European Journal of Physical and Rehabilitation Medicine 2025 Mar 13
DOI: 10.23736/S1973-9087.25.08419-9

ORIGINAL ARTICLE

Catastrophizing and fear avoidance beliefs in chronic low back pain: a cross-sectional study

Julio DOMÉNECH-FERNÁNDEZ [1], Aida EZZEDDINE ANGULO [2] *, Lourdes PEÑALVER-BARRIOS [3], Eva DEL RIO-GONZÁLEZ [4], Rocio HERRERO [4, 5], Azucena GARCÍA-PALACIOS [5, 6], Monica MARTINEZ-DIAZ [3], Iago GARRETA-CATALÁ [5], Máximo A. DIEZ-ULLOA [6], Rosa M. BAÑOS-RIVERA [6, 7, 8, 9]

[1]Orthopedic Surgery Department, Clinical University of Navarra, Pamplona, Spain; [2]Rehabilitation Service, General University Hospital of Valencia Consortium, Doctoral School, Catholic University of Valencia, San Vicente Mártir, Valencia, Spain; [3]Rehabilitation Service, Arnau de Vilanova Hospital, Valencia, Spain; [4]Faculty of Psychology, University of Zaragoza, Zaragoza, Spain; [5]CIBERObn Physiopathology of Obesity and Nutrition, Instituto de Salud Carlos III, Madrid, Spain; [6]Faculty of Psychology, Jaime I University, Castellón, Spain; [7]Orthopedic Surgery Service, Bellvitge Hospital, Barcelona, Spain; [8]Orthopedic Surgery Service, University Hospital Complex of Santiago, Santiago, Spain; [9]Faculty of Psychology, University of Valencia, Valencia, Spain

*Corresponding author: Aida Ezzeddine Angulo, Rehabilitation Service, General University Hospital of Valencia Consortium, Doctoral School, Catholic University of Valencia, San Vicente Mártir, 46015, Valencia, Spain. E-mail: aida_ezze@hotmail.com

ABSTRACT

BACKGROUND: Chronic low back pain continues to be a challenge in everyday rehabilitation services as improvement keeps being unpredictable.
AIM: To evaluate the role of pain coping strategies, fear-avoidance beliefs, anxiety and depression in pain and disability in patients with chronic low back pain.
POPULATION: Overall, 276 patients (200 women) with nonspecific low back pain according COST-B13 guidelines and lasting more than 6 months.
SETTING: Rehabilitation and Orthopedic departments in four tertiary hospitals in Spain.
DESIGN: A cross sectional study.
METHODS: Pain, disability, coping strategies, catastrophizing, anxiety, depression and fear-avoidance beliefs were evaluated with validated questionnaires. Predictive associations of disability and pain were analyzed by Pearson's test and by multivariate regression.
RESULTS: Catastrophizing is the pain coping strategy with the highest association with disability ($r=0.52$, $P<0.01$). Low back pain and disability showed little correlation in between ($r=0.40$, $P<0.01$). The correlation between fear-avoidance ideas and pain and disability was slight ($r=0.20$, $P<0.01$). No association was found between anxiety and depression with low back pain and disability. In the regression model, catastrophizing, kinesiophobia and gender explained 35% of the variance in disability. In the subanalysis of patients with surgical indication the influence of catastrophizing was maintained. However, correlation between pain and disability is lower than in patients without surgical indication.
CONCLUSIONS: The limited correlation between pain and disability suggests that pain alone cannot explain the variability of disability. Catastrophizing and kinesiophobia are predictors of the degree of disability in chronic low back pain and are cognitions potentially modifiable.
CLINICAL REHABILITATION IMPACT: These results support the biopsychosocial model in the pathogenesis of chronic low back pain and support the use of cognitive behavioral therapy to modify maladaptive beliefs and attitudes as part of medical or surgical treatment in low back pain.

(*Cite this article as:* Doménech-Fernández J, Ezzeddine Angulo A, Peñalver-Barrios L, Del Rio-González E, Herrero R, García-Palacios A, *et al*. Catastrophizing and fear avoidance beliefs in chronic low back pain: a cross-sectional study. Eur J Phys Rehabil Med 2025 Mar 13. DOI: 10.23736/S1973-9087.25.08419-9)

KEY WORDS: Low back pain; Disability; Kinesiophobia; Catastrophizing.

Low back pain (LBP) affects more than 70% of the general population.[1, 2] LBP is the leading cause of disability and it is the main contributor to Years Lived with disability.[3]

In approximately 85% of the cases, it is not possible to find a cause of pain.[4] Traditionally, low back pain was believed to be caused by structural alterations, but this must be reconsidered due to scientific evidence which shows correlation between symptoms and imaging findings is very poor.[5, 6] Carragee *et al.* found that structural alterations by MRI or discography had little or no association with LBP or disability.[7] The data indicated that the most important factors in predicting disability episodes, were beliefs of fear and avoidance. Currently, there is strong evidence that psychosocial factors, rather than biomedical or biomechanical factors, are crucial in the transition from acute to chronic LBP.[8] Among these factors we find: beliefs and attitudes regarding fear and avoidance, catastrophizing, and other maladaptive pain coping strategies.[9, 10] People who catastrophically misinterpret harmless bodily sensations, including pain, are likely to develop fear to pain, avoidance behaviors and increased body hypervigilance, worsening pain sensation. This approach constitutes the fear-avoidance model of LBP.

The threat of severe pain captures one's attention and an extremely negative set of thoughts develops. LBP patients who are more anxious, depressed and afraid of movement feel more disabled.[11] Prospective studies indicate that catastrophization can predict the onset of chronic musculoskeletal pain and disability in patients with non-specific low back pain,[12] more intense pain and slower recovery after surgery.[13] Similarly, fear-avoidance beliefs are associated with the onset of low back pain in the general population.[9] High fear avoidance beliefs are associated with continuous sick leave after 1 year in patients with chronic LBP.[14]

Although literature suggests there is a considerable overlap of different psychological factors, there is great controversy about how they relate to each other and influence chronification of LBP. More research is needed to assess the impact of psychological factors on the pain and disability experience. We hypothesize that psychological factors such as coping strategies, catastrophizing, fear-avoidance beliefs, and stress (anxiety and depression) significantly influence the levels of pain and disability experienced by patients with nonspecific chronic LBP. Specifically, maladaptive coping strategies and high levels of fear-avoidance beliefs will be associated with greater pain intensity and increased disability.

The aim of this study is to assess the role in nonspecific LBP pain and disability of the main variables in the biopsychosocial model of pain (coping strategies, fear-avoidance beliefs, stress) in a large sample treated at tertiary hospitals throughout Spain.

Materials and methods

Patients and scope

The patients were recruited from the Orthopedic Surgery and Rehabilitation departments of 4 University Hospitals located in Galicia, Barcelona and the Valencian Community. These hospitals serve a population of between 300,000 and 350,000 inhabitants. The inclusion criteria included presence of LBP lasting more than 6 months and written acceptance to be included in the study. We included diagnosis of nonspecific LBP as recommended by the Clinical Practice Guidelines COST-B13, including disc degeneration, facet arthrosis, disc protrusion or herniation, spondylolisthesis, and spondylolysis.[15] The exclusion criteria included cognitive disability or illiteracy in understanding and completing the questionnaires, history of vertebral fracture, previous lumbar surgery, inflammatory spondyloarthritis, spondylodiscitis and tumor in the spine or nerve structures. All patients were specifically evaluated for red flags of potentially serious injury and were studied with lumbar MRI. Patients meeting the inclusion criteria were evaluated as part of their routine clinical management at scheduled visits by specialists in orthopedic surgery and rehabilitation medicine and enrolled in our study during a one-year period.

The study was approved by the Local Clinical Research Ethics Committee. Patients gave written consent for their participation in accordance with Declaration of Helsinki. Therefore, the information obtained from each patient was considered confidential and data generated was handled anonymously by assigning a code to each patient.

Measurements

The sociodemographic data obtained were: age, sex, educational level, family situation, sports activity, profession (according to National Classification of Economic Activities). The following clinical data obtained were: weight and height, duration of pain in months.

Patients completed a booklet with specific and validated questionnaires in Spanish. In case of one or more empty items, the questionnaire was discarded without considering it in the analysis. When a patient had at least three questionnaires with missing data the entire case was dis-

carded. The measurements for each variable were made with the following instruments.

Pain

Pain measurement was obtained by asking pain during the last month on a numerical scale. IMMPACT recommends the Numerical Pain Scale (NPS) as a primary outcome measure in clinical trials evaluating the efficacy of treatments for chronic pain.[16] The scale is a continuous gradation from 0 "no pain" to 10 "worst pain imaginable."

Disability

Disability was evaluated using the Roland Morris (RM) and the Oswestry Disability Index (ODI) questionnaires. Patients undergoing rehabilitation treatment completed the Spanish version of the RM questionnaire.[17, 18] This is a disability questionnaire designed specifically for low back pain that consists of 24 sentences describing activities of daily living that can be limited by low back pain. Patients with surgical indication were evaluated using the ODI questionnaire. This is a self-administered questionnaire that measures limitations in daily activities. It consists of 10 questions with 6 possible answers each. It is the most widely used and recommended scale in patients undergoing lumbar surgery. The Spanish version has demonstrated its reliability, validity and internal consistency.[19]

Catastrophizing ideas

The Pain Catastrophizing Scale (PCS) measures the cognitive process by which pain is viewed as a threat with exaggeratedly negative consequences for the patient.[20] It consists of 13 descriptions of the painful experience by indicating the frequency of these ideas. A high score indicates high catastrophizing levels. The instrument evaluates three dimensions: rumination (inability to stop thinking about pain), magnification (exaggerated thoughts about pain) and despair (patient cannot do anything to relieve his pain).[21]

Fear-avoidance beliefs

The Fear Avoidance Beliefs Questionnaire (FABQ) is a 16-item questionnaire. The questionnaire is divided into two subscales: FABQ-Work composed of seven phrases that measure the patient's beliefs and attitudes about how work activities can influence his or her pain; FABQ-Physical Activity is composed of four phrases about the effect of activity on low back pain. In both subscales, high scores indicate high beliefs of fear avoidance.[22]

Anxiety and depression

Levels of anxiety and depression were measured with HADS (Hospital Anxiety and Depression subscale). It is a self-administered questionnaire consisting of 14 questions, divided into an anxiety subscale (7 questions) and a depression subscale (7 questions).[23] The Spanish version has adequate sensitivity and specificity to identify these psychiatric disorders.[24]

Pain coping strategies

The Coping Strategies Questionnaire (CSQ)[25] consists of 48 statements that describe the patient's thoughts or actions in response to their pain. This instrument has been translated into Spanish and proven reliable.[26]

The Spanish version consists of seven subscales that include six adaptative coping strategies (self-instruction, cognitive distraction, distracting behaviors, reinterpreting pain, ignoring pain, hope) and two maladaptive coping strategies (faith-prayers and catastrophizing).

Sample size calculation

The method proposed by Cohen (1988) for correlational studies was used to calculate the necessary sample size. It was considered a priori as relevant a correlation coefficient of at least 0.2 because this is the minimum threshold to find a slight correlation, an alpha value of 0.05 and a beta power of 0.9. With these values the required sample size is 256 patients. Assuming the possibility of 10% of lost values in the study variables, the final sample was established at 275 patients.

Statistical analysis

Descriptive statistics were calculated for each of the variables. The quantitative variables were described by means and standard deviation. The qualitative variables were expressed with the raw values and their percentages. The normal distribution was checked with the Kolmogorov test to determine the use of parametric or non-parametric tests. For comparison of continuous variables between groups the Student's *t*-test or the Mann-Whitney U Test was used and for categorical variables the Chi-square Test or the Fisher's Test according to the type of distribution. Pearson's correlation coefficient was used to check the association between pain intensity, disability, depression, anxiety, kinesiophobia, catastrophizing and each one of the subscales of the coping strategies of pain.

Patients with surgical treatment and patients with rehabilitative treatment were evaluated with different instru-

ments to measure disability (ODI in surgical treatment and RM in conservative treatment). The use of these two questionnaires is justified in the recommendation to use the MRI questionnaire in patients with mild/moderate disability and the ODI questionnaire in patients with severe and persistent disability.[18] To analyze the influence of the study variables on the disability measured with two different questionnaires (Roland-Morris and Oswestry) a Z-score was used so that there would be a single measure of disability and thus be able to relate all the variables to it (Disability: Z-score = direct-medium score / standard deviation).

Two models of regression analysis were performed considering the level of pain and disability as dependent variables in each of the models. In both cases the explanatory variables introduced were age, sex, anxiety, depression, catastrophizing and fear-avoidance beliefs. Additionally, pain was introduced as an explanatory variable in the regression analysis with disability as a dependent variable.

A significance level of $P<0.05$ was established in all cases. The statistical analyses were performed with the SPSS program (version 17 Institute, Cary, NC, USA).

The recommendations of the STROBE statement for cross sectional studies have been followed in the project design and in the writing of results.[27] The data associated with the paper are not publicly available but are available from the corresponding author on reasonable request.

Data availability

The data associated with the paper are not publicly available but are available from the corresponding author on reasonable request.

Results

Initially, 293 patients were evaluated for inclusion in the study. Seventeen patients were excluded for not meeting eligibility criteria (10 patients) or incomplete questionnaires (seven patients). The final sample was composed of 276 patients. Most of the patients were women with an average age of 46 years. Mean duration of low back pain was 70 months. The patients had low back pain of moderate intensity with a mean NPS rating of 6.7 (Table I).

Patients with a surgical indication had a higher intensity of low back pain (NPS 7.9) than those with rehabilitation treatment (NP-Pain 6.4; $P<0.01$). Patients with surgical indication had statistically significantly higher scores ($P<0.01$) on the catastrophizing and fear-avoidance scales than patients with conservative treatment (Table II).

TABLE I.—*Demographic, clinical and psychological characteristics of the sample.*

Characteristics	Value
N. patients	276
Female	200 (72%)
Age, years	46±10.6
Height, cm	167.2±9.5
Weight, kg	72.9±15.3
BMI, kg/m^2	26.2
Level activity (1: sedentary, 2: sedentary + walk, 3: mid physical effort, 4: high physical effort)	2.8±0.9
Duration of pain (months)	70.5±89.2
Numerical Pain Scale	6.7±2.1
Conservative treatment (N.=240)	6.5±2.0
Surgical treatment (N.=36)	7.9±2.2
Disability	
Conservative treatment RM (N.=240)	9.7±4.4
Surgical treatment IDO (N.=36)	54.5±15.2
Catastrophizing (PCS) total (N.=276)	22.1±12.8
Rumination	6.1±4.4
Magnification	3.7±3.2
Helplessness	7.7±6.3
Fear avoidance (FABQ) total score (N.=276)	51.9±21.9
FABQ- Physical Activity	15.7±5.8
FABQ-Work	21.3±11.5
Total stress (HADS) (N.=276)	18.3±5.4
Anxiety	10.1±2.8
Depression	8.2±1.9
Pain Coping Strategies (CSQ) (N.=180)	
Catastrophizing	7.4±5.5
Distracting behaviors	5.5±4.9
Self-instruction	4.2±3.9
Ignore Pain	21.9±6.5
Reinterpretation Pain	11.9±7.5
Hope	10.4±4.4
Faith-prayers	5.2±6.0
Cognitive distractions	9.1±5.0

BMI: Body Mass Index; RM: Roland-Morris; IDO: Disability Index Oswestry; PCS: Pain Catastrophizing Scale; FABQ: Fear-Avoidance Beliefs Questionnaire; HAD: Hospital Anxiety and Depression Scale; CSQ: Coping Strategies Questionnaire.
Standard deviation is shown in brackets.

TABLE II.—*Psychometric values in patients with indication for surgery compared to patients with indication for conservative treatment.*

Parameter	Surgical treatment (N.=36)	Rehabilitation treatment (N.=240)	Sig.
Pain NPS	6.5 (2.0)	7.9 (2.2)	<0.001
Disability			
RM	9.7 (4.4)	-	
IDO	-	54.5 (15.2)	
Catastrophizing (PCS)	30.5 (13.5)	20.8 (12.3)	<0.001
Fear-avoidance (FABQ)	48.5 (20.7)	71.8 (17.2)	<0.001
Anxiety-Depression (HAD)	20.6 (4.4)	18.3 (5.5)	NS

When analyzing the correlations between disability and fear avoidance beliefs or catastrophizing strategies, all significant existing correlations are positive, which trans-

TABLE III.—*Correlations between pain and disability with the variables of interest.*

Parameter	NPS	Disability (RM/IDO)
Pain	-	0.44***
Disability (RM)	0.44***	-
Age years	0.04	0.12
Educational level	-0.15	0.02
Physical activity level at work	-0.01	-0.26**
Duration of pain	0.15	0.18*
Catastrophizing (PCS)	0.37***	0.52***
Rumination	0.25**	0.40***
Magnification	0.29***	0.43***
Hopelessness	0.31***	0.47***
Fear-Avoidance (FABQ)	0.30***	0.42***
FABQ Activity	0.27***	0.37***
FABQ Work	0.21**	0.32***
Affective stress (HAD)	0.19*	0.32**
Anxiety	-0.14	0.33**
Depression	0.21*	0.11

Pearson's r values are expressed.
*P<0.05; **P<0.01; ***P<0.001.

TABLE IV.—*Correlations between pain and disability with the different subscales of the Pain Coping Strategies (CSQ) questionnaire in a subset of 180 patients.*

Pain Coping Strategies (CSQ) N.=180	NPS	Disability (RM/IDO)
Catastrophizing	0.14	0.40***
Distraction	0.17	0.29***
Self-instruction	0.16	0.34**
Ignore pain	0.01	-0.02
Reinterpretation pain	0.02	0.00
Hope	0.14	0.26*
Faith-prayers	0.24**	0.26*
Cognitive distractions	0.15	0.19*

Pearson's r values are expressed.
*P<0.05; **P<0.01; ***P<0.001.

lates into a direct relationship between them, except for a slight negative correlation between disability and level of physical activity at work (r=0.26, P<0.01) (Table III, IV). Catastrophizing (measured with PCS) has been revealed as the pain coping strategy that is most correlated with disability (r=0.52, P<0.001). Fear-avoidance beliefs, in their physical activity and work dimensions, are slightly correlated with disability (r=0.37 and r=0.32, P<0.001 respectively). Level of depression, age and level of education show no association with degree of disability. The correlation between disability and pain is only moderate (r=0.44, P<0.001). Pain is not correlated with anxiety and only marginally with depression (r=0.21, P<0.05). There was also no association between pain level and age, educational level, activity level or months of pain duration. The correlation between pain and catastrophizing was weak (r=0.37, P<0.001) and the correlation with the dimensions rumination, magnification of pain and hopelessness was also positive. Fear-avoidance beliefs were also weakly correlated with pain intensity (r=0.30, P<0.001), both in the physical activity and work subscales.

Two multivariate regression models were performed considering pain and disability as dependent variables in each of them (Table V). No collinearity problems were observed in both models, being optimal the collinearity statistics obtained (tolerance and variance inflation factor). In the interpretative model of disability, catastrophizing is the explanatory variable with the greatest weight, with the variables anxiety, depression, pain and age being rejected by the model. Catastrophizing, fear-avoidance beliefs and gender explain 35% of the variance in disability.

As for the explanatory model of pain, only catastrophizing and sex are included in the multivariate regression, rejecting age, fear-avoidance beliefs, anxiety and depression. Catastrophizing and gender explain only 11% of the variance in pain.

Discussion

The main objective of the study was to investigate the role of pain coping strategies, beliefs and attitudes concerning

TABLE V.—*Multivariate regression analysis: coefficients of the regression model with disability and pain intensity as the dependent variable in the explanatory model.*

Model	Non-standardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics	
	B	Typ. error	Beta			Tolerance	IVF
Disability							
(Constant)	0.373	1.614		0.231	0.818		
Catastrophization (PCS)	0.182	0.032	0.470	5.773	0.000	0.963	1.039
Fear-avoidance (FABQ)	0.055	0.018	0.246	3.028	0.003	0.964	1.038
Gender	1.863	0.744	0.200	2.506	0.014	0.998	1.002
Pain intensity							
(Constant)	3.805	0.722		5.267	0.000		
Catastrophization (PCS)	0.046	0.016	0.266	2.852	0.005	0.999	1.001
Gender	0.989	0.384	0.240	2.579	0.011	0.999	1.001

disability and LBP. Catastrophizing has been revealed as the pain coping strategy with the strongest relationship with disability in patients with chronic LBP. This cross-sectional association is consistent with several previous investigations in chronic pain[28] and in other osteoarticular conditions such as knee osteoarthritis,[29] patellofemoral pain syndrome,[30] rheumatoid arthritis[31] and upper extremity joint pathology.[32]

Although the exact mechanisms by which catastrophizing affects the experience of pain and disability are not well understood, it has been suggested that influences pain perception and pain-associated behavior. People with catastrophizing cognitions have difficulty in disengaging from painful stimuli.[33] This intensifies fear to pain, increasing the attention paid to nociceptive stimuli. In fact, in our study, a positive association was found between the degree of pain and catastrophizing cognitions. An overly emotional appraisal of pain is associated with increased catastrophizing thoughts, which in turn produce a heightened perception of the pain experience.[33] In addition to this psychological mechanism, recent research suggests that catastrophizing may also influence the neurophysiology of pain modulation. In a functional MRI study of chronic pain patients, catastrophizing thoughts were associated with increased activity in pain processing brain areas and cortical areas related to attention, anticipation of pain, and emotional aspects of pain.[34] In a study of healthy subjects provoked by heat pain, high levels of catastrophizing were associated with a greater degree and duration of pain suggesting that catastrophizing plays a facilitating role in the process of pain perception.[35] Some studies indicate that catastrophizing increases pain by interfering with pain modulating supraspinal descending inhibitory systems.[36] Catastrophizing has a distinctive way of influencing pain. There is evidence to suggest catastrophizing influences pain-related disability via fear of pain.[37] Additionally, we found positive association between pain and fear avoidance beliefs. Patients with high fear avoidance beliefs are more likely to experience improvement in pain intensity when these beliefs are treated.[38]

Pain is a constant symptom in patients with low back pain, however patients show a different degree of disability, with some patients being severely limited while others show mild disability. A widespread belief among clinicians is that the degree of pain justifies the degree of disability in chronic low back pain.[30] In the present study pain and disability showed a moderate correlation (r 0.44 P<0.001) indicating that pain alone is not able to justify disability in LBP patients. In fact, in the regression model explaining disability, pain was excluded when considering catastrophizing and kinesiophobia. We believe this is due to the stronger correlations between catastrophizing and disability (0.52 P<0.001), the similar correlation between fear-avoidance and disability (r 0.40 P<001), in the context of a slight correlation between pain and catastrophizing (r 0.37 P<0.001), 37 P<0.001) and with fear-avoidance (r 0.30 P<0.001). These findings are consistent with previous research finding that the influence of pain on disability is weak to moderate in patients with LBP.[39, 40]

A slight correlation has been observed between emotional stress (anxiety and depression) and both pain and disability. However, in the regression models the relationship between anxiety and depression disappears when catastrophizing and kinesiophobia are considered. These results are consistent with theoretical models of chronic pain that consider cognitions and avoidance behaviors as precursors of anxiety and depression and which in turn are predictors of disability and pain.[41] That is, the results of this study, reaffirm catastrophizing ideas and fear-avoidance beliefs as independent modulators in the development of disability.[42] Therefore people who catastrophically misinterpret harmless bodily sensations develop fear of pain, avoidance behaviors, hypervigilance, depression and disuse. All this may lead to increased pain and disability creating a vicious cycle that would explain the chronification of LBP.

The results of this study are partially consistent with others conducted in Northern Europe or in countries with an Anglo-Saxon culture.[31, 43] However, our results contrast with those obtained by Kovacs in Spain.[44] These authors observed that fear-avoidance beliefs had an irrelevant role in disability, attributing the discrepancy with European research to cultural differences between southern and northern Europe. Our results do not corroborate this interpretation. In our opinion, Spanish patients do not differ much from the rest of Europe and confirm the applicability of the biopsychosocial model in our environment. It is possible that the differences between our study and that of Kovacs *et al.* are due to differences in the type of sample. They included patients with acute, subacute and chronic low back pain with an average total evolution of 20 days in contrast to the chronic course of our patients with an average pain duration of 70 months. The influence of psychological variables that modulate the chronification of pain in the acute and subacute cases have not yet been settled clearly.

Limitations of the study

Our study has some limitations. The sample is composed of patients with chronic LBP with a very long evolution

time and recruited in Orthopedic Surgery and Rehabilitation clinics. This fact may magnify the results, and may not be fully applicable in the Primary Care setting or in patients with a shorter time of evolution of symptoms in whom the psychological mechanisms of reaction to chronic pain may not have been fully developed. Secondly, this is a cross-sectional study from which association can be inferred, but causality should be interpreted with caution. Although we observed a strong correlation between kinesiophobia and catastrophizing with disability, further follow-up studies are needed to confirm the hypothesis that the generation and maintenance of disability are influenced by these maladaptive cognitions and whether it would be possible to act on these psychological modulators of disability in our setting. In this sense, the results obtained may help to delimit the specific psychological constructs that are susceptible to modification in cognitive-behavioral therapy in the Spanish population. In a systematic review which included 97 controlled trials and a total of 13,136 patients, it was observed that cognitive-behavioral treatment associated with rehabilitation were most effective at short and midterm periods.[45]

Conclusions

In conclusion, the findings of this research highlight the importance of examining psychological variables in understanding the degree of pain and disability in patients with chronic low back pain. The limited correlation between pain and disability suggests that pain alone cannot explain the variability of disability. Catastrophizing and kinesiophobia beliefs and attitudes are predictors of the degree of disability in chronic low back pain. Catastrophizing and kinesiophobia are cognitions, therefore potentially modifiable. These results support the biopsychosocial model in the pathogenesis of chronic low back pain and support the use of cognitive behavioral therapy to modify maladaptive beliefs and attitudes as an adjunct to medical or surgical treatment of low back pain.

References

1. Alonso-García M, Sarría-Santamera A. The Economic and Social Burden of Low Back Pain in Spain: A National Assessment of the Economic and Social Impact of Low Back Pain in Spain. Spine 2020;45:E1026–32.

2. Mutubuki EN, Luitjens MA, Maas ET, Huygen FJ, Ostelo RW, van Tulder MW, *et al.* Predictive factors of high societal costs among chronic low back pain patients. Eur J Pain 2020;24:325–37.

3. GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet 2017;390:1211–59.

4. Fillingim RB. Individual differences in pain: understanding the mosaic that makes pain personal. Pain 2017;158(Suppl 1):S11–8.

5. Lall MP, Restrepo E. The Biopsychosocial Model of Low Back Pain and Patient-Centered Outcomes Following Lumbar Fusion. Orthop Nurs 2017;36:213–21.

6. Knezevic NN, Candido KD, Vlaeyen JW, Van Zundert J, Cohen SP. Low back pain. Lancet 2021;398:78–92.

7. Carragee EJ, Alamin TF, Miller JL, Carragee JM. Discographic, MRI and psychosocial determinants of low back pain disability and remission: a prospective study in subjects with benign persistent back pain. Spine J 2005;5:24–35.

8. Vlaeyen JW, Linton SJ. Fear-avoidance model of chronic musculoskeletal pain: 12 years on. Pain 2012;153:1144–7.

9. Crombez G, Eccleston C, Van Damme S, Vlaeyen JW, Karoly P. Fear-avoidance model of chronic pain: the next generation. Clin J Pain 2012;28:475–83.

10. Esteve R, Ramírez-Maestre C, López-Martínez AE. Experiential avoidance and anxiety sensitivity as dispositional variables and their relationship to the adjustment to chronic pain. Eur J Pain 2012;16:718–26.

11. Bean DJ, Johnson MH, Kydd RR. Relationships between psychological factors, pain, and disability in complex regional pain syndrome and low back pain. Clin J Pain 2014;30:647–53.

12. Wertli MM, Burgstaller JM, Weiser S, Steurer J, Kofmehl R, Held U. Influence of catastrophizing on treatment outcome in patients with nonspecific low back pain: a systematic review. Spine 2014;39:263–73.

13. Bellosta-López P, Langella F, Ponzo M, Bassani R, Brayda-Bruno M, Damilano M, *et al.* The burden of preoperative fear-avoidance beliefs in workers after thoracic and lumbar spine surgery: a 2-year follow-up study. Pain 2023;164:1734–40.

14. Trinderup JS, Fisker A, Juhl CB, Petersen T. Fear avoidance beliefs as a predictor for long-term sick leave, disability and pain in patients with chronic low back pain. BMC Musculoskelet Disord 2018;19:431.

15. Airaksinen O, Brox JI, Cedraschi C, Hildebrandt J, Klaber-Moffett J, Kovacs F, *et al.* COST B13 Working Group on Guidelines for Chronic Low Back Pain (2006). European guidelines for the management of chronic nonspecific low back pain. Eur Spine J 2006;15(Suppl 2):S192–300.

16. Dworkin RH, Turk DC, Farrar JT, Haythornthwaite JA, Jensen MP, Katz NP, *et al.*; IMMPACT. Core outcome measures for chronic pain clinical trials: IMMPACT recommendations. Pain 2005;113:9–19.

17. Kovacs FM, Llobera J, Gil Del Real MT, Abraira V, Gestoso M, Fernández C, *et al.* Validation of the spanish version of the Roland-Morris questionnaire. Spine 2002;27:538–42.

18. Roland M, Fairbank J. The Roland-Morris Disability Questionnaire and the Oswestry Disability Questionnaire. Spine 2000;25:3115–24.

19. Flórez García MT, García Pérez MA, García Pérez F, Armenteros Pedreros J, Álvarez Prado A, Martínez Lorente MD. Adaptación transcultural a la población española de la escala de incapacidad por dolor lumbar de Oswestry. Rehabilitacion (Madr) 1995;29:138–45.

20. Sullivan MJ, Bishop SR, Pivik J. The Pain Catastrophizing Scale: development and validation. Psychol Assess 1995;7:524–32.

21. García Campayo J, Rodero B, Alda M, Sobradiel N, Montero J, Moreno S. Validación de la versión española de la escala de la catastrofización ante el dolor (Pain Catastrophizing Scale) en la fibromialgia. Med Clin (Barc) 2008;131:487–92.

22. Waddell G, Newton M, Henderson I, Somerville D, Main CJ. A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. Pain 1993;52:157–68.

23. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983;67:361–70.

24. Herrero MJ, Blanch J, Peri JM, De Pablo J, Pintor L, Bulbena A. A validation study of the hospital anxiety and depression scale (HADS) in a Spanish population. Gen Hosp Psychiatry 2003;25:277–83.

25. Rosenstiel AK, Keefe FJ. The use of coping strategies in chronic low back pain patients: relationship to patient characteristics and current adjustment. Pain 1983;17:33–44.

26. Rodríguez Franco L, Cano García FJ, Blanco Picabia A. Evaluación de las estrategias de afrontamiento del dolor crónico. Actas Esp Psiq 2004;32:82–91.

27. Vandenbroucke JP, von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, Pocock SJ, *et al.*; STROBE Initiative. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): explanation and elaboration. PLoS Med 2007;4:e297.

28. Rogers AH, Farris SG. A meta-analysis of the associations of elements of the fear-avoidance model of chronic pain with negative affect, depression, anxiety, pain-related disability and pain intensity. Eur J Pain 2022;26:1611–35.

29. Kurien T, Kerslake RW, Graven-Nielsen T, Arendt-Nielsen L, Auer DP, Edwards K, *et al.* Chronic postoperative pain after total knee arthroplasty: the potential contributions of synovitis, pain sensitization and pain catastrophizing-An explorative study. Eur J Pain 2022;26:1979–89.

30. Domenech J, Sanchis-Alfonso V, López L, Espejo B. Influence of kinesiophobia and catastrophizing on pain and disability in anterior knee pain patients. Knee Surg Sports Traumatol Arthrosc 2013;21:1562–8.

31. Wilk M, Łosińska K, Pripp AH, Korkosz M, Haugeberg G. Pain catastrophizing in rheumatoid arthritis, psoriatic arthritis and axial spondyloarthritis: biopsychosocial perspective and impact on health-related quality of life. Rheumatol Int 2022;42:669–82.

32. Hirata J, Tomiyama M, Koike Y, Yoshimura M, Inoue K. Relationship between pain intensity, pain catastrophizing, and self-efficacy in patients with frozen shoulder: a cross-sectional study. J Orthop Surg Res 2021;16:542.

33. Meints SM, Mawla I, Napadow V, Kong J, Gerber J, Chan ST, *et al.* The relationship between catastrophizing and altered pain sensitivity in patients with chronic low-back pain. Pain 2019;160:833–43.

34. Malfliet A, Coppieters I, Van Wilgen P, Kregel J, De Pauw R, Dolphens M, *et al.* Brain changes associated with cognitive and emotional factors in chronic pain: A systematic review. Eur J Pain 2017;21:769–86.

35. Edwards RR, Fillingim RB, Maixner W, Sigurdsson A, Haythornthwaite J. Catastrophizing predicts changes in thermal pain responses after resolution of acute dental pain. J Pain 2004;5:164–70.

36. Toledo TA, Kuhn BL, Payne MF, Lannon EW, Palit S, Sturycz CA, *et al.* The Effect of Pain Catastrophizing on Endogenous Inhibition of Pain and Spinal Nociception in Native Americans: Results From the Oklahoma Study of Native American Pain Risk. Ann Behav Med 2020;54:575–94.

37. Wideman TH, Asmundson GG, Smeets RJ, Zautra AJ, Simmonds MJ, Sullivan MJ, *et al.* Rethinking the fear avoidance model: toward a multidimensional framework of pain-related disability. Pain 2013;154:2262–5.

38. Wertli MM, Rasmussen-Barr E, Held U, Weiser S, Bachmann LM, Brunner F. Fear-avoidance beliefs-a moderator of treatment efficacy in patients with low back pain: a systematic review. Spine J 2014;14:2658–78.

39. Ussing K, Smith A, O'Sullivan P. The relationship between changes in pain intensity and functional disability in persistent disabling low back pain during a course of cognitive functional therapy. Scand J Pain 2024;24.

40. Kovacs FM, Abraira V, Zamora J, Teresa Gil del Real M, Llobera J, Fernández C, *et al.*; Kovacs-Atención Primaria Group. Correlation between pain, disability, and quality of life in patients with common low back pain. Spine 2004;29:206–10.

41. Leeuw M, Goossens ME, Linton SJ, Crombez G, Boersma K, Vlaeyen JW. The fear-avoidance model of musculoskeletal pain: current state of scientific evidence. J Behav Med 2007;30:77–94.

42. Sisco-Taylor BL, Magel JS, McFadden M, Greene T, Shen J, Fritz JM. Changes in Pain Catastrophizing and Fear-Avoidance Beliefs as Mediators of Early Physical Therapy on Disability and Pain in Acute Low-Back Pain: A Secondary Analysis of a Clinical Trial. Pain Med 2022;23:1127–37.

43. Schumann ME, Coombes BJ, Gascho KE, Geske JR, McDermott MC, Morrison EJ, *et al.* Pain Catastrophizing and Pain Self-Efficacy Mediate Interdisciplinary Pain Rehabilitation Program Outcomes at Post-treatment and Follow-Up. Pain Med 2022;23:697–706.

44. Kovacs FM, Muriel A, Abriaira V, Medina JM, Castillo Sanchez MD, Olabe J; Spanish Back Pain Research Network. The influence of fear avoidance beliefs on disability and quality of life is sparse in Spanish low back pain patients. Spine 2005;30:E676–82.

45. Ho EK, Chen L, Simic M, Ashton-James CE, Comachio J, Wang DX, *et al.* Psychological interventions for chronic, non-specific low back pain: systematic review with network meta-analysis. BMJ 2022;376:e067718.

Conflicts of interest
The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Funding
This research was funded by a grant from the Fondo de Investigaciones Sanitarias, Instituto Carlos III (PI12/02710) and by the EUROSPINE Task Force on Research. The Spine Society of Europe (TFR 2013 #20130135).

Authors' contributions
Julio Doménech-Fernández, Aida Ezzeddine Angulo: substantial contributions to the conception or the design of the manuscript. Lourdes Peñalver Barrios, Monica Martinez Diaz, Iago Garreta Catalá, Máximo A. Diez Ulloa: acquisition patients. Eva Del Rio González, Rocio Herrero, Azucena García Palacios: interpretation of the data. Rosa Baños Rivera: analysis and revised it critically. All authors read and approved the final version of the manuscript.

History
Article first published online: March 13, 2025. - Manuscript accepted: February 18, 2025. - Manuscript revised: January 15, 2025. - Manuscript received: January 15, 2024.