



The Relationship Between Attachment Style, Deterministic Thinking, and Sources of Self-knowledge with the Response Rate to Pain Treatment in Patients with Chronic Non-specific Low Back Pain

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Abstract

Background: Chronic non-specific low back pain (CNLBP) is influenced by psychological and interpersonal factors that may be associated with differences in treatment outcomes.

Objectives: This study aimed to examine the associations between attachment styles, deterministic thinking, and sources of self-knowledge and changes in pain intensity following physiotherapy in patients with chronic non-specific low back pain.

Methods: This observational correlational study included 152 patients with CNLBP who were recruited from physiotherapy clinics in Tehran, Iran, in 2023. Participants completed the Adult Attachment Inventory, Deterministic Thinking Questionnaire (DTQ), and Sources of Self-Knowledge Scale (SSKS). Pain intensity was assessed using the Visual Analog Scale (VAS) at baseline (before the first physiotherapy session) and after completion of the tenth physiotherapy session. Treatment response was defined as the reduction in pain intensity from baseline to the post-treatment assessment. Pearson correlation coefficients and separate linear regression analyses were performed using SPSS version 25.

Results: Response to pain treatment showed significant positive correlations with a secure attachment style ($r = 0.377$, $P < 0.001$) and self-observation ($r = 0.306$, $P < 0.001$), whereas significant negative correlations were observed with deterministic thinking ($r = -0.200$, $P < 0.05$), social feedback ($r = -0.257$, $P < 0.01$), and social comparison ($r = -0.276$, $P < 0.01$). Regression analysis indicated that a secure attachment style ($\beta = 0.089$, $P < 0.001$), self-observation ($\beta = 0.040$, $P < 0.05$), and deterministic thinking ($\beta = -0.010$, $P < 0.05$) were significantly associated with treatment response.

Conclusions: The findings indicate that several psychological characteristics, particularly secure attachment, self-observation, and deterministic thinking, are associated with differences in pain improvement following physiotherapy in patients with chronic non-specific low back pain. These results underscore the potential relevance of psychological factors in explaining variability in treatment outcomes; however, the observational correlational design of the study precludes causal inferences.

Keywords: Chronic Nonspecific Low Back Pain, Attachment Styles, Sources Of Self-knowledge, Deterministic Thinking

1. Background

Chronic non-specific low back pain (CNLBP) remains a major contributor to disability across age groups and populations, imposing a substantial burden on individuals, healthcare systems, and society at large (1, 2). It is generally defined as low back pain persisting for

more than 12 weeks without a clearly identifiable specific cause, such as a fracture, infection, or neurological lesion (3). Although biological factors contribute to the onset and maintenance of this condition, they are often insufficient to explain pain persistence or the marked differences in patients' responses to similar treatment approaches. Accordingly, contemporary pain research increasingly emphasizes

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the role of psychological and social factors in shaping the experience and management of chronic pain (2-5).

The biopsychosocial model provides a useful framework for understanding CNLBP because it considers the dynamic interplay of physical, psychological, and contextual variables over time (6-8). Within this framework, psychological characteristics such as emotion regulation, cognitive style, and interpersonal functioning are regarded as important factors related to pain perception, coping, and treatment experience. Among these characteristics, attachment style has attracted considerable attention in pain research because of its association with emotional security, help-seeking behavior, and stress regulation (9, 10).

Attachment style refers to relatively stable patterns of relating to others that develop early in life and continue to influence interpersonal functioning in adulthood. Individuals with secure attachment are more likely to perceive others as reliable and supportive, which may facilitate more effective emotion regulation and constructive engagement with healthcare providers. In contrast, insecure attachment styles, particularly anxious attachment, have been associated with greater pain catastrophizing, heightened attention to pain-related experiences, maladaptive coping responses, and lower adherence to treatment recommendations (6, 11-12). These psychological and interpersonal patterns may also be associated with a weaker therapeutic alliance and reduced responsiveness to rehabilitation interventions such as physiotherapy.

Another psychological construct relevant to chronic pain is deterministic thinking. This concept refers to a rigid cognitive tendency to interpret events as fixed, inevitable, and difficult to change (13, 14). In the context of CNLBP, deterministic thinking may be reflected in beliefs that pain will inevitably persist, worsen, or remain unchanged regardless of treatment efforts. This construct should be considered separately from other cognitive distortions because it specifically emphasizes rigidity, inevitability, and reduced openness to change. Such a cognitive pattern has been linked to helplessness, hopelessness, and reduced motivation for active coping, which may, in turn, be associated with weaker engagement in rehabilitation programs (15-18).

In addition to attachment styles and deterministic thinking, self-knowledge represents another important dimension of psychological functioning that may be related to pain management. Self-knowledge develops through multiple sources, including self-observation, social feedback, and social comparison. These sources help individuals recognize internal states, evaluate their

behaviors, and adjust their responses to challenges. In chronic pain conditions, self-observation may be associated with greater awareness of pain triggers and treatment effects, thereby supporting a stronger sense of control. Social feedback from clinicians or significant others may reinforce adaptive behaviors, whereas social comparison may be associated with beneficial or harmful effects depending on its direction and interpretation (19-21). Given the established association between self-efficacy and effective pain management (4, 22), it is important to examine how different sources of self-knowledge are related to treatment response in CNLBP.

2. Objectives

Chronic pain and psychological factors interact bidirectionally; pain may increase psychological distress, whereas maladaptive psychological patterns can amplify pain perception. Although physiotherapy is commonly used to manage CNLBP, many patients continue to experience persistent pain and functional impairment despite treatment. This highlights the importance of identifying psychological factors that may contribute to variability in treatment outcomes. Accordingly, the present study aimed to examine the relationships among attachment style, deterministic thinking, sources of self-knowledge, and treatment response in patients with CNLBP. An improved understanding of these associations may support the integration of psychological factors into physiotherapy and pain management interventions.

3. Methods

3.1. Study Design and Participants

This observational correlational study was conducted in 2023 among patients with CNLBP who were referred to several physiotherapy centers in Tehran, Iran. The sample size was estimated using Cochran's formula, based on an accessible population of approximately 250 eligible patients, yielding a final sample of 152 participants.

Participants were recruited using convenience sampling among individuals attending the physiotherapy centers. The inclusion criteria were nonspecific low back pain for at least 12 weeks, the ability to understand and complete the study questionnaires, and willingness to participate. Patients with a history of spinal surgery; specific spinal disorders, such as fracture, tumor, infection, or inflammatory disease; severe neurological conditions;

or incomplete questionnaire data were excluded. Written informed consent was obtained from all participants before data collection.

3.2. Physiotherapy Treatment and Outcome Definition

Participants received a routine physiotherapy program consisting of 10 treatment sessions at the participating centers. All patients received a fixed electrotherapy protocol, including transcutaneous electrical nerve stimulation (TENS), ultrasound (US), and hot pack (HP), for 45 minutes per session. The objective was to examine the statistical relationships between baseline psychological variables and the extent of pain reduction following physiotherapy.

Pain intensity was assessed using the VAS before the first physiotherapy session and again after completion of the tenth session. Treatment response was defined as the reduction in pain intensity and was calculated by subtracting post-treatment VAS scores from baseline VAS scores (before-treatment VAS - post-treatment VAS). Thus, higher scores indicated greater pain reduction following physiotherapy.

3.3. Instruments

Pain intensity was measured using the VAS, a widely used measure ranging from 0, indicating no pain, to 10, indicating the worst imaginable pain (23, 24).

Adult attachment style was assessed using the Adult Attachment Inventory developed by Hazan and Shaver. This instrument evaluates secure, avoidant, and ambivalent attachment styles using items scored on a five-point Likert scale (10). Previous studies have reported acceptable reliability and validity for the Persian version of this instrument (25).

Sources of self-knowledge were assessed using the questionnaire developed by Younesi et al. The scale consists of 30 items assessing three domains: self-observation, social feedback, and social comparison. Items are rated on a four-point Likert scale, with higher scores indicating greater use of the corresponding source of self-knowledge (26).

Deterministic thinking was measured using the Deterministic Thinking Scale developed by Younesi and Mirafzal. This instrument assesses rigid and absolutist patterns of thinking and has demonstrated acceptable psychometric properties in Iranian populations (14).

3.4. Data Collection

After providing written informed consent, participants completed the study questionnaires before initiating physiotherapy treatment. Completion of the

questionnaires required approximately 30 minutes. Pain intensity was reassessed after completion of the tenth physiotherapy session using the VAS. The difference between baseline and post-treatment pain scores was used as the study outcome, representing the magnitude of pain reduction following physiotherapy.

3.5. Statistical Analysis

Data were analyzed using SPSS version 25. The normality of variable distributions was assessed using the Kolmogorov-Smirnov test. Descriptive statistics were calculated for demographic characteristics and study variables.

Pearson correlation analysis was conducted to examine the associations between psychological variables and pain reduction following physiotherapy. Separate linear regression analyses were performed to examine the statistical associations between each psychological variable and treatment response. Demographic variables were examined in preliminary analyses and were not significantly associated with treatment response; therefore, they were not included in the final regression models. Regression findings were reported using both standardized (β) and unstandardized (B) coefficients. Statistical significance was set at $P < 0.05$.

4. Results

The demographic characteristics of the 152 participants are presented in Table 1. Overall, 54.6% of participants were male, 52.0% were younger than 40 years, and 56.6% were married. Participants had diverse educational backgrounds and occupational statuses.

As shown in Table 2, the mean score for secure attachment was higher than the mean scores for the avoidant and ambivalent attachment styles. Among the sources of self-knowledge, social comparison had the highest mean score. Pain intensity decreased significantly following physiotherapy. The mean pain intensity score decreased from 7.91 ± 1.30 before physiotherapy to 3.14 ± 1.28 after physiotherapy. Treatment response was calculated as the difference between pain intensity before and after physiotherapy (VAS before physiotherapy - VAS after physiotherapy), with higher scores indicating a greater reduction in pain intensity following treatment. The mean treatment response score was 4.76 ± 1.01 .

Pearson correlation analyses showed that treatment response was significantly and positively associated with secure attachment ($r = 0.377$, $P < 0.001$) and self-observation ($r = 0.306$, $P < 0.001$). In contrast, treatment

Table 1. Demographic Characteristics of Patients with Chronic Nonspecific Low Back Pain

Demographic Variables	Number	Percentage
Gender		
Male	83	54.6
Female	69	45.4
Age (y)		
Under 40	79	52.0
Over 40	73	48.0
Marital status		
Married	86	56.6
Single	66	43.4
Education		
Less than diploma	35	23.0
Diploma	40	26.3
Associate degree	32	21.1
Baccalaureate	28	18.4
Master's degree and higher	17	11.2
Occupation		
Unemployed	33	21.7
Employee	65	42.8
Self-employed	54	35.5

Table 2. Attachment Styles, Sources of Self-Knowledge, Deterministic Thinking, and Pain Intensity in Patients with Chronic Nonspecific Low Back Pain

Variables and Subscales	Mean $\pm$ Standard Deviation
Attachment styles	
Secure attachment	15.65 $\pm$ 4.26
Avoidant attachment	14.44 $\pm$ 2.53
Ambivalent attachment	13.99 $\pm$ 4.11
Sources of self-knowledge	
Self-observation	26.31 $\pm$ 6.52
Social comparison	26.62 $\pm$ 4.62
Social feedback	22.77 $\pm$ 4.75
Deterministic thinking^a	94.92 $\pm$ 20.03
Pain intensity	
Pain intensity before physiotherapy	7.91 $\pm$ 1.30
Pain intensity after physiotherapy	3.14 $\pm$ 1.28
Response to treatment (difference in pain intensity before and after treatment)	4.76 $\pm$ 1.01

^a Paired t test, $t = 58.249$, $P = 0.000$.

response was significantly and negatively associated with social comparison ($r = -0.276$, $P = 0.001$), social feedback ($r = -0.257$, $P = 0.001$), and deterministic thinking ($r = -0.200$, $P = 0.014$). No statistically significant associations were observed between treatment response and avoidant attachment or ambivalent attachment (Table 3).

Separate linear regression analyses were conducted to examine the statistical associations between

psychological variables and treatment response. Regression assumptions, including normality of residuals, homoscedasticity, linearity, and multicollinearity, were assessed before analysis, and no serious violations were observed. Secure attachment was positively associated with treatment response ($B = 0.089$, $\beta = 0.377$, 95% CI: 0.054 to 0.124, $P < 0.001$). Self-observation was also positively associated with treatment response ($B = 0.040$, $\beta = 0.259$, 95% CI: 0.002

Table 3. Correlations Between Study Variables and Treatment Response (Pain Reduction) in Patients with Chronic Nonspecific Low Back Pain

Variables	R	P-Value	Number
Attachment styles			
Secure attachment	0.377*	0.000	152
Avoidant attachment	-0.070	0.197	152
Ambivalent attachment	-0.031	0.354	152
Sources of self-knowledge			
Self-observation	0.306*	0.000	152
Social comparison	-0.276*	0.000	152
Social feedback	-0.257*	0.001	152
Deterministic thinking			
Deterministic thinking	-0.200*	0.007	152

Table 4. Separate Linear Regression Analyses Examining Associations Between Psychological Variables and Treatment Response in Patients with Chronic Nonspecific Low Back Pain^a

Regression Results	B	SE	β	95% CI for B	t	P Value
Attachment styles						
Secure attachment	0.089	0.018	0.377*	0.054 to 0.124	4.964	0.000
Avoidant attachment	-0.027	0.030	-0.069	-0.086 to 0.032	-0.909	0.365
Ambivalent attachment	-0.011	0.019	-0.044	-0.049 to 0.027	-0.577	0.565
Sources of self-knowledge						
Self-observation	0.040	0.019	0.259*	0.002 to 0.078	2.093	0.038
Social comparison	-0.042	0.034	-0.194	-0.109 to 0.025	-1.250	0.213
Social feedback	0.024	0.034	0.112	-0.043 to 0.091	0.629	0.531
Deterministic thinking	-0.010	0.004	-0.200*	-0.018 to -0.002	-2.499	0.014

^a Abbreviations: B, unstandardized regression coefficient; SE, standard error; β , standardized regression coefficient; CI, confidence interval.

to 0.078, $P = 0.038$). In contrast, deterministic thinking showed a significant negative association with treatment response ($B = -0.010$, $\beta = -0.200$, 95% CI: -0.018 to -0.002, $P = 0.014$). Avoidant attachment, ambivalent attachment, social comparison, and social feedback were not significantly associated with treatment response in the regression analyses (Table 4).

5. Discussion

The present study examined the relationships among attachment style, sources of self-knowledge, deterministic thinking, and response to pain treatment in patients with CNLBP. The findings suggest that psychological variables are associated with individual differences in treatment response.

Consistent with previous studies, a secure attachment style was positively associated with a better response to physiotherapy, whereas insecure attachment styles were not significantly associated with treatment outcomes. Individuals with a secure attachment style may demonstrate greater trust in

healthcare providers, more adaptive coping strategies, and stronger engagement with rehabilitation programs. These findings are consistent with previous research highlighting the role of attachment-related factors in pain adjustment and self-efficacy (27). Furthermore, Amini Fasakhoudi et al. (11) reported significant associations among anxious attachment, pain catastrophizing, fear of pain, and hypervigilance, emphasizing the relevance of attachment-related psychological processes in pain perception and management.

Self-observation was positively associated with treatment response, suggesting that greater awareness of internal states and pain-related experiences may facilitate engagement in rehabilitation. In contrast, social comparison and social feedback were negatively associated with treatment response, indicating that greater reliance on external evaluation may be accompanied by poorer adaptation to chronic pain conditions. These findings are consistent with previous evidence regarding the role of interpersonal and

cognitive-emotional factors in chronic pain management (28-30).

Deterministic thinking also showed a negative association with treatment response. Rigid cognitive styles may reduce psychological flexibility and limit active participation in rehabilitation. Previous studies have similarly suggested that maladaptive cognitions are associated with less favorable pain-related outcomes and reduced treatment engagement (30, 31).

Recent intervention-based studies in patients with non-specific low back pain further support the multidimensional nature of treatment response. Alizad Arablouye Bishe et al. reported that both Pilates-Kinesio tape and Mulligan-Kinesio tape exercises were associated with improvements in pain-related outcomes (32). Similarly, Goudarzi Nasab et al. (33) observed improvements in pain, disability, balance, and quality of life following both cupping therapy and myofascial release interventions. Collectively, these findings suggest that treatment response in CNLBP may be associated not only with physical interventions but also with psychological and contextual factors that influence rehabilitation engagement.

5.1. Limitations

Several limitations should be acknowledged. First, the correlational design does not permit causal interpretation of the findings. Second, convenience sampling may limit the generalizability of the results. Third, treatment procedures and therapist-related factors may not have been fully standardized across participants. Future studies should use longitudinal designs, larger samples, and standardized treatment protocols to further clarify these associations.

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Footnotes

AI Use Disclosure: GapGPT was used for translation and localization of the manuscript, with a moderate level of involvement.

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and critical revision of the manuscript for important intellectual content; J. Y.: Contribution to the study idea and critical scientific revision of the manuscript; M. V.: Statistical analysis and assistance in data interpretation; Z. G.: Drafting the manuscript by extracting the article from the thesis and submitting the manuscript. All authors have read and approved the final version of the manuscript.

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Data Availability: The dataset presented in this study is available on request from the corresponding author during submission or after publication. The data are not publicly available due to privacy and ethical restrictions but will be provided to the journal or reviewers upon reasonable request.

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