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Subjective suffering in patients with low back pain

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Abstract

Aim: Low back pain (LPB) is a prevalent rheumatic and musculoskeletal disease and patients often experience physical discomfort and functional limitations. This study aimed to evaluate how subjective suffering relates to illness perceptions, pain intensity and psychological morbidity as well as to understand the mediator (direct and indirect) effects on functional disability.

Methods: A cross-sectional study with 125 patients who received physiotherapy and answered the following instruments: Illness Perception Questionnaire-Revised; Illness Subjective Suffering Inventory; Hospital Anxiety and Depression Scale and the Oswestry LBP Incapacity Questionnaire.

Results: In the structural equation modeling analysis, subjective suffering totally mediated the relationship between both emotional response (estimate = 0.068, 95% highest posterior density interval [HPDI] = [0.017, 0.133]), consequences (estimate = 0.118, 95% HPDI = [0.035, 0.211]) and functional disability. The relationship between coherence and disability was partially mediated by subjective suffering (estimate = −0.067, 95% HPDI = [−0.134, −0.016]). Only identity and pain intensity showed direct effects on functional disability.

Conclusion: Intervention in patients with LBP should focus on subjective suffering to reduce functional disability, providing information and promoting the acceptance of disease and pain.

KEYWORDS

cross-sectional studies, low back pain, musculoskeletal diseases, pain perception, physical therapy modalities

1 | INTRODUCTION

Low back pain (LBP) induces significant burden on individuals and healthcare systems, with societal costs.[1] There are two types of LBP: (a) mechanical pain (associated with disc, joint, ligament, and muscle problems or injuries) and (b) non-mechanical or referred pain (associated with tumor, infection, disorders of other internal organs, and neuropathic pain).[2] LBP is the most prevalent rheumatic and musculoskeletal disease (RMD)[3] and patients often experience physical discomfort and functional limitations that lasts for at least 1 day, affecting their daily activities, social and working lives.[4] The symptoms may result in disability, with implications on quality of life.[4] It is estimated that 5%-10% of individuals live with LBP and about 10% to 40% of all patients with LBP develop chronic symptoms with disability.[5] According to the EpiReumaPt study, in Portugal, 26.4% (95% CI 23.3%-29.5%) of individuals are diagnosed with LBP.[6]

Recent studies have shown the substantial role of psychosocial factors in the LBP disability process and outcomes, in primary care and after surgery.[7] LBP becomes persistent and 3 months after the initial consultation, a large proportion of patients, in primary healthcare settings, continue to have pain complaints and report disability.[8] Pain is a subjective experience[9] and because it is influenced by

psychological factors,[10] its expression is individual.[11] According to the literature, pain intensity is a predictor of disability in patients with chronic LBP[12] exacerbated by negative psychological factors such as depression[13] and fear-avoidance behavior[14] that increase the pain intensity and are associated with greater disability.[13]

Illness perceptions have a strong relationship with pain intensity, disability[15] and with disease prognosis.[9,16] According to the literature, individuals construct cognitive representations about their illness based previous experiences, interpretation of the symptoms and information received[17] that influence how patients react.[16] This representations having also an impact on how patients deal with their medical condition[18] predicting pain trajectory 5 years later.[19] More threatening illness perceptions (eg longer duration of illness, more symptoms and consequences, low internal control and little confidence in the ability to perform activities) have been associated with disability and poor clinical outcomes, at 6 months.[9,16] However, and as highlighted by Foster et al,[16] it is necessary to understand which are the potential mediators of the relationship between illness perceptions and pain outcomes.

Depression was found to predict functional disability[20], followed by pain intensity, anxiety and somatization of symptoms in LBP,[21] being a significant barrier to recovery.[10] Psychological morbidity was found to mediate the relationship between functional disability and quality of life in patients with chronic LBP, in differentiated treatments,[22] and depressed mood was found to mediate the relationship between pain intensity and pain disability, after controlling for pain duration.[23]

Subjective suffering involves physical, cognitive, affective and spiritual dimensions,[24] and occurs when a serious threat or damage to the personal integrity of an individual is perceived[25] being associated with pain itself.[26] Pain is a biological dimension and suffering an emotional one.[27] Emotional suffering was found to be a predictor of disability in patients with early LBP positively associated with pain intensity and coping and negatively associated with active coping, self-efficacy and social support.[28] Subjetive suffering was found to be a mediator between depression and functional disability in patients receiving physiotherapy (PT) treatment for LBP.[29] The present study goes further, focusing on the direct and indirect effects of pain intensity, illness perceptions, psychological morbidity and subjective suffering on functional disability.

Physiotherapy is the most common treatment in patients with LBP[16] and is the primary intervention, since it is reimbursed by the national healthcare system.[30] PT aims to improve posture and mobility, reduce pain and promote relaxation and muscle stabilization, by providing exercise therapy and patient education.[31]

The Akbari and colleagues' model[32] include pain catastrophizing beliefs, family functioning, kinesiophobia and depression as mediators between the exogenous variables (eg pain intensity) and endogenous variables (eg functional disability). The present study included the same exogenous and endogenous variables and analyzed how subjective suffering was related to illness perceptions, pain intensity and psychological morbidity and their direct and indirect effects on functional disability in chronic LBP, in patients undergoing PT. From a heuristic point of view, it is important to understand the factors that contribute to functional disability, in patients undergoing PT, in order to develop intervention programs that meet patients' needs and promote better adaptation to LBP.

2 | MATERIALS AND METHODS

2.1 | Sample and data collection

This study used a cross-sectional design with a sample of 125 outpatients. The inclusion criteria were: age between 18 and 65 years old; a diagnosis of LBP for a period more than 3 months, attributed to muscular ligaments, mechanical and degenerative causes (according to the diagnostic criteria defined by the Portuguese Association of Rheumatology), and receiving only PT as treatment. Patients who presented a critical limitation in their movement (eg not being able to walk) or diagnosis of severe psychiatric illness, registered in the patient's medical record, were excluded from the study. Participants who met the inclusion criteria, and after ethical approval by the institutional board of each clinic, were invited by medical professionals to participate in the study. All participants signed an informed consent. Participation was voluntary. Patients were evaluated in the third session (minimum number needed to reduce pain, regardless of treatment)[33] to control the influence of pain reduction on patients' cognitive perceptions. Data collection procedure occurred in four PT clinics located in the north of Portugal, which were contacted by letter explaining the design and objectives of the study, as well as the inclusion criteria.

2.2 | Instruments

2.2.1 | Sociodemographic and Clinical Questionnaire

This instrument evaluates sociodemographic (eg age, gender) and clinical variables, such as pain intensity (eg How intensely do you experience low back pain?).[34]

2.2.2 | Illness Subjective Suffering Inventory

This instrument evaluates the intensity of the subjective experience of suffering in five subscales: physical (eg I can't find a position to be comfortable), psychological (eg I think a lot about the gravity and consequences of my illness), existential (eg Pain forces me to put aside some important projects I had in mind) social-relational (eg I'm worried that pain might make me lose my job) and positive experiences (eg Even though I am sick, I feel relaxed and despite my pain I do not stop making plans for the future).[35] The instrument includes

44 items, with higher scores in each subscale indicating more suffering except in the positive experiences subscale. Cronbach's alphas, in the original version, ranged from .69 to .85 on the subscales and was .93 in the total scale. In this study, only the full scale was used with an alpha of .96.

2.2.3 | Oswestry LBP Incapacity Questionnaire

This instrument includes 10 items, evaluating functional disability in LBP. The items reflect daily activities related to pain intensity, personal care, lifting, walking, sitting, staying, living, sleeping, traveling, social life and sex life.[36,37] Higher values indicate greater disability. The Cronbach's alpha for the total scale was .87, in the original version. In this study, only the full scale was used with an alpha of .86.

TABLE 1 Sociodemographic and clinical characteristics

	PT group (125)		
Variables	**Mean**	**SD**	**%**
Age	47.93	12.942	
Gender			
Male			29.6
Female			70.4
Marital status			
Single			10.4
Married			72.8
Divorced			4.0
Widowed			9.6
Partnership			3.2
Family household members	2.46	1.081	
Education level			
1st–4th grade			46.8
5th–9th grade			25.4
10th–12th grade			9.8
University			18.0
Pain frequency			
Once/ twice a day			10.4
More than twice a day			31.2
All the time			58.4
Pain intensity			
Mild/moderate			32.0
Strong/very strong			68.0
Duration of illness			
6 m to 1 y			19.2
1-3 y			27.2
More than 3 y			53.6

Note: Abbreviations: ns, not significant; PT, physiotherapy; SD, standard deviation; m, months; y, year(s).

2.2.4 | Illness Perception Questionnaire - Revised (IPQ-R)

This instrument evaluates the cognitive representations of patients with chronic disease in 45 items, grouped into nine subscales: identity (eg pain, nausea, breathlessness, weight change, fatigue, stiff joints, sore eyes, headaches, upset stomach, sleep difficulties, dizziness and loss of strength, sore throat and wheeziness), timeline (acute/chronic) (eg My back pain will last a short time), consequences (eg My back pain has major consequences on my life), personal (eg There is a lot which I can do to control my symptoms) and treatment control (eg There is very little that can be done to improve my back pain), coherence (eg My back pain is a mystery to me), timeline (cyclic) (eg The symptoms of my back pain change a great deal from day to day), emotional representations (eg I get depressed when I think about my back pain) and causes (eg psychological attributions, risk factors, immunity, accident or chance). Higher scores indicate more threatening illness representations. In the original version, Cronbach's alpha ranged between .75 and .89 and in this study between .74 and.88.[38,39]

2.2.5 | Hospital Anxiety and Depression Scale (HADS)

This instrument assesses depression and anxiety in patients with physical pathology and receiving outpatient treatment.[40] It is composed of 14 items grouped into two subscales: anxiety (eg I feel tense or "wound up"; I get a sort of frightened feeling as if something awful is about to happen; I feel restless as I have to be on the move) and depression (eg I still enjoy the things I used to enjoy; I can laugh and see the funny side of things; I look forward with enjoyment to things), with seven items each. A higher score indicates more psychological distress. In the original version, Cronbach's alpha was .93 for anxiety and .90 for depression, and in the present study, was .83 and .81, respectively.

2.3 | Data analysis

To characterize the sample, descriptive statistics (frequency, mean and standard deviation) were used. The relationships between all variables with functional disability were assessed through Pearson correlations. To protect from type I error, a Bonferroni correction was conducted. The new *P* value was ≤.0041 ($\alpha_{altered}$ = .05/12 correlations with the dependent variable). In the path analysis, only the variables significantly correlated with functional disability (according to Bonferroni correction) were introduced.

The power of the sample size was calculated with G*Power version 3.1.9.2 , but since the sample size included only 125 participants, and the structural equation modeling (SEM) approach, in the present model, requires a bigger sample size, Bayesian Mediation Analysis

TABLE 2 Coefficient correlation between variables (N = 125)

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Disability	-												
2. IPQ_Identity	**.31*** **	-											
3. IPQ_Causes	**.39*** **	.22*	-										
4. IPQ_Timeline	.01	.07	.14	-									
5. IPQ_ Consequences	**.34*** **	.14	.11	.55***	-								
6. IPQ_Personal Control	.17	−.05	.11	−.19*	−.18*	-							
7. IPQ_Treatment Control	.01	.07	.14	−.18*	−.19*	.41***	-						
8. IPQ_Coherence	**−.40*** **	−.03	−.41***	−.30**	−.40***	.11	.122	-					
9. IPQ_Timeline (Cyclic)	.22*	.06	.13	.31***	.39***	−.03	−.08	−.29**	-				
10. IPQ_Emotional	**.35*** **	.20*	.38***	.18*	.28**	.11	−.03	−.40***	.23*	-			
11. Suffering	**.46*** **	.13	.35***	.44***	.63***	−.03	−.03	−.54***	.47***	.48***	-		
12. Psychology morbidity	**.26** **	.11	.26**	.31**	.37***	−.06	−.02	−.36***	.37***	.42***	.59***	-	
13. Pain intensity	**.41*** **	.13	.21*	.21*	.31**	−.08	−.11	−.22*	.13	.12	.21*	.05	-

Note: To protect from type I error, a Bonferroni correction should be conducted. The new *P* value will be the alpha-value = .00416666. Thus, to determine if any of the 12 correlations is statistically significant with disability, the *P* value must be $P < .0041$.

Abbreviations: IPQ, Illness Perception Questionnaire.

***$P < .001$.

**$P < .01$.

*$P < .05$; bold $P < .0041$.

(N < 200)[41] were performed, since is the appropriate method in these situations and considered more accurate.[42] The Markov Chain Monte Carlo (MCMC) stochastic simulation technique was used to extract repeated samples to estimate parameters for each model. The dataset generates a posterior likelihood distribution for each parameter estimate. The statistical significance is calculated through the Bayesian credible interval, that is, if it does not overlap 0, the parameter is statistically significant and allows direct probability statements about the parameter. In this study, model fit was assessed by posterior predictive *P* value (a value closer to .5 indicates a better model fit, whereas a value closer to 0 or 1 suggests a poor fit) and the value of a convergence statistic (CS) (value < 1.002 suggests that the model has converged; a CS value equal to 1.0000 means that the model has a perfect fit). Additionally, the deviance information criterion (DIC) was used to represent a Bayesian generalization of the Akaike information criterion and can be used for the purpose of comparing different models. Models with smaller DIC values should be preferably selected. The DIC is a combination of the deviance from the model and the penalty for the complexity of the model. The deviance is a measure of the model's fit.

All statistical analyses were performed using the IBM SPSS Statistics 25 (IBM Corp., Armonk, NY, USA), and for the structural equation model the IBM SPSS Amos 25 (IBM Corporation, Chicago, IL, USA) was used.

3 | RESULTS

3.1 | Sample characteristics

The sample consisted mostly of women, with an average age of 47.93 years (SD = 12.94) with 68.0% reporting a strong to very strong pain and 32.0% indicating mild to moderate pain (Table 1).

3.2 | Relationship between variables

Table 2 presents the correlations between the variables in the model. The results showed, according to Bonferroni correction, that higher levels of psychological morbidity ($r = .262$, $P = .003$), subjective suffering ($r = .456$, $P = .000$) and pain intensity ($r = .405$, $P = .000$) were associated with greater functional disability. Similarly, at the level of the illness perceptions, higher scores in the identity subscale ($r = .307$, $P = .000$), causes ($r = .391$, $P = .000$), consequences ($r = .337$, $P = .000$) and emotional representation ($r = .352$, $P = .000$) were associated with higher functional disability. Also, regarding illness perceptions, no significant correlations were found between personal control ($r = .165$, $P = .066$), timeline cyclical ($r = .220$, $P = .014$), treatment control ($r = .013$, $P = .888$) and timeline (acute/chronic) ($r = .135$, $P = .133$) with functional disability.

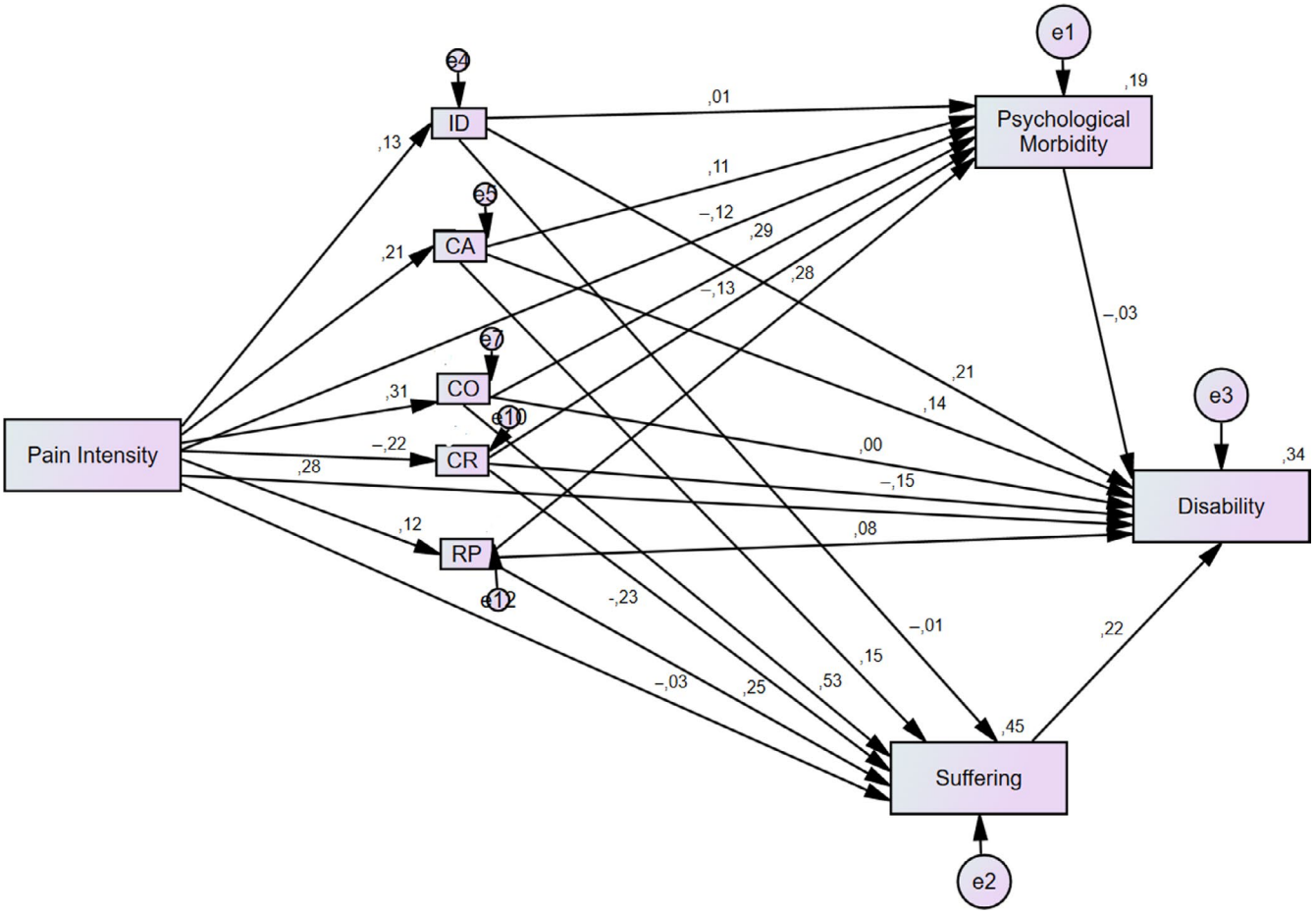

FIGURE 1 Hypothesized model. *Note*: posterior predictive $P = .00$, DIC = 187.61, number of effective parameters = 42.26; ID, IPQ-identity; CA, IPQ causes; CO, IPQ consequences; CR, IPQ coherence; RP, IPQ emotional representations

3.3 | Path analysis model

Bayesian SEM were used to test the mediation effect. Figure 1 shows the initial model and Figure 2 the final model with a good fit. The final model converged with a CS equal to 1.0001. The goodness-of-fit measures showed that the model was supported by the data, posterior predictive $P = .51$, DIC = 61.84, number of effective parameters = 26.24. All the parameters and the mediation effect estimates were statistically significant. The model showed that higher consequences and emotional response as well as lower coherence predicted higher functional disability with subjective suffering being a mediator. However, identity and pain intensity showed only direct effects on functional disability.

3.4 | Mediations (indirect effects)

In order to analyze subjective suffering as a mediator between consequences, coherence and emotional representation with functional disability, a bootstrapping with 55 500 samples was used. The results (Table 3) showed that the indirect effect of emotional response (estimate = 0.068, 95% highest posterior density interval [HPDI] = [0.017, 0.133]) and consequences (estimate = 0.118, 95% HPDI = [0.035, 0.211]) on functional disability was totally mediated by subjective suffering. The indirect effect of coherence (estimate = −0.067, 95% HPDI = [−0.134, −0.016]) on functional disability was partially mediated by subjective suffering. Therefore, the results showed that the three mediation effects were statistically significant.

4 | DISCUSSION

This study focused on the relationships among subjective suffering, illness perceptions, pain intensity and psychological morbidity, including the precursors of functional disability, based on Akbari and colleagues' theoretical model.[32] In the initial model, functional disability was directly affected by pain intensity and indirectly by illness perceptions through subjective suffering and psychological morbidity.

The results revealed that functional disability was mediated only by subjective suffering. As evidenced in the literature, suffering may be a predictor[30] and a precursor of functional disability in patients

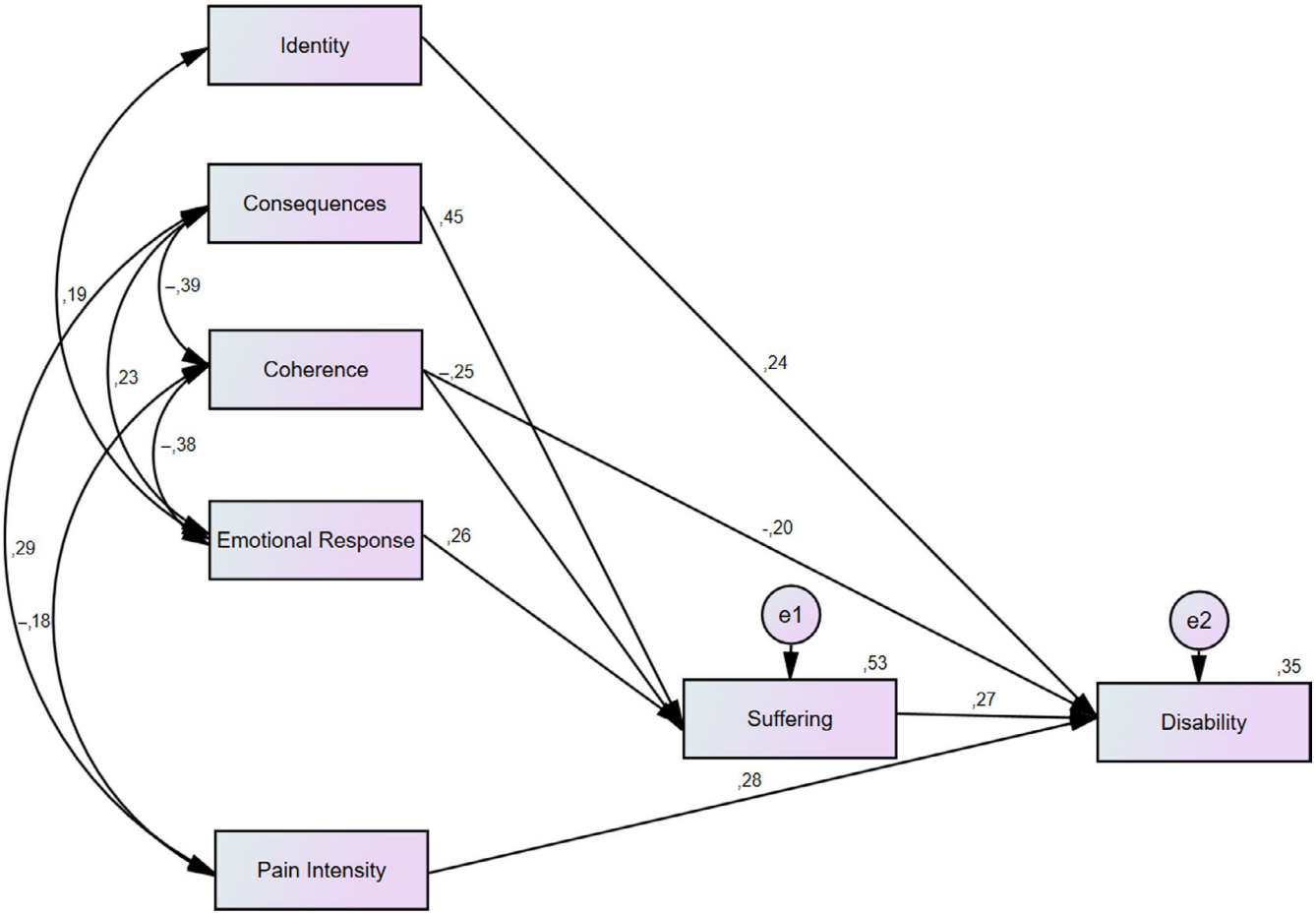

FIGURE 2 Final model. *Note*: posterior predictive $P = .51$, DIC = 61.84, number of effective parameters = 26.24

with LBP.[29] Another study has revealed that the negative emotional responses, including physical distress, contributed to functional disability in patients with chronic LBP,[43] which may explain, in the present study, the direct relationship between suffering and disability. In fact, according to Loeser and Cousins' pain model,[44] pain (nociceptive event) can trigger suffering (negative affect) and subsequent pain behaviors,[44] such as avoidance behavior, which may increase functional disability.[45] Accepting LBP, by the patient, is important in order to adapt and develop behavioral responses able to perform activities, rather than avoidance behaviors. Greater acceptance of pain has been associated with better psychological well-being and less pain, disability and distress.[46]

The results showed that LBP identity had a direct effect on functional disability. This finding is corroborated by Foster and colleagues[9,16] who found that identity (as well as other subscales) predicted functional disability, at 6 months. One explanation for this direct effect is the possibility that threatening illness perceptions (eg perceiving many symptoms to be related to LBP) play a role in amplifying the perception of pain[46] which in turn may lead to avoidance behaviors, for fear of exacerbating the pain, resulting in long-term functional disability.[45] However, in this study, illness perceptions such as consequences and emotional response impacted indirectly on functional disability through subjective suffering. More threatening illness perceptions have been related to increased pain intensity and psychological distress.[24] Also, patients who perceived their illness as implying serious consequences in their lives and those who reported greater emotional reactivity, such as fear and anger, were more likely to present poor therapeutic results.[11,12]

The results also showed that coherence (eg individual's ideas about understanding the illness) had an indirect impact on functional disability, but also had a direct impact on functional disability. The sense of coherence integrates comprehensibility, manageability and meaningfulness to a situation or illness. An individual who is able to understand (understandability), cope (manageability) and make sense (meaning) of an illness, has more potential to adapt and cope with the disease.[47] Therefore, having adequate information and knowledge (eg education regarding the illness) may increase the feeling of coherence, minimizing the effects of psychosocial risk factors, reducing psychological suffering associated with LBP, which in turn may have a positive impact on a patient's functionality.[48]

TABLE 3 Bayesian SEM results: mediation analysis

					Credible interval	
	Mean	SE	SD	CS	95% Lower bound	95% Upper bound
Regression weights						
Disability ← Identity	2.009*	0.036	0.695	1.001	0.640	3.334
Disability ← Coherence	−0.839*	0.021	0.379	1.002	−1.587	−0.093
Disability ← Pain intensity	5.642*	0.074	1.558	1.001	2.611	8.775
Disability ← Suffering	0.204*	0.003	0.071	1.001	0.065	0.345
Suffering ← Consequences	2.944*	0.023	0.447	1.001	2.073	3.813
Suffering ← Coherence	−1.412*	0.019	0.400	1.001	−2.220	−0.652
Suffering ← Emotional response	1.410*	0.017	0.372	1.001	0.675	2.120
Covariances						
Identity ↔ Emotional response	1.535*	0.040	0.764	1.001	0.077	3.101
Emotional response ↔ Consequences	3.422*	0.085	1.413	1.002	3.357	0.779
Emotional response ↔ Coherence	−6.658*	0.097	1.758	1.002	−10.149	−3.377
Consequences ↔ Coherence	−5.884*	0.088	1.516	1.002	−9.133	−3.284
Pain intensity ↔ Consequences	0.865*	0.013	0.293	1.001	0.328	1.485
Pain intensity ↔ Coherence	−0.650*	0.017	0.321	1.001	−1.301	−0.042

Path			Credible interval		
Indirect effects	Posterior mean	SD	95% Lower bound	95% Upper bound	Conclusion
Disability ← Suffering ← Consequences	0.118	0.044	0.035	0.211	Positive and significant
Disability ← Suffering ← Coherence	−0.067	0.030	−0.134	−0.016	Negative and significant
Disability ← Suffering ← Emotional response	0.068	0.030	0.017	0.133	Positive and significant

Note: Posterior predictive value is 0.51 and N = 55 500.

Abbreviations: CS, convergence statistic; SD, standard deviation; SE, standard error.

*Statistically significant (ie the 95% credible interval does not include 0).

The results also revealed that pain intensity directly affected functional disability and was not mediated by any other psychological variable. One may hypothesize that patients focused on pain symptoms resulting from the disease may be focused on their pain, which limits their physical functioning.

The results showed differences in psychological morbidity, subjective suffering, functional disability, illness perceptions (cause and coherence), according to gender. Women scored lower, except on coherence. However, these differences may be biased by the larger number of women in this study. This trend in sample prevalence, in the present study, is in line with international and national studies that point to a higher incidence of LBP in women[49–52] due to psychosocial and biological factors (eg menstrual cycle, pregnancy and procreation, physical stress of pregnancy, family and professional role burden, perimenopause, menopause, abdominal weight gain).[49,53] Also, this result is reinforced by the mean age of women in this study (51 years), compared to the mean age of men (40 years),[50] since, at menopausal age, women tend to present more LBP symptoms[54] and seek more medical services.

4.1 | Limitations

This study has some limitations that must be considered in the interpretation of results, such as the nature of the design and the use of self-report questionnaires. Longitudinal studies and larger samples are important in assessing how illness perceptions, psychological morbidity, pain intensity and subjective suffering affect functional disability, over time. Another limitation of this study is the number of women compared to men that may have biased the results. Therefore, future studies should include more men and address also the impact of LBP in the couple's dynamics.

5 | CONCLUSIONS

According to the results, functional disability was only mediated by subjective suffering. Therefore, it is important to intervene on subjective suffering to reduce functional disability, in LBP patients undergoing physiotherapy treatment. Health professionals should

focus on patients' suffering assessment early on, since subjective suffering is the path to functional incapacity in LBP patients. According to the results, a biopsychosocial approach that includes patient education regarding LBP is important in order to promote a greater sense of coherence as well as coping strategies to deal with pain in order to promote better outcomes regarding subjective suffering and functional disability, in LBP patients.

CONFLICT OF INTEREST

None.

HUMAN PARTICIPANTS AND/OR ANIMALS RIGHTS AND INFORMED CONSENT

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Hospital Ethics Committees and the Helsinki Declaration of 1964 (as revised in Brazil 2013). Participants who agreed to participate in this study voluntarily signed an informed consent.

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