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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

KRONİK BEL AĞRILI HASTALARDA AĞRI ŞİDDETİ İLE İLİŞKİLİ EMOSYONEL VE DAVRANIŞSAL FAKTÖRLERİN BELİRLENMESİ

DETERMINATION OF EMOTIONAL AND BEHAVIORAL FACTORS ASSOCIATED WITH PAIN SEVERITY IN PATIENTS WITH CHRONIC LOW BACK PAIN

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ÖZET

AMAÇ: Çalışmamızın amacı, kronik bel ağrısı olan hastaların emosyonel ve davranışsal faktörlerin hastaların ağrı şiddetini ne ölçüde etkilediğini belirlemektir.

GEREÇ VE YÖNTEM: Kesitsel tipteki araştırmamıza kronik bel ağrısı olan yüz yetmiş-sekiz hasta dahil edildi. Birincil değerlendirme parametrelerimiz dinlenme ve aktivite sırasındaki ağrı şiddetini değerlendiren Görsel Analgol Sklası ($GAS_{dinlenme}$, $GAS_{aktivite}$) idi. İkincil değerlendirme parametrelerimiz ise Ağrı İnançları Anketi (AİA), Ağrıyla Başa Çıkma Ölçeği (ABÇÖ) ve Korku-Kaçınma İnançları Anketidir (KKİA).

BULGULAR: Hastaların Ağrı İnaçları Anketi puanları arttıkça, dinlenme ($GAS_{dinlenme}$)ve aktivite ($GAS_{aktivite}$) sırasında ağrı şiddedileri azaldı ($p<0,05$). $GAS_{dinlenme}$ ile ABÇÖ'nin sadece Tıbbi Çare Arama alt parametresi arasında ($p=0,008$), $GAS_{aktivite}$ ile ABÇÖ'nin sadece Çaresizlik altparametresi arasında pozitif ve anlamlı bir korelasyon vardı ($p<0,05$). $GAS_{aktivite}$ ve $GAS_{dinlenme}$ ile KKİA puanları arasında pozitif ve anlamlı ilişkili olduğu görüldü ($p<0,05$). Regresyon analizi sonuçları, ağrı ile ilgili psikolojik inançların $GAS_{dinlenme}$ ($p=0,014$) ve $GAS_{aktivite}$ ($p=0,006$) 'nin temel belirleyicisi olduğunu göstermiştir. Ağrı ile ilgili organik inançlar, $GAS_{dinlenme}$ ($p=0,019$) ve $GAS_{aktivite}$ ($p=0,031$) üzerinde anlamlı ancak daha düşük etkiye sahip olduğu gözlemlendi. İstirahat halinde ağrı için ilaç almanın GAS pualarını düşürmede anlamlı etkisi olduğu görüldü ($p=0,024$).

SONUÇ: Ağrı ile ilişkili olumsuz inançların yönetimindeki yetersizlikler, istirahatte bile ağrının şiddetlenmesine katkıda bulunmaktadır. Ancak ağrı için geliştirilen tıbbi tedaviler dışında ne korkudan kaçınma davranışı ne de ağrı ile başa çıkma stratejileri ağrı şiddetini azaltmamaktadır.

ANAHTAR KELİMELER: Bel ağrısı, İnançlar, Başa çıkma stratejileri, Korkudan kaçınma, Psikososyal faktörler.

ABSTRACT

OBJECTIVE: The primary aim of the study was to determine which emotional and behavioral factors affect the pain severity and to what extent in patients with chronic low back pain (LBP).

MATERIAL AND METHODS: One hundred and seventy-eight patients with LBP participated in the cross-sectional study. The primary outcome was the Visual Analog Scale (VAS) evaluated the pain severity during rest (VAS_{rest}) and activity (VAS_{act}). Secondary outcomes included the Pain Beliefs Questionnaire (PBQ), The Pain Coping Questionnaire (PCQ) and The Fear-Avoidance Beliefs Questionnaire (FABQ).

RESULTS: While PBQ scores increased, VAS_{rest} and VAS_{act} scores decreased significantly ($p< 0.05$). There was a positive and significant correlation between VAS_{rest} and only Medical Remedies Subparameter of PCQ($p=0.008$), and between VASactivity and only Helpless Subparameter of PCQ ($p<0.05$). VASrest and VAS_{act} had positive and significant associations with FABQ scores ($p< 0.05$). The results of the regression analysis showed that pain-related psychologic beliefs are the main determinants of VAS_{rest}($p=0.014$) and VAS_{act} ($p=0.006$). Pain related organic beliefs had a significant but lower effect on VASrest ($p=0.019$) and VAS_{act} ($p=0.031$). It was observed that seeking a medical remedy for pain at rest had a significant effect on reducing the VAS scores($p=0.024$).

CONCLUSIONS: Inadequacies in the management of negative beliefs associated with pain contribute to the exacerbation of pain even at rest. However, neither fear avoidance behavior nor coping strategies except medical remedies developed for pain at rest do not reduce pain severity.

KEYWORDS: Low back pain, Beliefs, Coping strategies, Fear avoidance, Psychosocial factors.

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INTRODUCTION

Low back pain (LBP), which imposes a heavy economic and social burden, is one of the major disabling health problems. It is reported that 70-85% of people experience LBP pain at least once in their life and 20% of patients complain of persistent LBP (1). The International Association for the Study of Pain (IASP) defined pain as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (2). As can be understood from the definition of IASP, although pain is a response to tissue damage, it is always a subjective, sensory, and emotional experience (3). However, chronicity of pain causes deleterious emotional and behavioral consequences (4). Therefore, in the evaluation of chronic LBP, patients should be evaluated from a biopsychosocial perspective by moving away from traditional approaches to assessing acute pain (5, 6).

The Biopsychosocial Model focuses on the complex interaction of biological, emotional, behavioural and social factors. The model presented the most accepted hypotheses for asymptomatic individuals to have severe structural abnormalities and for patients with severe pain having no defined organic pathology (3 - 5). Since the basic assumption is that beliefs and behaviours about LBP affect pain severity and are affected by it, the Biopsychosocial Model mainly examines pain-related beliefs, strategies for coping with pain, and how pain affects activities (4 - 7). Notwithstanding substantial body of evidence about strong association between chronic LBP and psychological factors, the psychosocial dimension of pain does not receive sufficient attention by researchers (6-8). Negative beliefs toward pain are predisposing factors for recurrence of pain (1). The approaches focused on the psychological dimension of pain define pain-related beliefs as "fundamental truths governing behavior" (2). According to these approaches, a mental representation of a symptom that is experienced or about which negative information is obtained, is created. This representation has components such as the identity of the pain in the mind, the causes of the pain, how the organism works in the presence of pain, the negativities that the pain can cause and the manageability of the pain. As mental representation of pain may exist even before the pain experiences, pain related beliefs, and coping strategies and behaviors developed as a result of beliefs should be among the main predictors of pain (6).

Chronic LBP resulted in negative beliefs and thoughts may cause the patients to develop coping maladaptive strategies (4). While active and positive coping strategies allow to perform daily function in spite of pain, passive and maladaptive strategies lead to withdrawal like avoidance behaviour are related to greater pain (3). If patients with chronic LBP do not use active coping strategies in pain management, they may feel helpless, need medication or seek social support. Furthermore, the patients with LBP start to avoid movements that they think cause pain over time (9). The development of fear avoidance behavior depended on erroneous/unhelpful beliefs and anxiety about pain may decrease the success of rehabilitation and increase the severity of pain (4). Although the close relationship between pain and non-organic factors has been emphasized for a long time, the emotional and behavioral factors associated with pain severity in patients with chronic LBP have not been clearly explained. The primary objective of the study was to determine which emotional and behavioral factors affect the pain severity and to what extent in patients with LBP.

MATERIAL AND METHODS

Current research is a cross-sectional clinical trial conducted from January 2022 to April 2022. The sample size calculation was estimated with G*Power 3.1.6.6 for Mac OS (G*Power from the University of Dusseldorf, Germany). In the sample size analysis, Touche et al. (10) study was taken as a reference. As a result of the power analysis, with Type-I error rates of 0.005 and %95 power, it was predicted that at least 178 people should participate in this study.

Participants One hundred and seventy eight patients (69 females, 109 males), having LBP, were included to the study. To be included in the study, patients aged 20-55 years had to

suffer non-specific low back pain for at least 3 months. Patients undergoing lumbar or lower extremity surgery, having acute back pain, suspected or confirmed psychiatric, orthopedic, or any neurological disease, lumbar radiculopathy and disc herniation and pregnant women were excluded. Each participant signed the informed-consent form.

Assessment Methods After a researcher informed the participants about the study, the demographics and clinical data of the participants were recorded in a form. The same physiotherapist utilized followed assessment tools to determine emotional and behavioral factors associated with the pain characteristic.

Visual Analog Scale (VAS) was used to evaluate the severity of LBP felt by the participants during rest and activity. VAS is a scale between 0 and 10, where 0 represents no pain and 10 represents pain as bad as it can be. Patients are asked to mark their pain severity on a 10-centimeter line. The pain severity is determined by measuring the distance from the marked point to the "0" point with a tape measure (11).

The Pain Beliefs Questionnaire (PBQ) developed by Edwards et al. (12) evaluates the beliefs about the cause and treatment of pain. PBQ is a 6-point Likert scale (6: always; 1: never) consisting of 12 items. It has two subscales including organic (8 items) and psychological (4 items) beliefs. While the Organic Belief subscale (PBQ-O) reflects that the pain is largely of organic origin, the Psychological Belief subscale (PBQ-P) shows that the experience of pain is under the influence of psychological factors (13). High scores signify high pain belief for both subscales and Berk et al. (14) validated the Turkish version of the questionnaire.

The Pain Coping Questionnaire (PCQ) developed by Kleinke et al. (15) was adapted to Turkish by Karaca et al. PCQ assesses pain-specific emotional and behavioral patterns. The questionnaire consists of 29 items in which patients rate their agreement with each statement on a 4-point Likert scale (0= never, 3=very often). A higher score indicates stronger pain coping. There are four subscales within the PCQ; self-management (PCQ-SM) (maximum score of 36), helplessness (PCQ-H) (maximum score of 24), social support (PCQ-SS) (maximum score of 24), and medical remedies (PCQ-MR) (maximum score of 27) (16, 17).

The Fear-Avoidance Beliefs Questionnaire (FABQ) is a self-reported questionnaire consisting of 16 questions. The questionnaire developed by Waddell consists of two subscales, physical activity (FABQ-PA) and work (FABQ-W) (18). The physical activity subscale contains 5 questions and the work subscale contains 11 questions. Each item is scored between 0-6. A score of "0" means "strongly disagree", while a score of "6" is interpreted as "totally agree". A total score approaching "0" indicates a decrease in fear-avoidance behavior. Özcan et al. (19) carried out. The Turkish validity and reliability of the questionnaire.

Ethical Committee

The trial protocol has been approved by the Ethics and Human Research Committee of Suleyman Demirel University (72867572-050.01.04-196254) and registered on ClinicalTrials.gov (NCT05232747). The study was performed in accordance with the Helsinki Declaration.

Statistical Analysis

Data obtained in the study were analyzed statistically using the Statistical Package for the Social Sciences (SPSS, version 21.00) for Windows software (SPSS Inc., IBM Corporation in NY). Descriptive statistics were used to show the participants' characteristics. Continuous variables were expressed as means (and standard deviations), and as medians (minimum and maximum values). Shapiro-Wilk Test evaluated all continuous variables for normality. As parametric test assumptions were not met, the relationship between pain characteristics (pain severity during rest and activity, pain duration) and independent variables was examined using Spearman Correlation Analysis. As a result of the correlation analysis, regression models were created to determine the effect level of the variables, which were determined to have a significant correlation with the pain severity during rest and activity. A total of five variables were included in both created models, and multiple regression analysis was used

to determine the effects of the models on pain severity during rest and activity, respectively. The statistical level of significance was set at $p<0.05$.

RESULTS

A sample of 178 volunteers (69 males and 109 females) completed the study. It was observed that while the mean score of VAS during rest was 4.81±1.88, the pain severity score increased to 6.35±2.09 on average with activity. Participants suffered from LBP for an average of 44.75±57.55 months. Demographics and clinical characteristics of participants were given in **(Table 1)**.

Table 1: Characteristics of participants and clinical findings

		n (%)
Gender*	Male/Female (%)	69/109 (38.8/61.2)
Diagnosis*	Mechanical LBP/ Disc herniation (%)	134/44 (73.3/24.7)
Smoking*	+/- (%)	118/60 (66.3/33.7)
Alcohol Consumption*	+/- (%)	29/149 (16.3/83.7)
Exercise Habit*	+/- (%)	121/57 (68.0/32.0)
Medication for Pain Management*	+/- (%)	144/34 (80.9/19.1)
		Mean ± SD (min-max)
Age (years) †		35.47±10.84 (20-55)
BMI (kg/m²) †		26.37±3.14 (19.84-34.67)
VAS_{rest}†		4.81±1.88 (1-10)
$VAS_{activity}$†		6.35±2.09 (2-10)
Pain Duration (month)		44.75±57.55 (3-360)
PBQ	PBQ-O†	3.06±0.65 (1.25-4.50)
	PBQ-P†	2.55±0.84 (1.00-4.75)
PCQ	PCQ-SM†	15.64±5.85 (1-29)
	PCQ-H†	10.20±3.75 (1-19)
	PCQ-SS†	10.97±4.76 (0-24)
	PCQ-MR†	10.16±4.02 (1-23)
FABQ	FABQ-P†	15.83±5.39 (0-24)
	FABQ-W†	25.59±11.21 (0-50)

BMI: Body Mass Index; PBQ: Pain Beliefs Questionnaire; PCQ: Pain Coping Questionnaire; FABQ: Fear Avoidance Beliefs Questionnaire, O-Organic, P: Psychologic, SM: Self-Management, H: Helplessness, SS: Social Support, MR: Medical Remedies, PA: Physical Activiy, W: Work

*expressed as mode (100%)

†: expressed as mean±standart deviation (minumum-maximum values)

A Spearman's rho correlation revealed a negative and significant association between VAS_{rest} and VAS_{act}, and both sub-parameters of PBQ. Analysis of the relationship between pain severity and pain-specific emotional and behavioral patterns showed that while there was a positive and significant correlation between VAS_{rest} and only PCQ-MR, VAS_{act} had only a positive and significant correlation with PCQ-H. Both VAS_{rest} and VAS_{act} scores showed a positive and significant correlation with sub-parameters of FABQ (Table 2). While pain duration had a negative and significant association with scores of PBQ-P items, a positive and significant correlation was found between pain duration, and PCQ-MR, and both sub-parameters (Physical activity and Work) of FABQ as shown in **Table 2**.

Table 2: Correlation between pain characteristics and behavioral-emotional factors

	Variables	VAS_{rest}		VAS_{act}		Pain Duration	
		r	p	r	p	r	p
PBQ	PBQ-O	-0.216**	0.004	-0.216**	0.004	-0.319	0.065
	PBQ-P	-0.282**	0.000	-0.301**	0.000	-0.302**	0.000
PCQ	PCQ-SM	-0.044	0.561	-0.031	0.683	0.099	0.188
	PCQ-H	0.140	0.062	0.168*	0.025	0.102	0.175
	PCQ-SS	0.106	0.159	0.109	0.146	0.101	0.180
	PCQ-MR	0.199**	0.008	0.210	0.005	0.164*	0.029
FABQ	FABQ-PA	0.260**	0.000	0.284**	0.000	0.339**	0.000
	FABQ-W	0.171*	0.022	0.163*	0.030	0.160*	0.033

VAS_{rest}: VAS during resting; VAS_{act} :VAS during activity; PBQ: Pain Beliefs Questionnaire; PCQ: Pain Coping Questionnaire; FABQ: Fear Avoidance Beliefs Questionnaire, O-Organic, P: Psychologic, SM: Self-Management, H: Helplessness, SS: Social Support, MR: Medical Remedies, PA: Physical Activiy, W: Work

Five variables related to VAS_{rest} were entered into the model containing variables for PBQ-O, PBQ-P, PCQ-MR, FABQ-PA, and FABQ-W. The model described a total of 16.7% of pain severity at rest. Those that made a statistically significant contribution to VASrest were PBQ-O (p=0.019), PBQ-P (p=0.014), and PCQ-MR (p=0.024), respectively (Table 3). After the correlation analysis (see Table 2), PBQ-O, PBQ-P, PCQ-H, FABQ-PA, and FABQ-W were retained in the main hierarchical model for VAS_{act}. The R^2 value in the model was 16.3%. The main predictors for VASact were the organic (p=0.031) and psychological (p=0.006) components of pain belief. It was determined that FCQ-MR and FABQ results did not contribute significantly to the model and were not critical determinants **(Table 3)**.

Table 3: Main models predicting pain severity during rest and activity

Predictor Variables for VAS_{rest}	B	SE	t	p	Odds ratio 95% CI	R^2	p
PBQ-O	-0.510	0.214	-2.377	0.019	(-0.933)-(-0.086)		
PBQ-P	-0.426	0.171	-2.494	0.014	(-0.763)-(-0.089)		
PCQ- MR	0.083	0.036	2.276	0.024	0.011-0.154	0.167	0.001
FABQ-PA	0.021	0.028	0.737	0.462	(-0.034)-(0.075)		
FABQ-W	0.014	0.013	1.067	0.288	(-0.012)-(0.040)		
Predictor Variables for VAS_{act}							
PBQ-O	-0.524	0.241	-2.175	0.031	(-0.999)-(-0.048)		
PBQ P	-0.524	0.190	-2.757	0.006	(-0.899)-(-0.149)		
PCQ-H	0.075	0.044	1.720	0.087	0.011-0.161	0.163	0.001
FABQ-PA	0.032	0.031	1.011	0.313	(-0.030)-0.093		
FABQ-W	0.014	0.015	0.950	0.343	(-0.015)-0.043		

B: Unstandardized Beta; SE: Standard Error; CI: Confidence Interval VAS_{rest} : VAS during resting; VAS_{act} :VAS during activity; PBQ-O: Pain Beliefs Questionnaire- Organic Subparameter; PBQ-P: Pain Beliefs Questionnaire- Psychologic Subparameter; PCQ-MR: Pain Coping Questionnaire- Medical Remedies Subparameter; PCQ-H: Pain Coping Questionnaire- Helplessness Subparameter; FABQ-PA: Fear Avoidance Beliefs Questionnaire- Physical Activiy Subparameter; FABQ-W: Fear Avoidance Beliefs Questionnaire- Work Subparameter

DISCUSSION

The current study demonstrated that pain severity during rest and activity had a significant relationship with pain-related beliefs, coping strategies, and fear avoidance behavior in patients with LBP. Multiple regression analysis also revealed that organic and psychological beliefs associated with pain were the main determinants of pain severity during both rest and activity. Choosing medical remedies as a coping strategy was also found to contribute significantly to the management of pain severity at rest. Additionally, the coping strategies developed did not have a significant effect on reducing the pain severity during activity.

Our literature review highlighted a continuing need to understand the psychosocial factors influencing LBP severity. A substantial body of research has generally focused on the relationship between pain and functional limitation, or activity limitation after pain, or poor expectation for recovery (expectations) (2, 5, 7, 20). While even the psychosocial aspect of LBP is not fully understood, it is a complete mystery how emotional and behavioral attitudes affect pain severity. However, emotional and behavioral factors possibly co-existing with LBP affect the need to seek healthcare (2). Therefore, the management of chronic LBP, a universal problem associated with severe deterioration in psychosocial status, must be biopsychosocial-based to improve health-related quality of life (9). In the struggle against pain, it is important to consider the meaning attributed to pain, beliefs about pain, and strategies developed to cope with pain (21, 22).

Our study results showed that the main predictors of pain severity were pain-related beliefs rather than strategies for passive or active coping with pain, prevention of pain, and learning pain management. In the early 2000s, Turk et al. (23) stated that weak beliefs about painkillers increase pain intensity as a result of faulty emotional processing, and blamed behavioral and belief systems for the chronicity of pain. The mechanism underlying the increase in pain severity due to poor management of the cognitive process may be the increase in susceptibility to somatization. As a result of failure to control pain-related beliefs in patients with LBP, dysfunction develops in the mesolimbic dopamine system, which controls both pain and pleasure, resulting in somatization which is a major risk factor for LBP (24). While this dysfunction causes the pain to be delayed suppression in the presence of short-term erroneous/unhelpful beliefs and thoughts, having a non-intellectual attitude towards pain can cause hyperalgesia and pain severity to reach much more serious dimensions (25). The results of Yoshimoto et al's study indicated that LBP should be treated as if it were a brain dysfunction, as well as being an organically based musculoskeletal disease (24). In line with our findings and hypotheses of dysfunction developing in the mesolimbic dopamine system, McGorry et al. (20) reported that patients with a longer duration of pain may interpret the pain severity exaggeratedly, and poor expectations and beliefs for recovery may become a self-fulfilling prophecy. Moreover, Hirsch et al. (26) found that patients with strong erroneous beliefs and emotions about LBP had a longer and more costly process for pain rehabilitation, compared to sufferers with more positive cognitions and attitudes.

If the autonomous methods and strategies used by patients to cope with pain cannot depress symptoms, they can be one of the biggest obstacles to rehabilitation success (4). In this regard, Dansie and Turk underlined that it is important for the patient to use an appropriate coping strategy to reduce pain severity within the framework of the biopsychosocial model (5). However, questions such as "Which coping strategy significantly reduces the pain severity?", "Do coping strategies directly inhibit pain or do they change beliefs and emotions about pain?" could not be answered conceptually (9). Although many researchers have investigated which active and passive coping strategies are preferred more after pain, the issue of how effective these strategies are in pain management has not received enough attention (27 - 30). However, we can interpret that pain coping strategies may be effective on the severity of LBP from studies reporting better pain control after cognitive behavioral therapy (4, 22, 29). Contrary to the studies, our findings revealed that no pain coping strategy, other than medical remedies for pain during

rest, had an explanatory efficacy on pain severity at either rest or activity. The results of the correlation analysis suggest that the possible reason for applying Medical remedies is the prolonged duration of pain. As stated by Christie et al. (27), pain coping strategies may reduce pain severity by creating an emotional and cognitive change regarding pain. This hypothesis is consistent with our findings showing that negative beliefs related to pain are the most influential factor on both rest and pain severity.

Thoughts of helplessness and lack of control against the LBP are a prerequisite for fear-avoidance behaviors (1, 4, 20). In addition, a high level of fear-avoidance behavior may be a possible marker of the development and persistence of LBP (9). Yoshimoto et al. (24) concluded that fear-avoidance behavior should be evaluated for the prediction of LBP prognosis in even recruitments. Furthermore, the researchers determined that the physical activity subscore of fear-avoidance behavior had a significant contribution to the occurrence of LBP, but they did not examine the effect of fear-avoidance behavior on pain severity. In another study, which also pointed out that pain severity did not cause a significant difference in terms of fear avoidance symptoms and negative beliefs in patients with LBP, Alaca et al. (9) demonstrated that pain severity during both rest and activity had a significant relationship with pain-related beliefs, similar to our results. Despite the fear-avoidance behavior, the gradual increase in physical activity is a necessity for pain management. As a result of the linear regression analysis, Nava-Bringas et al. (31) expressed that the exacerbation of fear-avoidance behavior is one of the primary factors that increase the level of pain severity and disability. Contrary to these findings, we found that fear-avoidance behavior did not have a significant place in the model we created from the factors related to pain severity during rest and activity. The reason for the differences between the results is possibly that the populations participating in the studies were different in terms of age and sample size. As emphasized by others, our results reinforce data indicating that the main cause of pain severity in patients with LBP is pain-related beliefs and emotions rather than fear-avoidance behavior (9, 27). The significant correlation between fear-avoidance behavior and pain severity may be due to the much longer pain duration of the volunteers or the negative emotions towards pain leading to fear-avoidance behavior. Some methodological limitations of this study need to be highlighted. First, the majority of participants were women. Gender may be an important factor influencing pain-related emotions and behaviors. On the other hand, the study was planned as a cross-sectional and done on just patients with LBP. A comparison with an age and gender-matched healthy-control group could be included in future longitudinal studies. In summary, emotional and behavioral problems secondary to LBP have a strong association with pain severity. In particular, emotions involving beliefs about LBP seem to have a more dominant role than behavioral choices for pain management. Although fear avoidance behaviors did not have a significant effect on pain severity, the significant association observed between them suggests that pain related beliefs have a primary importance in shaping pain behaviors. Inadequacies in the management of negative beliefs associated with pain level contribute to the exacerbation of pain even at rest.

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