



# Effect of Cognitive-Behavioral Training on Pain Self-Efficacy, Self-Discovery, and Perception in Patients with Chronic Low-Back Pain: A Quasi-Experimental Study

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## Abstract

**Background:** Correcting false cognitions and establishing preventive behaviors in patients with chronic low-back pain can improve self-efficacy and self-discovery of these patients against the physical and psychological consequences of chronic back pain through reinforcing thoughts and constructive behaviors.

**Objectives:** This study aimed to investigate the effectiveness of cognitive-behavioral training in self-efficacy, self-discovery, and pain perception of patients with chronic low-back pain.

**Methods:** Based on a quasi-experimental design, 40 patients with chronic low-back were selected through purposive sampling and assigned into two groups of intervention ( $n = 20$ ) and control ( $n = 20$ ). After administering the pain self-efficacy (PSE) scale, the self-discovery scale (SDS), and the pain perception questionnaire (MPQ) to both groups, the intervention group received the cognitive-behavioral training while the control group did not receive the intervention. The post-test was performed on both groups and the data were analyzed using SPSS.

**Results:** The scores of pain self-efficacy and self-discovery (self-awareness and acceptance, commitment and attraction, transcendence and development, and personal growth) were higher in the intervention group than in the control group ( $P < 0.01$ ). The highest increase with an effect size of 0.514 was related to the self-awareness and acceptance subscale. In addition, the pain assessment perception was the only reduced subscale among the other dimensions of pain perception ( $P < 0.01$ ).

**Conclusions:** Psychosocial complementary therapies can provide patients suffering from chronic pain with better physical and mental conditions to have a higher quality of life.

**Keywords:** Cognitive-Behavioral Training, Pain Perception, Pain Self-Efficacy, Self-Discovery

## 1. Background

Chronic low-back pain is one of the most common types of pain (1). In patients with chronic low-back pain, the objective measurement of physical activity is not necessarily related to the fear of movement (2). Complete relief from pain, sometimes, is not possible and therefore, learning to live with pain is essential. Psychological factors play an important role in converting acute pain to chronic pain and explaining the severity of pain and pain-related problems (3). The belief that pain is a disaster and the formation of avoidance-fear behavioral patterns can ultimately lead to helplessness pain responses (1). Cognitive-behavioral training, with a focus on avoidance beliefs and behaviors, can play an important role in pain management. The long-term physiological interventions without

any psychological intervention may not be very effective in pain self-management. On the other hand, the effect of cognitive-behavioral training is more stable on the self-management of pain (4). High levels of self-efficacy can reduce distracting physical information by reducing anxiety, physiological exacerbations, and negative physical senses (5). Therefore, pain self-efficacy can reduce the effect of pain on crucial everyday activities by increasing efforts to cope effectively with pain (6).

In adaptation to chronic pain, it is necessary to overcome the gaps between social roles and personal identities (7). The frequent presence of pain-related symptoms can form a fragile (8), fearful, and humiliated person, and may be associated with the experience of negative emotions, identity confusion (9), and more avoidable behaviors in everyday life (10). Based on humanistic views, the degree of

perception destruction that an individual has of “self” (11) can engage the person in a continuous defense against attacks to “self” and against self-blame, due to the discrepancy between the “real self” and the “ideal self” (12, 13). As cognitive bias increases, the pattern of “self-pain enmeshment and pain increases (13) to the extent that the physician occasionally becomes pessimistic about the patient’s treatment process (14). Under these circumstances, self-discovery can help patients to achieve a more productive life despite their pain and limitations. Self-discovery is defined as prosperity and realization of self, accurate recognition of abilities, and effort to realize them, and is based on the dimensions of self-awareness and acceptance, commitment and attraction, transcendence and development, and personal growth (15). Integrated medicine, besides focusing on the regaining of more normal physical conditions, emphasizes the importance of patients’ unique ability and desire for adaptation and continuous promotion of his well-being (16).

## 2. Objectives

This study aimed to examine the effectiveness of cognitive-behavioral training in pain self-efficacy, self-discovery, and perception in patients with chronic low-back pain.

## 3. Methods

In this quasi-experimental study, 40 patients were purposefully selected from among 100 patients diagnosed with chronic low-back pain referring to the pain clinic of Rasoul-e-Akram affiliated to Iran University of Medical Sciences. They were divided into an intervention group ( $n = 20$ ) and a control group ( $n = 20$ ). The patients’ selection criteria included consent to participate in the study, no history of similar training, appropriate physical conditions for attending the training sessions, and having the pain for more than three months. Cognitive-behavioral intervention for chronic pain was designed based on the general cognitive-behavioral (17) and special chronic pain (18, 19) packages and administered in eight two-hour sessions. Patients in the intervention and control groups were asked to complete the pain self-efficacy (PSE) scale, the self-discovery scale (SDS), and the pain perception questionnaire (MPQ) as the pretest. Then, the training was performed on the intervention group and the control group continued the routine medical treatment. Finally, the questionnaires were completed again by both groups as the post-test.

PSE is a six-item scale each scored from 0 to 10 to assess the sense of trust in patients with chronic pain in some

activities related to disease control (20). SDS is a 33-item questionnaire each scored 0 - 4 on four dimensions of self-awareness and acceptance, commitment and attraction, transcendence and development, and personal growth (total self-discovery) (21). The MPQ is a 20-item questionnaire with the dimensions of pain sensory perception, affective perception, and pain assessment perception (22). The validity and reliability of these tools were proven by previous similar studies in Iran.

### 3.1. Implementation

The protocol designed for eight two-hour sessions (Table 1) was performed for the intervention group. The cognitive-behavioral training sessions for chronic pain are presented in Table 1.

### 3.2. Statistical Analysis

Descriptive statistics such as mean and standard deviation and inferential statistics as multivariate and univariate covariance analysis were used in the present study.

## 4. Results

In the experimental group, the post-test scores of the self-discovery dimensions increased compared to the pretest scores, but no considerable change was observed in the scores of the control group. The reduction in the score of pain perception in the experimental group was not very significant when compared to the control group score. However, the post-test score of pain self-efficacy significantly increased in the experimental group when compared to the control group. Table 2 presents the pre-test and post-test mean scores and standard deviations of self-discovery, pain perception, and pain self-efficacy.

Univariate covariance analysis indicated a higher pain self-efficacy score in the intervention group than in the control group ( $P < 0.01$ ) and 40% of increased pain self-efficacy was related to the effect of cognitive-behavioral training (Table 3).

Multivariate covariance analysis indicated that the total score of self-discovery and the scores of the components (self-awareness and acceptance, commitment and attraction, transcendence and development, and personal growth) were significantly higher in the intervention group than in the control group ( $P < 0.01$ ). The highest effect size was related to the self-awareness and acceptance component (0.514) (Table 4).

Among the dimensions of pain perception, only the score of pain assessment perception was lower in the intervention group than in the control group ( $P < 0.01$ ) and 35.7% of the reduction in the pain assessment perception

**Table 1.** Cognitive-Behavioral Training Sessions for Chronic Pain

Session	Outlines	Time, min	Subtitles
1	Principles of cognitive-behavioral training and pre-test	120	Relationship between thoughts, feelings, and behaviors; the need for psychological training along with drug use
2	Training of guided mastery	120	Patterning, activation (encouragement and planning of daily activities to avoid passivity)
3	Exposure to avoidance and elimination of safe behaviors	120	Training of visual exposure
4	Stress reduction methods	120	Training of rapid relaxation and diaphragmatic breathing
5	Training of problem-solving	120	Exploring efficient problem-solving methods
6	Training of profit and loss analysis	120	How to complete the profit and loss analysis table
7	Application of dual criteria method	120	Learning how to think about different options for a problem
8	Summary, conclusion, and post-test	120	Reviewing the achievements of the sessions in relation to the experienced situations

**Table 2.** The Mean  $\pm$  SD of Self-Discovery, Pain Perception, and Pain Self-Efficacy in Pre-Test and Post-Test<sup>a</sup>

Components	Intervention Group		Control Group	
	Pre-Test	Post-Test	Pre-Test	Post-Test
1- Self-awareness and acceptance	85.33 $\pm$ 5.6	39 $\pm$ 3.9	31.30 $\pm$ 6.8	31.35 $\pm$ 6.5
2- Commitment and attraction	27.45 $\pm$ 5.8	31.70 $\pm$ 4.8	28.20 $\pm$ 5	28.25 $\pm$ 5.4
3- Transcendence and development	24.30 $\pm$ 4	28.25 $\pm$ 3.6	21.70 $\pm$ 3.9	22.45 $\pm$ 4.3
4- Personal growth	26.25 $\pm$ 4.6	30.60 $\pm$ 3.8	25.20 $\pm$ 5.3	25.70 $\pm$ 5.5
5- Total (self-discovery)	111.85 $\pm$ 16.4	129.55 $\pm$ 13.9	106.55 $\pm$ 21.8	107.90 $\pm$ 18.4
6- Pain sensory perception	17.10 $\pm$ 5.9	9.95 $\pm$ 3.3	13.65 $\pm$ 6.9	9.15 $\pm$ 5.8
7- Pain affective perception	7.95 $\pm$ 2.7	4.10 $\pm$ 2	8 $\pm$ 2.5	4.30 $\pm$ 1.8
8- Pain assessment perception	24.05 $\pm$ 7.9	14.40 $\pm$ 4.9	25.35 $\pm$ 8.4	17.85 $\pm$ 5.3
9- Total (pain perception)	49.10 $\pm$ 14.2	28.45 $\pm$ 8.7	47 $\pm$ 15.7	31.30 $\pm$ 11.4
10- Pain self-efficacy	10.95 $\pm$ 7.18	16 $\pm$ 5.7	11.5 $\pm$ 7.86	12.65 $\pm$ 7.5

<sup>a</sup>Values are expressed as mean  $\pm$  SD.

**Table 3.** A Summary of ANOVA Test for Inter-Group Factors to Examine the Effect of Cognitive-Behavioral Training on Pain Self-Efficacy

Change Source	Sum of Squares	Degree of Freedom	Mean of Squares	F Ratio	Significance Level	Effect Size
Covariance	1492	1	1492	257.3	0.001	0.874
Group	144.8	1	144.8	25	0.001	0.403
Error	214.6	37	5.8			
Total	19927	40				

score was related to the effect of cognitive-behavioral training (Table 5).

## 5. Discussion

The reported symptoms in people suffering from specific low-back pain (with specific medical causes like blows or osteoporosis) and non-specific low-back pain (without specific medical causes) (23) do not match the data obtained from clinical examinations (24). Perceived fear-

avoidance beliefs, catastrophic thinking, and perceived disability make the symptoms more severe than they really are. Therefore, psychological interventions in both groups with specific and non-specific chronic low-back pain (CLBP) can be useful (7, 25).

The first finding of the current study suggesting that cognitive behavioral education (CBE) increases pain self-efficacy in the experimental group is in line with some previous studies (26, 27) that indicated the role this approach in increasing the efficacy, active coping strategies, and psy-

**Table 4.** Factor Covariance Analysis to Compare Post-Test scores of Self-Discovery Components

Change Source/Variable	Sum of Squares	Degree of Freedom	Mean of Squares	F Ratio	Significance Level	Effect Size
<b>Group</b>						
Self-awareness and acceptance	260.1	1	260.1	40.3	0.001	0.514
Commitment and attraction	176.4	1	176.4	13.2	0.001	0.257
Transcendence and development	102.4	1	102.4	9.9	0.003	0.207
Personal growth	148.2	1	148.2	20.9	0.001	0.355
Total	3515.6	1	3515.6	847	0.001	
<b>Error</b>						
Self-awareness and acceptance	245.5	38	6.5			
Commitment and attraction	508.7	38	13.4			
Transcendence and development	392.7	38	10.3			
Personal growth	269.6	38	7.09			
Total	2796.4	38	73.6			
<b>Total</b>						
Self-awareness and acceptance	776	40				
Commitment and attraction	870	40				
Transcendence and development	716	40				
Personal growth	653	40				
Total	11811	40				

**Table 5.** Factor Covariance Analysis to Examine the Effect of Cognitive-Behavioral Training on Pain Perception

Change Source/Variable	Sum of Squares	Degree of Freedom	Mean of Squares	F	Significance Level	Effect Size
<b>Group</b>						
Pain sensory perception	19.9	1	19.9	5.9	0.21	0.144
Pain affective perception	0.304	1	0.304	0.22	0.65	0.006
Pain assessment perception	98.8	1	98.8	19.4	0.001	0.357
<b>Error</b>						
Pain sensory perception	118.4	35	3.4			
Pain affective perception	49.2	35	1.4			
Pain assessment perception	178.2	35	5.09			
<b>Total</b>						
Pain sensory perception	449.6	40				
Pain affective perception	842	40				
Pain assessment perception	11507	40				

chological flexibility in people with CLBP. In explaining this finding, we can point to the impressionability of the individual's cognitive evaluations in the area of bodily information, attention diversion from potentially threatening bodily information, increased resistance against disturbing bodily information, changes in explanation and interpretation of body sensations and hence, increased pain self-efficacy (8). The second finding also suggests that

awareness and acceptance, commitment and absorption, transcendence and advancement, and personal growth, as the dimensions of self-discovery, increased in the experimental group. This finding conforms to a study that emphasized the role of self-discovery and the ability to distinguish between the "self" and the body; the study also indicated that the pain-related thoughts and feelings played a very important role in pain self-management education

and enhanced self-compassion in patients with CLBP (28). Increased self-awareness and self-acceptance in patients is also in agreement with a previous study that indicated the role of CBE in increasing mindfulness in patients with chronic pain (29). In explaining this finding, we can point to the role CBE in reducing the avoidance strategies, decreasing the disparity between the actual and the ideal self of the patient (30) and therefore, enhancing self-awareness and self-acceptance.

As the second self-discovery dimension, commitment and absorption also increased in the experimental group. This finding conforms to a survey in which CBE positively influenced active coping with the problem, solving the programmed problem, reevaluating the problem, and accepting responsibility for the problem (31).

In fact, the lack of complete success in daily living activities prevents the increased entanglement of the “self” and pain, and the individual experiences greater commitment and attraction to the personal life through accepting pain as a life event and by refusing to focus excessively on the body as a painful object (13).

In the present study, education increased transcendence and advancement as the third self-discovery dimension in the experimental group. This finding agrees with a study that investigated the effects of CBE on developing newer capabilities and skills for adapting to conditions. We can explain this finding through the effect of CBE on reevaluating the new goals and concentrating on behaviors to reach these goals, thus enabling CLBP patients to experience less damage to their self-concept, transcendence, and advancement (32).

As the last self-discovery dimension, personal growth increased in the experimental group. This finding is in agreement with studies of the effect of CBE on increasing self-direction, the incentive to collect information regarding oneself, self-confidence, time spent for oneself, and concentration on treatment quality in patients with CLBP (33). In fact, CBE can prepare the ground for personal growth in patients by influencing information processing, acceptance of facts, and continuous learning and self-sufficiency (15, 34).

The last finding of the present study suggests that education had a positive effect on reducing pain assessment perception among the other dimensions of pain assessment.

Studies conforming to the present study (35-37) also emphasized the effect of CBE on reducing the pain assessment perception. It seems that approaches like neurofeedback and emotion-focused approach together with CBE are appropriate complements for influencing the sensory and affective perception of pain.

By employing the educational aspect of CBE as a dis-

tinctive feature, the present study indicated that CBE was more effective on CLBP compared to cognitive-behavioral treatment in patients who did not necessarily belong to the upper social classes. It also increased physical performance, reduced pain level, and even decreased depression in this group of people (38). Moreover, most domestic studies have not examined the processes centered on “self” to even influence the cognitive and affective aspects of CLBP, while recent research in other countries on CLBP places greater emphasis on reconstructing processes centered on “self” (39).

### 5.1. Conclusions

Based on the fear-avoidance model, fear of movement in patients with CLBP can increase their inefficiency in coping with pain and pain severity (39). Furthermore, losing the feelings of control, self-determination, and identity of the “self” as an efficient human being creates the feeling in a person with CLBP that his whole life is under attack. Therefore, psychological interventions like CBE for chronic pain can enhance self-rediscovery in people, along with increasing pain self-efficacy and reducing pain perception. The impossibility of studying the stability of the effects of CBE and the fact that patients with various types of low back pain (specific, non-specific, persistent chronic, and recurrent) were not separately assessed to compare the results were among the limitations of the study. Research in other areas related to pain can be useful.

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### Footnotes

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