examine the factor structure of the Spanish version of the Pain Vigilance and Awareness Questionnaire and present empirical evidence regarding its validity.
Method A sample of 468 chronic back pain patients completed a battery of instruments to assess fear-avoidance beliefs, pain anxiety, pain catastrophizing, pain vigilance and awareness, pain acceptance, depression, anxiety, disability, and pain intensity.
Results Confirmatory factor analysis supported the validity of a nine-item version with two subscales: Active Vigilance and Passive Awareness. Both subscales and the total score were positively and significantly correlated with other fear-related constructs: fear-avoidance beliefs, pain anxiety, and pain catastrophizing. Regression analyses showed that Active Vigilance and the two subscales of the Fear-Avoidance Beliefs Questionnaire were significantly associated with higher anxiety and that the Acceptance Activity Engagement subscale was significantly associated with lower anxiety. The Fear-Avoidance Beliefs Questionnaire–Physical subscale was associated with higher disability and the Acceptance Pain Willingness subscale was associated with lower disability. The Fear-Avoidance Beliefs Questionnaire–Work subscale was significantly associated with higher pain intensity and depression; the Acceptance Activity Engagement and Pain Willingness subscales were significantly associated with lower pain intensity and depression.
Conclusion The Spanish version of the Pain Vigilance and Awareness Questionnaire is a reliable and valid instrument. Pain Acceptance and Fear Avoidance beliefs are better predictors of adjustment to pain than pain hypervigilance.

Keywords Chronic pain · Pain hypervigilance · Pain acceptance · Fear of pain · Pain vigilance awareness questionnaire · Validity

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Introduction

Pain hypervigilance could be defined as overalertness to pain and to signals of impending pain. It emerges when the threat value of pain is high, pain-related anxiety evolves and the individual's goal is to escape or avoid pain [1, 2]. McCracken [3] developed the Pain Vigilance and Awareness Questionnaire (PVAQ) to assess awareness, consciousness, vigilance, and observation of pain. The instrument is based on a behavioral conceptualization of attention which implies that behavior is being influenced by the focus of attention. This perspective suggests that people who focus excessively on pain will probably behave in a manner strongly influenced by pain. They will not engage in reinforcing and healthy activities and will consequently suffer more distress and disability [3]. This questionnaire has good internal consistency (α=0.86) and adequate test–retest reliability (r=0.80) in a sample of low back pain patients. Furthermore, the PVAQ scores correlated positively with the Body Consciousness Questionnaire [4] and negatively with ignoring pain (Coping Strategies Questionnaire) [5], providing support for the construct validity of the PVAQ. Moreover, the criterion validity of the PVAQ was supported, as patients

reporting more pain vigilance were also found to report higher levels of pain intensity, emotional distress, psychosocial disability, and more physician visits due to pain (even when controlling for pain severity and demographic variables).

Several studies have further evaluated the psychometric properties of the PVAQ and have conducted factor analyses to investigate the factor structure of the questionnaire. In a non-clinical sample, McWilliams and Asmundson [6] performed a principal component analysis with oblique rotation and found a three-factor solution which accounted for 62.8% of the variance. The factors were awareness of change, intrusion, and monitoring. Cronbach's alphas for the total PVAQ scale (0.92) and the three identified subscales (ranging from 0.65 to 0.88) indicated adequate to excellent internal consistency. Roelofs et al. [7] investigated the factorial validity of the PVAQ in a sample of university students. By exploratory factor analysis with oblique rotation, they found a two-factor solution which accounted for 52% of the variance. The first factor was named "Attention to Pain"—comprising the "Intrusion" and the "Monitoring" factors proposed by McWilliams and Asmundson [6]—and the second factor was named "Attention to Changes in Pain" which was identical to the Awareness of Change factor previously obtained by McWilliams and Asmundson [6]. The internal consistency of the total questionnaire was good (α=0.88). On the Attention to Pain and Attention to Changes in Pain subscales, Cronbach's alphas were 0.86 and 0.85, respectively, indicating good internal consistency. Furthermore, test–retest reliability was 0.77 for the total PVAQ and 0.82 and 0.71 for the Attention to Pain subscale and the Attention to Changes in Pain subscale, respectively, indicating adequate test–retest reliability. In addition, in a confirmatory analysis using Structural Equation Modeling (SEM) in another sample of healthy college students, Roelofs et al. [7] found that both the two- and three-factor solutions showed a good fit. In another study, Roelofs et al. [8] conducted an exploratory factor analysis with oblique rotation, in a sample of Dutch patients suffering from fibromyalgia. They found a factor structure similar to that obtained in healthy individuals with two factors—Attention to Pain and Attention to Changes in Pain—accounting for 49% of the variance [7]. Roelofs et al. [8] also performed a confirmatory factor analysis using SEM in order to test the factor structure obtained by the exploratory factor analysis in their study and the factor structures previously reported by Roelofs et al. [7] and McWilliams and Asmundson [6]. This study was carried out with two independent samples (Dutch patients suffering from fibromyalgia and American patients diagnosed with various pain conditions). The results of this study indicated that the three different factor structures showed a good fit. Nevertheless, since the intrusion and the monitoring subscales proposed by McWilliams and Asmundson [6] were highly intercorrelated, Roelofs et al. [8] suggested that they may represent the same underlying construct.

McCracken [9] used principal components analysis with oblique rotation in a sample of patients who attended a pain management centre, finding a two-factor solution with 13 items similar to the results of Roelofs et al. [8]. He renamed the factor "Attention to Pain" as "Active Vigilance" and "Attention to Changes in Pain" as "Passive Awareness". The latter had a weak association with interference caused by pain, whereas "Active Vigilance" had a stronger association since it implies that pain has a higher degree of influence on behavior.

In summary, the data on the psychometric properties of the English and Dutch versions of the PVAQ support its construct validity and criterion validity as well as its reliability (internal consistency and test–retest reliability) both in healthy subjects and in samples of patients suffering from chronic pain. Studies on the factor structure of the questionnaire indicated that the dimensions assessed by the questionnaire can be well represented by two dimensions: Attention to Pain or Active Vigilance and Attention to Changes in Pain or Passive Awareness.

As far as we know, the PVAQ remains unvalidated in Spanish, the fourth most widely spoken language in the world. Reliable and valid instruments are needed to measure pain vigilance for research and clinical interventions in Spanish-speaking populations. The factor structure found in the British, Canadian, and Dutch studies should be further cross-validated. A preliminary study provided a translation of the questionnaire and showed that, in a sample of patients with chronic pain, the Spanish version of the PVAQ (PVAQ-SV) had adequate internal consistency (α=0.80) [10].

Hypervigilance plays a central role in the contemporary fear-avoidance models of pain. According to the Fear-Anxiety-Avoidance Model of Pain [11], the catastrophic interpretation of pain produces a fear-based emotional state designed to protect the individual from the perceived catastrophic threat (fear of pain) and this may promote the onset of pain-related anxiety. Three components are distinguished in pain anxiety: the cognitive (hypervigilance), physiological (autonomic arousal), and motivational (preventive motivation). Hypervigilance will increase the likelihood that pain will be detected and, in interaction with memories and pain-relevant schemata, could even lead to the misinterpretation of innocuous stimuli as painful. Given that hypervigilance is a key concept in this influential model, it is relevant to investigate the relationship between the PVAQ and other self-report measures of the constructs included in the model, such as the Pain Catastrophizing Scale, the Pain Anxiety Symptoms Scale, and the Fear-Avoidance Beliefs Questionnaire. To investigate the uniqueness of the PVAQ in relation to the Pain Catastrophizing Scale and the Fear of

Pain Questionnaire [12], Roelofs et al. [7] conducted an exploratory factor analysis in which all the items of the three questionnaires were analyzed. Their results revealed that the PVAQ items from the Attention to Pain subscale loaded on the same factor as all the Pain Catastrophizing Scale items. The items from the Attention to Changes in Pain loaded on a separate factor. Taking these results into account, the authors suggested that there could be considerable overlap between the PVAQ and the Pain Catastrophizing Scale which were also highly correlated [7]. Another study [8] showed that the PVAQ correlated highly with the Pain Catastrophizing Scale, the Pain Anxiety Symptoms Scale, and the Tampa Scale of Kinesiophobia [13]. The association of these measures with the Attention to Pain subscale was significantly stronger compared to the association with the Attention to Changes in Pain subscale.

The relative association between pain hypervigilance and pain-related fear and pain intensity is another topic of interest. Some experimental [14–16] and correlational [17] studies have shown that the influence of pain-related fear on pain perception is mediated by attentional processes. Nevertheless, another study has found that the experience of pain is independently determined by fear of pain and pain hypervigilance [18], and that attention to pain is more closely associated with pain intensity than pain-related fear. Thus, a further aim of the present study was to compare pain hypervigilance and pain-related fear and their association with self-reported pain intensity, anxiety, depression, and disability.

Pain acceptance is another construct which has been compared with pain hypervigilance regarding its ability to predict pain interfering with the patients' emotional, social, and physical functioning. Acceptance is a process within the broader process of psychological flexibility which also includes contact with the present moment, values-based action, committed action, self-as-context, and cognitive defusion [19, 20]. Acceptance of chronic pain has two associated components: Pain Willingness, understood as responding to pain-related experiences without attempts at control or avoidance; and Activity Engagement, understood as engaging in normal life activities even if pain is present [21]. Greater acceptance is associated with reports of lower pain intensity and enhanced emotional and physical functioning in clinical samples [22–34]. McCracken [9] emphasized that the construct of pain acceptance includes attention in a functional framework since it includes awareness of pain while continuing to engage in desired activities without struggling to control the pain. In a sample of chronic pain patients, McCracken [9] recently compared pain hypervigilance to acceptance in predicting adjustment among patients. He found that acceptance accounted for more variance in adjustment to pain than hypervigilance alone. Thus, the present study also compared hypervigilance with pain acceptance in relation to their association with pain intensity, depression, anxiety, and disability.

The aim of the present study was to further evaluate the psychometric properties of the PVAQ-SV in chronic back pain patients attending Primary Care Units. Previous studies have been conducted with samples of healthy subjects or with patients attending specialized care units and it may not be possible to generalize the results to patients with less complex difficulties, such as those seen in primary care. The two-factor solution obtained in previous studies [7, 8] and the three-factor solution [6] were tested by confirmatory factor analysis (objective 1). The internal consistency of the instrument was studied (objective 2). Furthermore, to assess the convergent validity of the PVAQ-SV, its relationship with other pain-related self-report measures such as the Pain Catastrophizing Scale, the Pain Anxiety Symptoms scale, and the Fear-Avoidance Beliefs Questionnaire was investigated (objective 3). It was predicted that the PVAQ-SV would be positively correlated with reports of pain catastrophizing, pain anxiety, and fear-avoidance beliefs. In addition, the criterion validity of the PVAQ-SV was studied (objective 4). For this purpose, hypervigilance was compared to pain acceptance and fear of pain in relation to their association with pain intensity, depression, anxiety, and disability. According to previous results [9], it was hypothesized that acceptance would account for more variance in adjustment to pain than pain hypervigilance and fear-avoidance beliefs. It was predicted that hypervigilance and fear-avoidance beliefs would be associated with higher pain intensity, anxiety, depression, and disability, whereas pain acceptance would be associated with better adjustment to chronic pain.

Methods

Participants

Fifty patients refused participation because they could not fulfill the requirements of the study due to time constraints. The participants consisted of a consecutive sample of 478 patients suffering from chronic back pain who attended four Primary Care Units. Ten participants provided incomplete data and were excluded from the analyses. Thus, the final sample included 468 participants. All the participants were Caucasian and 59.40% were female. The mean age was 46.54 years (SD=13.23). The majority were married (61.30%), followed by never married (16%), cohabiting (8.50%), divorced (6.20%), widowed (4.10%), and separated (3.80%). A total of 37.40% had completed primary school and 34.40% had completed high school; only 17.70% had a university degree. The largest single group of patients was working full time (51.30%), followed by

housekeeping (18.80%), retired (15.80%), unemployed (11.50%), and studying (2.50%). The median duration of pain was 70.11 months (SD=93.18). The most common site of pain was the sacral area (61.80%), followed by vertebral-lumbar (60.90%), cervical (57.90%), leg below knee (33.80%), lumbar-renal (33.50%), and thoracic (32.70%). Regarding pain medication, most of the participants were taking NSAIDs (36.80%), while the remainder was taking non-opioid analgesics (32.10%), muscle relaxants (22.20%), and opioids (11.30%).

Individuals were considered eligible for the study if they fulfilled the following criteria: they had experienced pain for at least 3 months, they had a pain intensity score of at least 3 on a numerical composite pain intensity score [35], they had continuous pain or intermittent pain if it occurred for five or more days per week, and they were not being treated for a terminal illness. The sample met the recommended 10:1 ratio of the number of subjects to the number of test items [36].

Measures

Demographic and clinical pain-related variables Participants were interviewed and provided information on a number of demographic and pain-related variables including time in pain, medications and other medical treatment.

Fear-Avoidance Beliefs Questionnaire (FABQ) [37]. The Spanish version of the FABQ-SV consists of 15 items related to beliefs that physical activity (FABQ-Phy) and work (FABQ-Work) influence pain intensity [38]. The instrument showed high internal consistency (α=0.93).

Pain Anxiety Symptoms Scale (PASS) [39]. This is a 40-item measure of anxiety and fear of responses associated with chronic pain. It consists of four subscales measuring (a) cognitive anxiety responses, (b) escape and avoidance, (c) fearful thinking, and (d) physiological anxiety responses. The psychometric properties of the PASS subscales and total score are highly reliable [40, 41]. Only the total score was used in this study. The Spanish version of the questionnaire [10] showed high internal consistency (α=0.93).

Pain Catastrophizing Scale (PCS) [42]. This questionnaire comprises 13 items in which participants are asked to report on the degree to which they experience various thoughts and feelings while in pain. It consists of three subscales assessing rumination, magnification, and helplessness, and also provides a total score on catastrophizing. The total score alone was used in this study. The Spanish version of the scale shows appropriate reliability and validity. Internal consistency was high (rumination, α=0.89; helplessness, α=0.90; magnification, α=0.79; total PCS, α=0.95) [43].

Pain Vigilance and Awareness Questionnaire [3]. This instrument assesses awareness, vigilance, preoccupation, and observation of pain. The PVAQ consists of 16 items. This questionnaire has been previously translated into Spanish and the instrument showed and adequate internal consistency [10].

Chronic Pain Acceptance Questionnaire (CPAQ) [26]. We applied the Spanish version of the questionnaire (CPAQ-SV) [44], which was originally created by McCracken et al. [26]. The instrument consists of 20 items. Like the original questionnaire, the CPAQ-SV yields a total score and two subscale scores for Pain Willingness and Activity Engagement. The subscales of the CPAQ-SV showed good internal consistency (Activity Engagement, α=0.85; Pain Willingness, α=0.75) [45]. Two studies on the CPAQ-SV [45, 46] supported the validity of a 20-item version with two subscales corresponding to two independent factors. In addition, the CPAQ-SV demonstrated adequate criterion validity [45].

Hospital Anxiety and Depression Scale (HADS) [47]. This is a self-reporting scale that contains two seven-item Likert scales, one for anxiety and one for depression. The Spanish version of the scale shows appropriate reliability and validity. The internal consistency of both scales is high (α=0.86 for anxiety; α=0.86 for depression) [48, 49].

Roland–Morris Questionnaire (RMQ) [50]. It consists of 24 items, which reflect limitations in different daily activities attributed by the patient to low back pain. The patient must mark each item that applies to his or her current status. The Spanish version [51] showed adequate internal consistency (between α=0.83 and α=0.94) and the ability to predict self-reported pain intensity and quality of life.

Pain intensity Patients were asked to rate their mildest, average, and worst pain during the past 2 weeks, as well as their current pain, on a scale ranging from 0 to 10, with a "0" indicating "no pain" and "10" indicating pain as "intense as you could imagine". A composite pain intensity score was calculated for each subject by calculating the average of the mildest, average, worst, and current pain. Jensen et al. [35] showed that composites of the 0–10 ratings are highly reliable measures of pain intensity in chronic pain patients.

Procedure

The research project was approved by the Carlos Haya Hospital Ethics Committee. First, the patients visited their Primary Care doctors. At the end of the visit, the doctors informed the patients about the study aims and asked for their participation. Some of the patients were interviewed after their visit,

whereas others left their telephone number to make an appointment another day. Informed consent was obtained prior to data collection. Participants were aware that the information collected was confidential. Each participant had a semi-structured interview with a psychologist to obtain demographic, social, or medical history data. A battery of questionnaires was also completed by each participant. All of them were interviewed in their usual Primary Care Center.

Statistical Analysis

With regard to the factorial validity of the PVAQ-SV (objective 1), a confirmatory factor analysis (CFA) was performed via Structural Equation Modeling using the LISREL 8.30 software package [52]. The validity of the three-factor structure previously obtained by McWilliams and Asmundson [6] and the two-factor structures obtained by Roelofs et al. [18, 50] was examined. For purposes of comparison, a one-factor model in which all the items were specified to load onto a single factor was also estimated. Analyses were performed on the polychoric correlation matrix of the PVAQ-SV items using the Maximum Likelihood Robust estimation method. Several goodness-of-fit indexes (GFIs) for the four alternative models were considered: Satorra–Bentler divided by the degrees of freedom, the comparative fit index, the non-normed fit index, and the root mean-square error of approximation.

The Satorra–Bentler chi-square is a chi-square fit index that corrects the statistic under distributional violations [53]. To reduce the sensitivity of chi-square to sample size, the index is divided by the degrees of freedom. Ratios of 3 or less indicate an acceptable fit of the model [24]. The Comparative Fit Index (CFI) [54] and the Non-Normed Fit Index (NNFI) [55] measure the proportional improvement in fit by comparing a hypothesized model with a more restricted baseline model (a null model is the most commonly used baseline model). The CFI and NNFI range from 0 (absolute lack of fit) to 1 (perfect fit) and fit is considered to be good when the values are more than 0.90 [56]. The Root Mean-Square Error of Approximation (RMSEA) is an absolute misfit index; the closer to zero, the better the fit. Values less than 0.08 indicate an adequate fit and values less than 0.06 indicate a good fit [56, 57]. To study the internal consistency of the PVAQ (objective 2), Cronbach's alpha coefficients were calculated for the subscales and the whole instrument.

To assess the convergent validity of the PVAQ (objective 3), Pearson-correlation coefficients were computed between the PVAQ-SV and the measures of Pain Catastrophizing Scale, the Pain Anxiety Symptoms scale, and the Fear-Avoidance Beliefs Questionnaire.

In addition, the criterion validity of the PVAQ-SV was studied (objective 4). For this purpose, criterion validity was examined by regression analysis of the (exogenous) determinant variables—the subscales of the PVAQ-SV, the FABQ-SV, and the CPAQ-SV—on the (endogenous) criterion variables—pain intensity, anxiety, depression, and disability—via Structural Equation Modeling, using the LISREL 8.30 software package [52]. According to the Kolmogorov–Smirnov test, the variables fulfilled the assumption of multivariate normality, and we therefore used Maximum Likelihood Estimation on a covariance matrix of the observable variables, also providing the matrix of fourth-order moments. In regression analyses via Structural Equation Modeling, the gamma parameters represent the directional effects of the exogenous variables on the endogenous variable (equivalent to Beta in traditional regression) and the t values indicate whether or not the gamma parameters are significant. All the determinant variables (exogenous) are force entered into the model. In addition, the determination coefficients indicate the proportion of variability in the criterion variables (endogenous) that is accounted for by the exogenous variables.

Results

Confirmatory Factor Analysis

Table 1 shows all the GFIs of the tested models. The two-factor model obtained by Roelofs et al. [18] had the best overall fit and was the most parsimonious; the GFIs were indicative of an acceptable, but not good, fit. To achieve a good fit, the items with the lowest loadings were then successively excluded (items 1, 4, 7, 10, and 15) [58]. As shown in Table 1, the final two-factor model had an excellent fit. The structural model is shown in Fig. 1. All the factor loadings were significant ($p<0.05$).

To sum up, and based on these results, a reduced version of the PVAQ-SV is presented which consists of nine items with two related subscales ($r=0.50$), corresponding to two factors: Active Vigilance and Passive Awareness. The subscales showed good internal consistency (Active Vigilance, $\alpha=0.88$; Passive Awareness, $\alpha=0.92$) as well as the total scale ($\alpha=0.89$). As shown in Table 2, corrected item-factor correlations were positive and appropriate.

Convergent Validity

Convergent validity was assessed by computing Pearson correlations of the PVAQ-SV ($M=24.04$, SD=7.56) and its subscales with other pain-related self-report measures such as the Pain Catastrophizing Scale (PCS, $M=23.75$, SD=9.02), the Pain Anxiety Symptoms scale (PASS, $M=72.61$, SD=28.20), and the Fear-Avoidance Beliefs Questionnaire (FABQ, $M=31.26$, SD=21.09) (Table 3). Correlations were assessed following the guidelines proposed by Cohen [59],

Table 1 Confirmatory factor analysis of the CPAQ-SV—goodness-of-fit indexes

	χ^2/df[a]	NNFI	CFI	RMSEA
One factor	20.17	0.57	0.63	0.20
Three factors (McWilliams and Asmundson 2001)	5.00	0.85	0.86	0.09
Two factors (Roelofs et al. 2002)	5.27	0.83	0.85	0.10
Two factors (Roelofs et al. 2003)	4.51	0.88	0.87	0.09
Two-factor final model	2.99	0.96	0.97	0.07

NNFI non-normed fit index, *CFI* comparative fit index, *RMSEA* root mean-square error of approximation

[a] χ^2/df Satorra–Bentler chi-square divided by degrees of freedom

where low correlations are in the range 0.10–0.29, moderate correlations 0.30–0.49, and high correlations 0.50–1.

Active Vigilance showed a moderate significant positive correlation with fear-avoidance beliefs (FABQ) and high significant positive correlations with pain anxiety (PASS) and pain catastrophizing. Passive Awareness showed moderate correlations with the FABQ and the PCS, and low correlations with the PASS. The PVAQ total correlated highly with pain catastrophizing and moderately with fear avoidance beliefs and pain anxiety.

Criterion Validity

Criterion validity was examined by regression analysis of the (exogenous) determinant variables—the subscales of the PVAQ-SV, the FABQ-SV, and the CPAQ-SV—on the (endogenous) criterion variables via Structural Equation Modeling. Criterion variables were as follows: Depression (HADS-D—M=21.80, SD=5.31), Anxiety (HADS-A—M=17.98, SD=5.28), Disability (RMQ—M=9.18, SD=5.23), and Pain Intensity (M=5.31, SD=1.61).

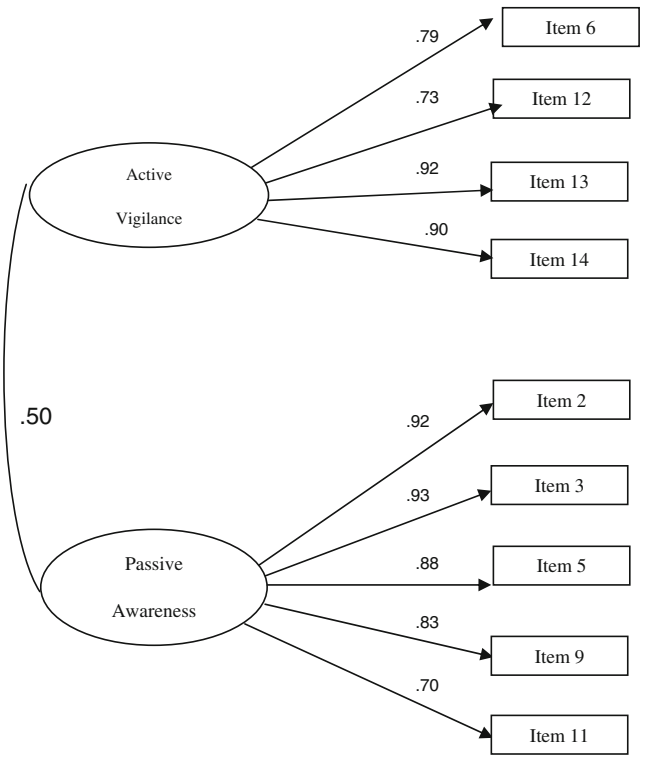

Fig. 1 Confirmatory factor analysis of the PVAQ-SV. Two related factors solution

Table 4 shows the gamma parameters representing the directional effects of the exogenous variables on the endogenous variables (equivalent to Beta in traditional regression); also shown are the t values, both significant and non-significant, and the determination coefficients. All the determinant variables (exogenous) were force entered into the model. As can be seen, the FABQ-Work was significantly associated with higher Pain Intensity and Depression; Activity Engagement and Pain Willingness were significantly associated with lower Pain Intensity and Depression.

As regards the criterion of Anxiety, Active Vigilance, the FABQ-Phy, and the FABQ-Work subscales were significantly associated with higher Anxiety; further, Activity Engagement was significantly associated with lower Anxiety. With regard to Disability, the FABQ-Phy was associated with higher Disability and Pain Willingness was associated with lower Disability.[1]

Discussion

The aim of this study was to examine the factor structure of the PVAQ-SV and present some empirical evidence regarding its validity in a clinical sample of patients with chronic back pain who were attending four Primary Care Units. The specific aims of this study were (a) to evaluate the validity of the two-factor structure [18, 50] and the three-factor structure [43] by confirmatory factor analysis; (b) to examine the association of pain hypervigilance, as measured by

[1] When the total score of the CPAQ-SV was introduced into the regression analysis rather than the subscales of the PVAQ-SV and the FABQ-SV, acceptance was significantly associated with all the criterion variables (Pain Intensity, γ=−0.31, t=−5.54, p<0.05; Depression, γ=−0.51, t=−10.95, p<0.05; Anxiety, γ=−0.19, t=−3.66, p<0.05; Disability, γ=−0.36, t=−6.47, p<0.05).

Table 2 Means (*M*), standard deviations (SD), and corrected item-factor correlations of the items of the PVAQ-SV

	M	SD	Corrected item-factor correlations
Factor I: Active Vigilance			
6. I focus on sensations of pain *Me centro en las sensaciones de dolor*	1.82	1.13	0.71
12. I seem to be more conscious of pain than others *Creo que yo me doy más cuenta del dolor que otras personas*	1.79	1.22	0.67
13. I pay close attention to pain *Le presto mucha atención al dolor*	1.91	1.20	0.81
14. I keep track of my pain level *Estoy pendiente de cuánto me duele*	2.01	1.17	0.80
Factor II: Passive Awareness			
2. I am aware of sudden or temporary changes in pain *Me doy cuenta de cambios repentinos en mi dolor*	3.27	1.15	0.81
3. I am quick to notice changes in pain intensity *Rápidamente me doy cuenta de cambios en la intensidad del dolor*	3.31	1.12	0.82
5. I am quick to notice changes in location or extent of pain *Rápidamente me doy cuenta de cambios en la localización o la extensión del dolor*	3.26	1.12	0.84
9. I know immediately when pain starts or increases *Sé inmediatamente cuándo empieza el dolor o cuándo aumenta*	3.35	1.10	0.79
11. I know immediately when pain decreases *Sé inmediatamente cuando me baja el dolor*	3.32	1.22	0.67

the PVAQ-SV, with other fear-related constructs, such as fear-avoidance beliefs, pain anxiety, and catastrophizing; and (c) to compare hypervigilance with pain acceptance and fear-avoidance beliefs in predicting anxiety, depression, pain intensity, and disability.

Confirmatory factor analysis of the PVAQ-SV supported the validity of a nine-item version with two subscales corresponding to two related factors: Active Vigilance and Passive Awareness. These results are consistent with previous research which has also supported the validity of this two-factor structure [18, 50]. The subscales and the total scale showed high internal consistency. Thus, the PVAQ-SV combines the main elements of the pain hypervigilance construct with the advantage of brevity. Note that this is the first validity study of the PVAQ conducted in a primary care context.

With regard to convergent validity, as expected, the PVAQ-SV total was positively and significantly associated with other pain fear-related variables: it was moderately associated with pain fear-avoidance beliefs (BFQ) and pain anxiety (PASS) and highly associated with catastrophizing (PCS). Of interest, the Active Vigilance subscale showed high correlation with the PASS, whereas the Passive Awareness subscale showed low correlation with the PASS. The Fear-Anxiety-Avoidance Model of Pain [11] considers that pain hypervigilance constitutes the cognitive component of pain anxiety. These results raise the question of whether only one of the components of Pain Hypervigilance, as measured by the PVAQ-SV, is related to pain anxiety. In this study, and consistent with previous findings [18, 50], the PVAQ-total and the Active Vigilance subscale were highly and positively associated with catastrophizing, and the Passive Awareness subscale was positively and moderately associated with the PCS. It may be the case that the PCS and the PVAQ are highly associated because both measures share some items related to "intrusion"; nevertheless, it was striking that the association between Catastrophizing and Active Vigilance remained even though all the "intrusion" items were eliminated from the final version of the PVAQ-SV. Roelofs et al. [50] stated that there appeared to be some overlap between the PVAQ and the Pain Catastrophizing Scale.

Table 3 PVAQ-SV total and subscale correlations with FABQ, PASS, and PCS

	PVAQ-SV Active Vigilance	PVAQ-SV Passive Awareness	PVAQ—total
FABQ—total	0.27*	0.32*	0.35*
PASS—total	0.50*	0.24*	0.42*
PCS—total	0.59*	0.40*	0.57*

PVAQ-SV Pain Vigilance and Awareness Questionnaire, Spanish version; *FABQ* Fear-Avoidance Beliefs Questionnaire; *PASS* Pain Anxiety Symptoms Scale; *PCS* Pain Catastrophizing Scale

*$p<0.001$

Regression analyses showed that the Passive Awareness subscale was not significantly associated with any of the measures of adjustment to pain (Pain Intensity, Depression, Anxiety, and Disability). The Active Vigilance subscale only had a significant association with anxiety (HADS). With regard to fear of pain, the regression analyses showed that the FABQ-Work was significantly associated with Pain Intensity, Anxiety, and Depression. The FABQ-Phy was significantly associated with anxiety and disability (RMQ). Overall, the results indicate that fear-avoidance beliefs significantly contributed to the prediction of adjustment to chronic pain and that the FABQ subscales were better predictors than the PVAQ-SV subscales. These results contradict previous findings indicating that pain intensity is independently determined by fear of pain and pain

Table 4 Criterion validity—regression analyses

Determinant variables	Criterion variable	Gamma coefficients	*t* value	R^2
Active Vigilance	Pain Intensity	−0.06	−1.11	0.20
Passive Awareness		0.09	1.79	
FABQ-Phy		−0.01	−0.12	
FABQ-Work		0.18	2.71*	
Activity Engagement		−0.20	−3.29*	
Pain Willingness		−0.20	−3.63*	
Active Vigilance	Depression	0.08	1.64	0.46
Passive Awareness		0.07	1.82	
FABQ-Phy		−0.00	−0.08	
FABQ-Work		0.13	2.36*	
Activity Engagement		−0.47	−9.19*	
Pain Willingness		−0.10	−2.26*	
Active Vigilance	Anxiety	0.34	6.42*	0.33
Passive Awareness		0.02	0.38	
FABQ-Phy		0.16	2.58*	
FABQ-Work		0.25	4.13*	
Activity Engagement		−0.26	−4.59*	
Pain Willingness		−0.04	−0.81	
Active Vigilance	Disability	−0.01	−0.26	0.26
Passive Awareness		0.06	1.24	
FABQ-Phy		0.29	4.55*	
FABQ-Work		−0.08	1.26	
Activity Engagement		−0.02	−0.37	
Pain Willingness		−0.36	−6.97*	

*$p<0.05$

hypervigilance and that attention to pain is more closely associated with pain intensity than pain-related fear [5]. Differences in the self-report measures used and the study design could explain these contradictory results. Future research should use a variety of designs and instruments to examine in depth the relative contribution of fear of pain and pain hypervigilance to adjustment to chronic pain.

Further, comparisons between the subscales of pain hypervigilance and pain acceptance demonstrated that acceptance provided a better prediction of adjustment to pain, indicating that pain acceptance may have a greater influence in reducing the impact of pain on behavior. The Activity Engagement subscale was significantly associated with pain intensity, depression, and anxiety. The Pain Willingness subscales significantly predicted pain intensity and disability. As in previous studies [45], although Pain Willingness explained the unique variance of disability, Activity Engagement did not; that is, in the long term, Pain Willingness may be the key to adjustment to chronic pain due to its association with the deterioration of pain-related activities. These results are consistent with a previous study by McCracken [40] who compared measures of pain attention and measures of acceptance in the prediction of cognitive, emotional, physical, and social functioning. Multiple regression analyses showed that once acceptance was taken into account, attention accounted for little or no variance in measures of functioning. According to McCracken [40], acceptance accounts for more variance in functioning because it includes attention in a functional framework; it embraces both awareness of pain and the behavior that occurs with that awareness. From this contextual point of view, the central question is not how much pain is being felt, but what influence pain exerts in relation to behavior. Under this functional perspective, McCracken [40] suggested integrating the study of all the psychological processes responsible for controlling behavior, including the mental or meditational processes traditionally designated by the term "attention".

This study has some limitations. Despite the fact that the measures included were intended to assess patient functioning across emotional and behavioral domains, self-reporting was the only method included in the analyses. In addition, all findings were based on cross-sectional and correlational data. Significant correlations do not indicate causal effects. In the future, experimental research could provide solid evidence on the causal relationships between the variables. Furthermore, longitudinal research could shed light on the role of hypervigilance at different stages of the development of chronic pain conditions. Additionally, test–retest reliability should be examined. The responsiveness of the PVAQ-

SV and its subscales to treatment interventions should also be further examined.

This study has several clinical implications. According to our results, the patients' functioning mainly depends on pain acceptance and, to a lesser extent, on fear-avoidance beliefs. Active Vigilance was only associated with anxiety. Consequently, acceptance-based treatment programs could be effective in promoting adjustment to chronic pain. There is growing evidence of the effectiveness of Acceptance and Commitment Therapy (ACT) [60] in the field of chronic pain [27, 30, 31]. In ACT, patients learn to observe pain, to observe their own fear-avoidance thoughts, and to disconnect them from behavior. Pain and fear-avoidance thoughts do not control the action which is directed by the values that the patients choose in the course of the therapy. Patients are taught the practice of broad, present-focused, and behaviorally neutral awareness of physical symptoms, emotions, or thoughts, such that some of the otherwise automatic behavioral influences linked to them are reduced.

In summary, a Spanish version of the PVAQ has been presented. It consists of nine items with two related subscales: Active Vigilance and Passive Awareness. Both subscales and the total PVAQ were positively and significantly correlated with other fear-related constructs: fear-avoidance beliefs, pain anxiety, and pain catastrophizing. Pain acceptance and fear-avoidance beliefs showed a higher association than pain hypervigilance with adjustment to pain.

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