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Experiential avoidance and anxiety sensitivity as dispositional variables and their relationship to the adjustment to chronic pain

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Abstract

Anxiety sensitivity has been included in the fear-avoidance model as a vulnerability factor to explain individual differences in fear of pain. Several studies have suggested that the relationship between anxiety sensitivity and some psychopathological disorders is mediated by experiential avoidance, an affect-related regulatory process that involves unwillingness to endure private experiences. The role of these constructs as vulnerability variables has not been investigated in chronic pain patients. The aim of this study was to investigate the role of anxiety sensitivity and experiential avoidance as dispositional variables in pain fear-avoidance. Two alternative hypothetical models were tested: one in which anxiety sensitivity and experiential avoidance would be independently associated with pain fear-avoidance; and second, one in which experiential avoidance would mediate the relationship between anxiety sensitivity and pain fear-avoidance.

The sample was composed of 299 patients with chronic back pain. The postulated relationships were tested using LISREL 8.20 software (Scientific Software International, Chicago, IL, USA) and the generally weighted least squares. The structural equation modelling analyses showed that experiential avoidance and anxiety sensitivity were independently associated with pain fear-avoidance and that anxiety sensitivity had a stronger association with pain fear-avoidance than experiential avoidance. The alternative model, in which experiential avoidance mediates the relationship between anxiety sensitivity and pain fear-avoidance, gave a much worse fit.

These results highlight the importance of both anxiety sensitivity and experiential avoidance as variables which could explain individual differences in pain fear-avoidance. Thus, in terms of prevention, it should be a priority to identify patients with increased anxiety sensitivity and experiential avoidance during the first stages of the development of chronic pain conditions.

1. Introduction

The study of dispositional variables is crucial to the early identification of people at risk of becoming disabled by pain (Leeuw et al., 2007). Anxiety sensitivity (AS) has been included in the fear-avoidance model as a vulnerability variable which could explain individual differences in fear of pain (Norton and Asmundson, 2003). AS is defined as the fear of anxiety-related sensations, specifically, fear of bodily sensations due to beliefs that these sensations will have negative somatic, cognitive or social consequences (Reiss and McNally, 1985).

Experiential avoidance (EA) denotes an affect-related regulatory process that involves unwillingness to endure upsetting emotions, thoughts, memories

and other private experiences. Such unwillingness is thought to lead to maladaptive efforts to resist, escape and avoid such experiences (Hayes et al., 1996). Individuals reporting higher levels of EA have lower pain tolerance and higher pain catastrophizing (Zettle et al., 2005; Feldner et al., 2006).

Both AS and EA are associated with negatively experiencing internal events (Berman et al., 2010) and are considered as dispositional variables in relation to anxiety disorders (Kashdan et al., 2006). However, distinctions also exist between them: whereas EA involves negative private experiences in general, AS specifically involves arousal-related body sensations; and whereas AS is described as a set of trait-like dysfunctional beliefs, EA is conceptualized as a psychological process. Berman et al. (2010) found that AS and EA were associated with each other and that both constructs were correlated with anxiety symptoms. Nevertheless, the variance in anxiety symptoms accounted for by EA overlapped with that accounted for by AS. Two studies suggested that the relationship between AS and some psychopathological disorders – depression and anxiety symptoms – is mediated by EA as a mechanism of emotional dysregulation (Zvolensky and Forsyth, 2002; Tull and Gratz, 2008).

In relation to pain, a study in a sample of patients under treatment for drug-dependence disorder investigated differences between patients who developed chronic pain after the abstinence period and those who did not, finding that the chronic pain group had significantly higher scores in AS and EA and depression (Álvarez and Esteve, 2009). McCracken and Keogh (2009), in a sample of patients with chronic pain, studied AS as a factor which could contribute to EA, given that fear of one's own emotional experiences would be expected to lead to avoidance of such experiences and situations that evoke them, and that distressing emotions and avoidance appear as central features of chronic pain. They found that the therapeutic processes designed to reduce EA (acceptance, mindfulness and values) weakened, but did not eliminate, the association between AS and the patient's ability to function.

The aim of this study was to investigate the role of AS and EA as dispositional variables of pain fear-avoidance. Based on previous evidence, we hypothesized that AS and EA would be positively correlated and that both would be associated with pain fear-avoidance. Further, two alternative hypothetical models were tested: one in which AS and EA are independently associated with pain fear-avoidance; and one in which EA mediates the relationship between AS and pain fear-avoidance.

2. Methods

2.1 Participants

The participants consisted of a consecutive sample of 309 patients with chronic back pain who attended four primary care centres. Ten participants provided incomplete data and were excluded from analyses. Thus, the final sample included 299 participants. Individuals were considered eligible for the study if they had experienced back pain for at least 3 months and were not being treated for a terminal illness. Table 1 shows the characteristics of the sample.

2.2 Measures and procedures

The research project was approved by the Carlos Haya Hospital Ethics Committee. 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 for each participant prior to any treatment at the clinic.

2.2.1 Anxiety Sensitivity Index (ASI, Peterson and Reiss, 1992)

This is a 16-item questionnaire where respondents indicate the degree to which they fear the negative consequences of anxiety symptoms on a 5-point Likert-type scale. The Spanish version of the ASI is fully equivalent to the original (Sandín et al., 1996). The results of validation studies provide cross-cultural evidence for construct validity and the concurrent validity of the Spanish ASI.

2.2.2 Acceptance and Action Questionnaire (AAQ)

This was developed by Hayes et al. (2004) to assess EA. The Spanish version of the AAQ (Barraca, 2004) was used in this study. It consists of nine items in which participants are asked to rate each statement on a 7-point scale. Higher scores indicate higher levels of avoidance and immobility. The Spanish AAQ is a stable, internally consistent ($\alpha = 0.74$) and valid scale.

2.2.3 Fear-Avoidance Beliefs Questionnaire (FABQ, Waddell et al., 1993)

The Spanish version of the FABQ consists of 15 items related to beliefs reflecting that physical activity and

Table 1 Means, standard deviations and frequency data for the variables.

Variables (n = 299)	Mean/n	SD/(%)
Demographic and clinical variables		
Age (year)	44.18	12.17
Sex		
Male	138	(46.20)
Female	161	(53.80)
Marital status		
Single	54	(18.10)
Married	184	(61.50)
Unmarried couple	29	(9.70)
Divorced	13	(4.30)
Separated	10	(3.30)
Widowed	9	(3.00)
Education		
Reading and writing	24	(8.10)
Primary school	105	(35.10)
High school	111	(37.10)
University education	59	(19.70)
Work Status		
Housewife	45	(15.10)
Working	174	(58.20)
Studying	4	(1.30)
Unemployed	41	(13.70)
Retired	35	(11.70)
Site of pain		
Cervical	157	(52.50)
Thoracic	96	(32.10)
Lumbar	265	(88.63)
Sacral	172	(57.50)
Leg below knee	85	(28.40)
Time in pain (month)	25.21	22.22
3–9	51	(17.05)
9–15	78	(26.09)
15–21	71	(23.75)
21–27	32	(10.70)
27–98	67	(22.41)
Pain medication		
Analgesics	99	(33.10)
Opioids	22	(7.40)
NSAIDs	123	(41.10)
Anxiolytics	42	(14.05)
Antidepressants	26	(8.70)
Muscle relaxants	80	(26.80)
Neuroleptics	1	(0.30)
Anti-epileptics	2	(0.70)
Antiparkinson drugs	1	(0.30)
Antimigraine drugs	1	(0.30)
Variables included in the model		
Anxiety sensitivity (ASI)	48.66	7.88
Experiential avoidance (AAQ)	40.12	5.60
Catastrophizing (PCS)	23.32	7.50
Pain vigilance (PVAQ)	43.35	11.54
Fear of pain (FABQ)	32.43	20.09
Pain intensity	5.25	1.96
Depression (HADS)	13.06	4.71
Anxiety (HADS)	17.35	4.01
Daily functioning (IFI)	42.70	10.70
Impairment (IFI)	3.05	2.99

AAQ, Acceptance and Action Questionnaire; ASI, Anxiety Sensitivity Index; FABQ, Fear-Avoidance Beliefs Questionnaire; HADS, Hospital Anxiety and Depression Scale; IFI, Impairment and Functioning Inventory; NSAIDs, non-steroidal anti-inflammatory drugs; PCS, Pain Catastrophizing Scale; PVAQ, Pain Vigilance and Awareness Questionnaire; SD, standard deviation.

work influence pain intensity (Kovacs et al., 2006). The patient is asked to rate each sentence from 0 (totally disagree) to 6 (totally agree). The instrument showed high internal consistency ($\alpha = 0.93$).

2.2.4 Pain Catastrophizing Scale (PCS, Sullivan et al., 1995)

This is a 13-item measure that asks respondents to report on a 5-point scale 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, $\alpha = 0.89$; helplessness, $\alpha = 0.90$; magnification, $\alpha = 0.79$; total PCS, $\alpha = 0.95$) (Muñoz and Esteve, 2005).

2.2.5 Pain Vigilance and Awareness Questionnaire (PVAQ, McCracken, 1997)

This instrument assesses awareness, vigilance, preoccupation and observation of pain. It displays good internal consistency ($\alpha = 0.86$), test–retest reliability ($r = 0.80$), and has been validated for use in chronic pain and non-clinical samples (Roelofs et al., 2003). The Spanish version shows adequate internal consistency ($\alpha = 0.80$) (Esteve and Muñoz, 2009).

2.2.6 Hospital Anxiety and Depression Scale (Zigmong and Snaith, 1983)

This is a self-reporting scale that contains two 7-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 ($\alpha = 0.86$ for anxiety; $\alpha = 0.86$ for depression) (Tejero et al., 1986; Quintana et al., 2003).

2.2.7 Impairment and Functioning Inventory (IFI, Ramírez-Maestre and Valdivia, 2003)

This consists of 30 items each referring to an activity related to one of the following areas: household, autonomous behaviour, leisure and social relationships. First, the patients are asked whether they performed an activity during the previous week. If they have, they are asked about frequency, but if they have not, they are asked whether they practiced this activity before suffering chronic pain. This approach

differentiates between present functioning and impairment and is useful in assessing patients with a long history of pain where the degree of deterioration is at least as informative as the current level of functioning. The IFI has been specifically developed for patients with chronic pain and takes into account the distinguishing features of Spanish culture. The instrument provides an index of functioning, an index of impairment and scores for each of these areas. The subscales and global scales are very reliable (functional status, $\alpha = 0.84$; functional impairment, $\alpha = 0.85$).

2.2.8 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. (1999) showed that composites of the 0–10 ratings are very reliable measures of pain intensity in chronic pain patients.

2.3 Data analysis

The hypothetical model was tested via structural equation modelling (SEM) using LISREL 8.30 software. Prior to the analyses, the data were checked and no problems were encountered regarding the shape of the frequency distributions or outliers. The variables were normally distributed and the estimation method was generally weighted least squares. Analyses were performed on the polychoric correlation matrix (Table 2), also providing the matrix of fourth-order moments. Following the recommendations of Bollen and Long (1993), several goodness-of-fit indexes (GFIs) were considered. The Satorra–Bentler chi-square is a chi-square fit index that corrects the statistic under distributional violations (Bentler, 2006). To reduce the sensitivity of chi-square to sample size, the index is divided by the degrees of freedom. Ratios of 3 or smaller are indicative of an acceptable fit of the model (Kline, 2005). The Comparative Fit Index (CFI, Bentler, 1990) and the Non-normed Fit Index (NNFI, Bentler and Bonnet, 1980) 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). 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 (Hu and Bentler, 1998, 1999). The GFI and the adjusted goodness-of-fit index (AGFI) both range between 0 and 1, where the closer to 1, the better the fit; whereas in the standardized root mean square residual (SRMR), the smaller the value, the better the fit (the smallest possible value being 0).

The path coefficients should not be interpreted as correlation coefficients. A path coefficient (e.g., 0.80) connecting two variables (A and B) means that if A increases by one standard deviation from its mean, B would be expected to increase its own standard deviations from its own mean by 0.80 while holding all other relevant connections constant. With a path coefficient of –0.16, when A increases by one standard deviation from its mean, B would be expected to decrease its own standard deviations from its own mean by 0.16 while holding all other relevant connections constant.

Six latent variables such as pain fear-avoidance, negative mood, functional status, pain intensity, EA

Table 2 Correlations between the variables included in the model.

Measures	1[a]	2	3	4	5	6	7	8	9	10
1. Anxiety sensitivity	1									
2. Experiential avoidance	0.26**	1								
3. Fear of pain	–0.07	0.08	1							
4. Catastrophizing	0.34**	0.26**	0.43**	1						
5. Hypervigilance	0.25**	0.11	0.35**	0.60**	1					
6. Pain intensity	0.06	0.12*	0.28**	0.17**	0.25**	1				
7. Anxiety	0.34**	0.17**	0.20**	0.40**	0.36**	0.09	1			
8. Depression	0.29**	0.12*	0.32**	0.49**	0.37**	0.24**	0.51**	1		
9. Functioning	–0.10	–0.06	–0.29**	–0.26**	–0.19**	–0.02	–0.19**	–0.25**	1	
10. Impairment	0.30**	0.09	0.14**	0.37**	0.26**	0.12*	0.16**	0.38**	–0.38**	1

*$p < 0.05$.

**$p < 0.01$.

[a]The numbers in the top row refer to the variables listed in rows 1–10.

and AS were related in a hypothesized structural equation model. Ten observable variables or indicators of the latent variables were used. Pain fear-avoidance as a latent construct was specified by pain catastrophizing (PCS), hypervigilance (PVAQ) and fear of pain (FABQ). Anxiety and depression were indicators of the latent variable negative mood. The latent variable functional status was specified by the two subscales of the IFI, functioning and impairment. Because pain intensity, EA and AS were measured by one variable, the error variance was fixed to 0 and the loading value to 1.

3. Results

3.1 Correlation analyses

Table 2 presents the polychoric correlation matrix of the self-report variables. As can be seen, AS was positively and significantly associated with EA, catastrophizing, hypervigilance, anxiety, depression and impairment. It is worth emphasizing that there was no association between AS and fear of pain (–0.07). Furthermore, EA was significantly and positively associated with catastrophizing and to a lesser extent with anxiety. In addition, catastrophizing, hypervigilance and fear of pain were highly intercorrelated, as were anxiety and depression. Patients' functioning and impairment were mainly associated with anxiety and depression.

It should be noted that catastrophizing was significantly associated with all the variables in the matrix and almost all the correlations were of considerable magnitude. Hypervigilance was also significantly associated with all the variables except with EA.

3.2 Evaluation of measurement model

The first step in SEM analyses with latent variables is the evaluation of the measurement model. Confirmatory factor analysis gave a close fit of this model to the data: X^2 (19) = 50.16, X^2/ *df* = 2.64, *CFI* = 0.90, *NNFI* = 0.75, *RMSEA* = 0.07, *GFI* = 0.96, *AGFI* = 0.88, *SRMR* = 07. All the standardized path coefficients were within an acceptable range and all the scales loaded significantly on the appropriate latent construct (Figure 1). This indicates that the measurement scales employed in the model can be considered valid operationalizations of the latent constructs.

3.3 Evaluation of the structural model

Results revealed that our hypothesized structural model had a good fit (Figure 1): X^2 (28) = 79.96, X^2/ *df* = 2.86, *CFI* = 0.82, *NNFI* = 0.71, *RMSEA* = 0.07, *GFI* = 0.93, *AGFI* = 0.874, *SRMR* = 09. Standardized β-coefficients and R^2 values are shown in Figure 1, with R^2 values shown above each endogenous variable. As expected, the findings show that EA and AS were positively significantly associated with pain fear-avoidance. Also, the higher the pain fear-avoidance, the higher the pain intensity and negative mood and, the lesser the patients' functional status. The covariance between EA and AS was 0.17. All path coefficients were statistically significant ($p < 0.05$). As Figure 1 shows, the final model accounts for a substantial proportion of the variance of negative mood and functional status.

Interpretation of SEM results is strengthened by comparisons of data fit for alternative, theory-based models (Bollen, 1989; Tomarken and Waller, 2005). We next evaluated a model in which the latent variable EA was hypothesized to mediate the relationship between AS and pain fear-avoidance. SEM analysis indicated a worse fit of this alternative model: X^2 (29) = 128.11, X^2/ *df* = 4.42, *CFI* = 0.76, *NNFI* = 0.63, *RMSEA* = 0.11, *GFI* = 0.90, *AGFI* = 0.80, *SRMR* = 0.17.

4. Discussion

The present study represents the first empirical evaluation of the relative contribution of AS and EA to pain fear-avoidance in a clinical sample within the theoretical framework of the fear-avoidance model (Vlaeyen and Linton, 2000). In brief, this study found that EA and AS are associated with one another. This is an expected result since both constructs relate to negative experiences with internal events. In fact, McCracken and Keogh (2009) suggest conceptualizing AS as being within the framework of the acceptance and commitment therapy model and consider AS as being part of a more general tendency to respond in a distressed and avoidant way towards one's own experiences of emotions. Nevertheless, the magnitude of the correlation coefficient is smaller than that reported in previous studies (Zvolensky and Forsyth, 2002; Forsyth et al., 2003; Tull and Gratz, 2008; Berman et al., 2010). Additionally, AS had moderate associations with catastrophizing, hypervigilance, anxiety, depression and impairment, whereas EA only had a moderate correlation with catastrophizing, and significant but weak correlations with anxiety, depression and pain intensity. These findings suggest that dysfunctional beliefs about internal experiences have a stronger relationship with pain fear-avoidance and adjustment to pain than the general unwillingness to endure such private events.

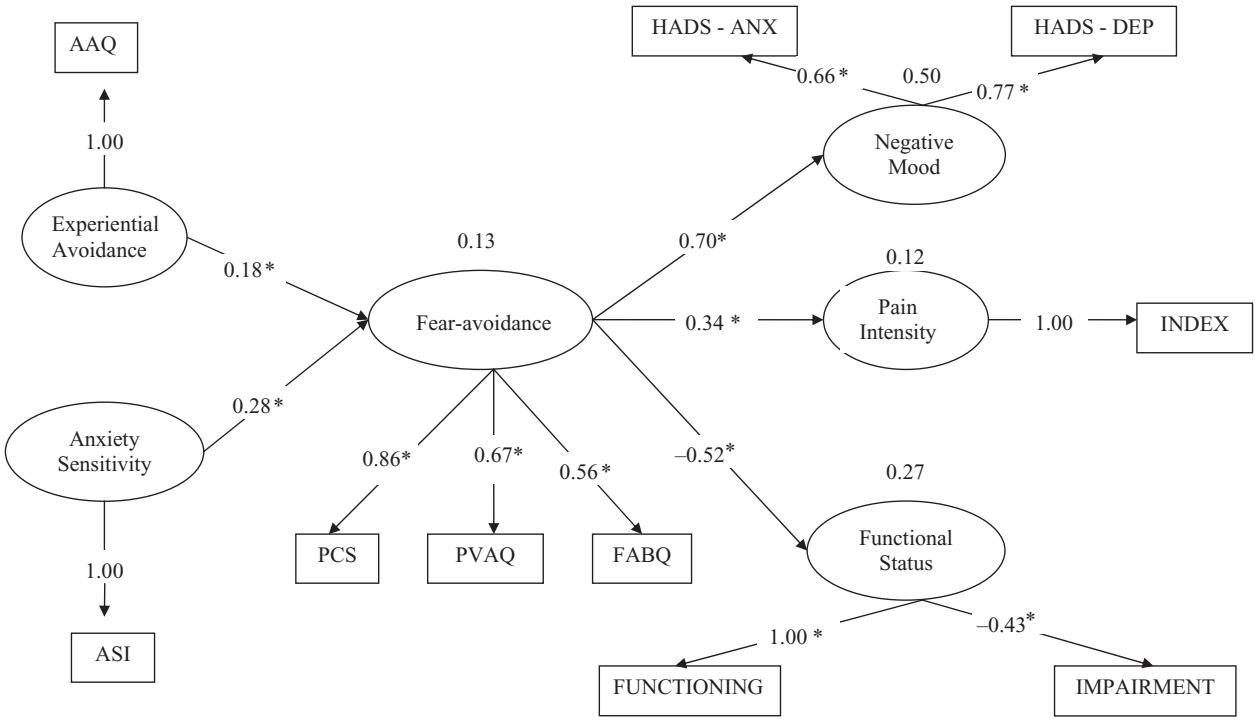

Figure 1 Structural equation model. AAQ indicates Acceptance and Action Questionnaire; ASI, Anxiety Sensitivity Index; PCS, Pain Catastrophizing Scale; PVAQ, Pain Vigilance and Awareness Questionnaire; FABQ, Fear-Avoidance Beliefs Questionnaire; HADS-ANX, Anxiety subscale of the Hospital Anxiety and Depression Scale; HADS-DEP, Depression subscale of the Hospital Anxiety and Depression Scale; INDEX, Composed Pain intensity index; FUNCTIONING, Functioning subscale of the Impairment and Functioning Inventory; IMPAIRMENT, Impairment subscale of the Impairment and Functioning Inventory. *$p < 0.05$.

Unexpectedly, AS and EA were not associated with fear of pain. This result may be due to the instruments used to assess fear of pain. In this sense, McCracken et al. (1996) found that various measures of fear of pain significantly differed in their ability to predict adjustment to pain. In this study, the FABQ (Waddell et al., 1993) was administered and no association was found between the two constructs. It must be emphasized that the FABQ only assesses fear-related beliefs in relation to physical activity and work and cannot be considered a complete measure of fear of pain.

The SEM analysis showed that EA and AS were independently associated with pain fear-avoidance and that AS had a stronger association than EA with pain fear-avoidance. Furthermore, the alternative model in which EA mediates the relationship between AS and pain fear-avoidance gave a much worse fit. These results contradict the findings of several studies which demonstrate that EA, as a rigid and inflexible emotion regulation strategy, mediates the relationship between AS and some psychopathological disorders (Zvolensky and Forsyth, 2002; Tull and Gratz, 2008). The results of our study are partially in agreement with those of Berman et al. (2010) who found that AS independently predicted anxiety symptoms and more reliably than EA. Furthermore, our results are also consistent with those of McCracken and Keogh (2009) who found, in a sample of chronic pain patients, that the therapeutic processes designed to reduce EA weakened, but did not eliminate, the association between AS and the patient's ability to function. It has been suggested that the failure of EA to account for anxiety symptoms may be due to the fact that the EA concept is too general, and therefore the instrument used to assess it does not discriminate between specific avoidance strategies (Berman et al., 2010). In relation to pain, it has consistently been found that acceptance of pain, which is the antithesis of EA (Orsillo et al., 2003), is consistently associated with reports of less pain intensity and enhanced emotional and physical functioning in clinical samples (McCracken et al., 1999, 2004, 2005; Viane et al., 2003, 2004; Esteve et al., 2007; Vowles et al., 2007, 2008; Mason et al., 2008; Wicksell et al., 2009). Several studies have compared the predictive power of the instruments that assess EA and pain acceptance and the results have

been mixed. Although McCracken and Zhao-O'Brien (2010) found that pain acceptance accounted for an average of 24% of the explained variance in adjustment and that EA significantly increased this percentage, Bendayan et al., (2011), using SEM analysis, found that pain acceptance significantly predicted adjustment to pain and that EA did not.

In addition, the stronger association of AS with pain fear-avoidance could be explained by the attentional component of the construct. Apart from the catastrophic misinterpretation of arousal-related body sensations, several studies have suggested that body vigilance is an effect of AS (Reiss et al., 1986; Asmundson et al., 1997; Keogh and Cochrane, 2002; Esteve and Camacho, 2008).

Pain fear-avoidance was strongly associated with adjustment to pain, explaining 50% of the variance of negative mood and 27% of the variance of functional status. As shown in Figure 1, to the degree that pain fear-avoidance increases, negative mood (anxiety and depression) increases, functional status worsens, and pain intensity increases. Thus, these results provide new evidence in support of the fear-avoidance model (Vlaeyen and Linton, 2000).

Although of interest, this study is not without limitations. First, as the data were cross-sectional it is impossible to determine the exact nature of the relationships between the variables of interest and or to form conclusions on cause and effect relationships. Prospective, longitudinal studies are needed to determine the precise nature of the relationships explored in this study. Second, self-reporting was the only method followed and shared method variance may have contributed to the magnitude of some correlations. Future research should replicate the present study and include different assessment methods, as well as experimental designs. Third, the study patients were receiving treatment for back pain in primary care centres, and thus the results may not be generalizable to patients not receiving treatment.

In summary, the aim of this study was to investigate the role of AS and EA as dispositional variables of pain fear-avoidance. It was hypothesized that AS and EA would be positively correlated and that both would be associated with pain fear-avoidance which would be related to pain intensity, negative mood and the patients' functional status. The results showed that, as expected, EA and AS were positively and significantly associated with pain fear-avoidance: the higher the pain fear-avoidance, the higher the pain intensity and negative mood, and thus the patients' functional status was lower. Although speculative, it may be the case that individuals with increased EA and AS are less responsive to psychological treatment for pain fear-avoidance than those without these vulnerabilities. In terms of prevention, identifying this type of patient should be a priority, since the presence of AS and EA may require a different and more thorough approach than when addressing pain fear-avoidance in patients without these vulnerabilities. Furthermore, since AS and EA are both significantly associated with pain fear-avoidance, dysfunctional beliefs about the harmfulness of arousal-related body sensations may therefore be a target for therapeutic change within the acceptance and commitment therapy approach which facilitates flexibility.

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