

# Efectividad de la educación terapéutica basada en un enfoque bioconductual en la intensidad y la discapacidad del dolor lumbar crónico: una revisión sistemática

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## RESUMEN

**Antecedentes:** El dolor lumbar crónico (DLC) es un problema musculoesquelético prevalente que puede causar una discapacidad significativa y que implica dolor persistente y factores psicológicos que contribuyen a su complejidad. La educación terapéutica que combina enfoques cognitivo-conductuales puede ayudar en el manejo del DLC.

**Objetivos:** Esta revisión sistemática evaluó la eficacia de la educación terapéutica basada en un enfoque bioconductual para modificar creencias y promover estrategias de afrontamiento activas en pacientes con DLC.

**Métodos:** Siguiendo las directrices PRISMA, se buscaron ensayos controlados aleatorios (ECA) y estudios cuasiexperimentales en PubMed, EBSCO host y Google Scholar desde el 27 de marzo hasta el 16 de abril de 2022, con una actualización el 15 de junio de 2024. Los criterios de inclusión se centraron en adultos con DLC que recibieron educación terapéutica dirigida a la modificación conductual. La calidad metodológica se evaluó utilizando la escala PEDro y el riesgo de sesgo se evaluó con RoB 2.0.

**Resultados:** De los 532 estudios, cuatro cumplieron los criterios de inclusión. Las intervenciones combinaron educación terapéutica con ejercicio terapéutico o fisioterapia convencional. La intensidad del dolor y la discapacidad fueron los principales resultados medidos. Un estudio encontró mejoras significativas en dolor y discapacidad, mientras que otros mostraron tendencias hacia la mejora sin significancia estadística. La calidad de la evidencia fue muy baja.

**Conclusión:** La combinación de educación terapéutica con estrategias de afrontamiento activas y otras terapias podría reducir la intensidad del dolor y la discapacidad en pacientes con DLC. Sin embargo, la calidad de la evidencia es muy baja, destacando la necesidad de más investigaciones.

**Palabras clave:** Dolor crónico lumbar, Educación terapéutica, Paradigma bioconductual, Intensidad de dolor, Discapacidad.

# Effectiveness of biobehavioral therapeutic education in chronic low back pain intensity and disability: a systematic review

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## ABSTRACT

**Background:** Chronic low back pain (CLBP) is a prevalent musculoskeletal issue that could lead to significant disability. CLBP involves persistent pain and psychological factors contributing to its complexity. Therapeutic education combining cognitive-behavioral approaches may aid in managing CLBP.

**Objectives:** This systematic review evaluates the efficacy of therapeutic education based on a biobehavioral approach in modifying beliefs and promoting active coping strategies in CLBP patients.

**Methods:** Following PRISMA guidelines, we searched PubMed, EBSCO host, and Google Scholar for randomized controlled trials (RCTs) and quasi-experimental studies from March 27 to April 16, 2022, with an update on June 15, 2024. Inclusion criteria focused on adults with CLBP undergoing therapeutic education aimed at behavioral modification. Methodological quality was assessed using the PEDro scale, and risk of bias was evaluated using RoB 2.0.

**Results:** Out of 532 studies, four met the inclusion criteria. The interventions combined therapeutic education with therapeutic exercise or conventional physical therapy. Pain intensity and disability were the main outcomes measured. One study found significant improvements in pain and disability, while others showed trends towards improvement without statistical significance. The quality of evidence was very low.

**Conclusion:** Combining therapeutic education with active coping strategies and other therapies may reduce pain intensity and disability in CLBP patients. However, the evidence quality is very low, highlighting the need for further research.

**Keywords:** Chronic low back pain, Therapeutic education, Biobehavioral approach, Pain intensity, Disability.

## INTRODUCTION

Low back pain (LBP) is considered the most prevalent musculoskeletal problem and one of the leading causes of disability, behind only chronic obstructive pulmonary disease and ischemic heart disease (Hoy et al., 2012; Murray et al., 2015). It affects 57.6 million people worldwide, resulting in a significant socioeconomic impact, accounting for three-quarters of healthcare costs related to pain (Fourney et al., 2011; Vos et al., 2017).

Chronic low back pain (CLBP) is defined as a multifactorial condition with a high risk of becoming chronic. This disorder is characterized by persistent pain located between the lower limits of the ribs and the upper edges of the gluteal muscles, lasting for more than three months (Airaksinen et al., 2006; Chou et al., 2007; Da Luz et al., 2013; Hancock et al., 2009; Stanton et al., 2010). It has been identified that, in the context of chronicity of symptoms, individuals affected by CLBP experience a notable incidence of psychological components. These psychological factors play a crucial role in the persistence and recurrence of pain, significantly contributing to the complexity of clinical management of this condition (Castro et al., 2011; Lumley et al., 2011; Sheng et al., 2017; Woby et al., 2004).

Scientific evidence indicates that the level of self-efficacy and fear-avoidance beliefs are the most significant predictors of disability, surpassing the impact of chronicity and pain intensity in this population (Denison et al., 2004; Turner et al., 2005). Additionally, factors such as kinesiophobia and pain catastrophizing have been identified as predictors of pain recurrence in individuals with CLBP (Picavet et al., 2002). Specifically, it has been found that subjects with CLBP who exhibit high levels of pain catastrophizing, kinesiophobia, greater pain severity, and a negative perception of their health status show high scores on the central sensitization inventory (Grotle et al., 2010; Sullivan et al., 2001, 2009).

The interaction between psychological factors and the possible involvement of certain sensorimotor variables can generate maladaptive neuroplastic changes at both spinal and supraspinal levels (Apkarian et al., 2011; Catley et al., 2014; Sheng et al.,

2017; Woby et al., 2007). Currently, numerous studies support the application of a cognitive-behavioral approach in patients with chronic musculoskeletal pain, thus introducing therapeutic education as a key tool in treatment due to the biopsychosocial nature of this musculoskeletal disorder (Hayden et al., 2005; O'Sullivan et al., 2018; Vibe Fersum et al., 2019).

Pain neuroscience education is defined by many authors as a tool that focuses on teaching patients the neurophysiological processes involved in their pain experience and reducing the perception of threat and the influence of psychological factors (Baloochi Beydokhti et al., 2020; Brodal, 2017; G. L. Moseley, 2003; L. Moseley, 2003).

Initially, educational interventions for patients with chronic low back pain (CLBP) focused on "back schools," which were based on injury prevention models and pathoanatomic approaches, diverging from the contemporary approach of therapeutic education. The current purpose of therapeutic education is to modify maladaptive beliefs that can affect the pain experience and provide patients with active coping strategies, thus inducing behavioral changes. This approach has shown proven efficacy in generating benefits in this population (Cox et al., 2016; Grande-Alonso et al., 2019; López-de-Uralde-Villanueva et al., 2020; Meeus et al., 2010; Parreira et al., 2017). The application of this tool has shown benefits in cognitive, affective, and sensorimotor variables, with greater benefits in patients with various chronic musculoskeletal pain conditions when combined with other interventions, such as therapeutic exercise or manual therapy (Lin et al., 2020; Louw et al., 2016; Matias et al., 2019; Meeus et al., 2010; Nijs et al., 2014).

Despite having evidence of the efficacy of therapeutic education, there are various modalities of education focused on modifying beliefs. However, the current trend shows that it is not only necessary to modify beliefs but also to generate behavioral changes and provide self-management tools. Therefore, the objective of this systematic review was to evaluate the efficacy of therapeutic education based on a biobehavioral approach in patients with CLBP, analyzing studies that conducted therapeutic education

interventions with the intention of modifying behavior and providing active coping strategies.

## METHODS

This systematic review was conducted following the PRISMA guidelines for systematic reviews and meta-analyses (Page et al., 2021). It was also registered in the PROSPERO review database with the identifier number CRD42022326679.

### PICO

The selection criteria used for this review were based on the PICOS question (Stone, 2002), considering the type of population, intervention, control, outcome variables, and study type.

### Population

Studies had to include patients over 18 years old, with CLBP of at least 3 months duration, and who were capable of understanding and performing the intervention required. Articles including patients who had undergone lumbar surgery in the last 6 months or less or who had diseases that could alter or influence the intervention results, such as fibromyalgia, rheumatoid arthritis, or cancer, were excluded.

### Intervention and Control

Studies that conducted therapeutic education focused on changing beliefs and coping strategies regarding CLBP in the experimental group were included. Studies that conducted interventions based solely on education in pain neurophysiology without any intention of behavioral modification (e.g., benefits of physical activity and active recovery approach) were excluded. The control group had to include subjects on a waiting list or another intervention that had shown positive effects in studies. In the latter case, the intervention group had to consist of a combination of this intervention with therapeutic education or therapeutic education alone.

### Outcome Variables

The main outcome variables were pain intensity, measured using scales such as the Numeric Pain Rating Scale (NPRS) or the Visual Analogue Scale (VAS), and disability, assessed with the Roland Morris Disability Questionnaire (RMDQ) or the

Oswestry Disability Index (ODI). All the mentioned variables had to be measured pre- and post-intervention to evaluate the effect size through P values, confidence intervals, and effect size.

### Study Design

The chosen studies were randomized controlled trials (RCTs) and crossover studies with randomized intervention orders. Those studies with no control arm or whose participants were not randomized to each group were excluded from the review.

### Search Strategies

The search strategy was carried out independently by two reviewers using the same search strategy in the databases of PubMed (MEDLINE), EBSCO host, and Google Scholar between March 27, 2022, and April 16, 2022. A second update search was conducted on June 15, 2024. The detailed search strategy is indicated in Annex 1.

### Selection and Data Extraction Criteria

In the first phase, two independent reviewers screened the studies found in the databases (RCTs and quasi-experimental) based on the title, abstract, and keywords. After the first screening, the full text of the studies was read to determine which ones met the inclusion criteria mentioned above. The same independent reviewers performed the data extraction. In case of differences in the selection of any article, a third reviewer determined the inclusion or exclusion of the study. The data extracted from the studies were synthesized in a summary table of the main characteristics of the studies (population, intervention, control, outcome measures, and main results) and a descriptive table of the different therapeutic education interventions.

### Methodological Quality and Risk of Bias Assessment

The methodological quality of the studies was assessed using the Physiotherapy Evidence Database (PEDro) scale (de Morton, 2009), which includes 11 different items. The first item, which evaluates external validity, was omitted for the total score. The remaining ten items evaluated were: 1) random allocation of subjects to groups; 2) allocation concealment; 3) group similarity at baseline regarding



the most important prognostic indicators; 4) blinding of subjects; 5) blinding of therapists; 6) blinding of assessors; 7) obtaining outcomes from more than 85% of subjects initially assigned to groups; 8) intention-to-treat analysis; 9) presentation of between-group statistical comparisons for at least one key outcome; 10) presentation of point estimates and variability measures for at least one key outcome. According to Maher et al., studies with a PEDro score below 4 are considered to have poor methodological quality; those with scores between 4 and 5 have fair quality; scores between 6 and 8 indicate good quality; and scores of 9 or 10 are considered to have excellent methodological quality (Maher et al., 2003).

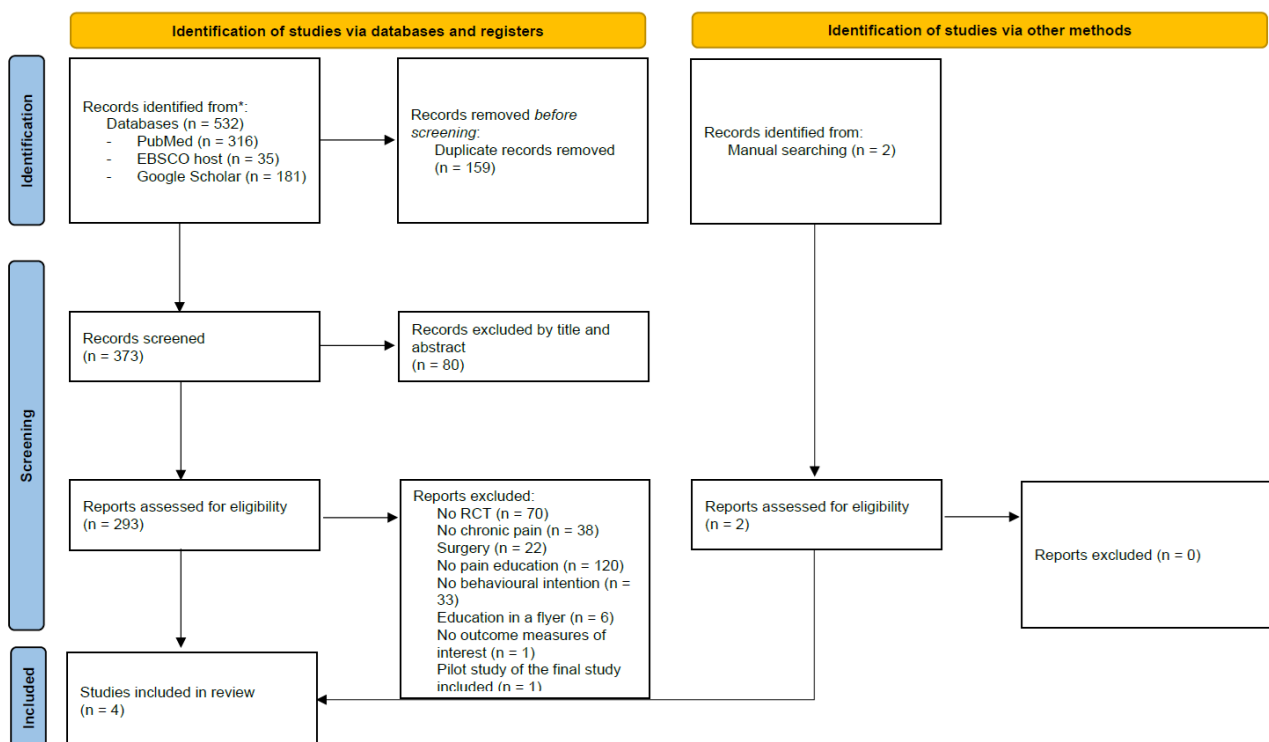
The risk of bias assessment was performed using the Risk of Bias 2 (RoB 2.0) tool (Sterne et al., 2019), classifying studies as “low risk,” “some concerns,” or “high risk” of bias across five domains: 1) risk of bias arising from the randomization process; 2) risk of bias due to deviations from the intended interventions (effect of assignment to intervention); 3) risk of bias due to missing outcome data; 4) risk of bias in the measurement of outcomes; and 5) risk of bias in the selection of reported results. Both assessments were

carried out by two independent reviewers, and in case of discrepancies, a consensus was reached through a third reviewer. Inter-reviewer reliability was determined using the Kappa index, where <0.5 indicates low values, between 0.5-0.7 a moderate level, and >0.7 a high level of agreement (Cohen, 1960).

### Qualitative Analysis

For the qualitative analysis, the results were classified into evidence levels based on the Grading of Recommendations, Assessment, Development and Evaluation (GRADE), which evaluates five domains: study design, imprecision, indirectness, heterogeneity, and publication bias. The quality of evidence decreases by one or two points for each category showing risk and can increase by one or two points if the results show a large or very large effect size or if there is a dose-response gradient between the factor and the dependent variable (Guyatt et al., 2011). Four levels of evidence quality are thus presented: 1) High: very confident that the true effect is close to the estimated effect; 2) Moderate: moderately confident in the estimated effect, but there is a possibility it is substantially different; 3) Low: limited confidence in

Figure 1. PRISMA flowchart of the study eligible process.



the estimated effect, the true effect could be substantially different; and 4) Very low: very little confidence in the estimated effect, the true effect is likely to be substantially different (Balslem et al., 2011).

## RESULTS

Out of 532 studies found, a total of 4 were selected for meeting the inclusion criteria (Galan-Martin et al., 2020; Ibrahim et al., 2023; McConnell et al., 2024; Zheng et al., 2022). The search strategy can be seen in the flow diagram (Figure 1).

### Methodological Quality and Risk of Bias

The methodological quality was assessed using the PEDro scale (Table 1). Each of the 4 studies evaluated scored between 4 and 8 on the PEDro scale, indicating fair to good methodological quality. Inter-reviewer reliability showed a high level of agreement, with a

### Study Population Characteristics

There was a total of 362 participants distributed across 4 different studies, of which 3 were subdivided into two intervention/control groups, and one remained with three groups. All participants were previously diagnosed with chronic low back pain, defined as prolonged pain lasting at least 3 months. The characteristics of the study populations are detailed in Table 2.

### Interventions

The 4 included studies presented interventions in therapeutic education. Three of them combined therapeutic education with therapeutic exercise, and one with conventional physical therapy, which included exercise. The most common control was isolated therapeutic exercise, and one included conventional physical therapy with electrotherapy. The characteristics of the interventions are detailed in

**Table 1.** Methodological quality assessment of each study based on PEDro scale.

Title	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11	Total
Galan-Martin et al, 2020	+	+	+	-	-	+	+	-	+	+	7
Ibrahim et al., 2023	+	+	+	-	-	+	+	+	+	+	8
McConnell et al., 2024	+	-	+	-	-	-	-	-	+	+	4
Zheng et al., 2022	+	+	-	-	-	+	+	+	+	-	6

Kappa index > 0.7 (k = 0.79). Regarding the risk of bias, the studies were evaluated using the RoB 2.0 tool (Figures 2 and 3). Two studies were considered to have a low risk of bias (Galan-Martin et al., 2020; Ibrahim et al., 2023), one study obtained some concerns (Zheng et al., 2022), and one study had a high risk of bias (McConnell et al., 2024). Inter-reviewer reliability showed a high level of agreement, with a Kappa index > 0.7 (k = 0.845).

Table 3.

### Outcome Variables

The results of the evaluated variables are briefly described in the previously mentioned Table 2.

### Pain Intensity

Pain intensity was measured using the Numeric Pain Rating Scale (NPRS) in three studies (Ibrahim et al., 2023; McConnell et al., 2024; Zheng et al., 2022),

**Table 2.** Summary information of each article included in the systematic review.

Title	Participants Age BMI (kg/m <sup>2</sup> )	Study + Intervention	Control or Comparison	Variables	Follow-up	Results and Conclusion	PEDro
Galan- Martín et al. 2020	N=170 (136F 34M) Age: CG: 49.14 ± 12.14 IG: 53.01 ± 10.7 <u>BMI:</u> CG: 26.5 ± 5 IG: 27.6 ± 4.7 Low back pain >6 months	RCT IG (n=89) Therapeutic education + exercise	CG (n=81) Conventional physiotherapy (electrotherapy + exercise)	Pain (VAS) Disability (RMDQ)	11 weeks 6 months	The therapeutic education + exercise group showed a statistically significant reduction in VAS pain compared to the conventional physiotherapy control group at 11 weeks and 6 months (MD=-40.9; 95%CI - 46.7 -35.2). Similarly, disability as measured by RMDQ decreased (MD=-5.6; 95%CI -6.7 -4.5).	7/10
Ibrahim et al. 2023	N=120 MCE: 20F 20M PE: 14F 26M MCE + PE: 14F 26M Age: MCE: 45.1 ± 13.1 PE: 47.78 ± 15.9 MCE + PE: 45 ± 15.2 <u>BMI:</u> MCE: 23.3 ± 4.44 PE: 22.3 ± 3.88 MCE + PE: 21.7 ± 2.81 Low back pain >3 months	RCT MCE + PE (n=40) Education + motor control exercise	PE (n=40) Education MCE (n=40) Motor control exercise	Pain (NPRS) Disability (ODI)	20 weeks Dropouts: MCE (n=8) PE (n=8) MCE + PE (n=9)	The MCE + PE and MCE groups were significantly superior to the PE group at 8 and 20 weeks in reducing pain and improving disability with no statistically significant differences between the MCE + PE and MCE groups.	8/10

**Table 2.** Summary information of each article included in the systematic review.

Title	Participants Age BMI (kg/m <sup>2</sup> )	Study + Intervention	Control or Comparison	Variables	Follow-up	Results and Conclusion	PE德罗
McConnell et al. 2024	N=32 IG: 11F 8M CG: 9F 4M <u>Age:</u> IG: 48.2 ± 12.7 CG: 43.3 ± 17.4 <u>BMI:</u> IG: 34.3 ± 12.3 CG: 33.7 ± 8.5	RCT IG (n=19) Therapeutic education in virtual reality format + conventional physiotherapy	RCT CG (n=13) Conventional physiotherapy	Pain (NPRS) Disability (ODI)	6 weeks	No statistically significant differences were found between the groups at 6 weeks.	4/10
Zheng et al. 2022	N=40 IG: 14F 6M CG: 12F 8M <u>Age:</u> IG: 34.0 CG: 34.9 <u>BMI:</u> IG: 21.5 CG: 22.3 Low back pain >3 months	RCT IG (n=20) Exercise + therapeutic education	RCT CG (n=20) Exercise	Pain (NRS) Disability (RMDQ)	6 weeks Dropouts: IG (n=1) CG (n=1) 18 weeks Dropouts: IG (n=2) CG (n=1)	No significant different between groups in the different outcomes.	6/10

**CG:** Control Group; **IG:** Intervention Group; **PNE:** Pain Neuroscience Education; **PE:** Physical Exercise; **MCE:** Motor Control Exercise; **VAS:** Visual Analog Scale; **RMDQ:** Roland-Morris Disability Questionnaire; **NPRS:** Numeric Pain Rating Scale; **ODI:** Oswestry Disability Index; **SF-36:** Short Form (36) Health Survey; **PCS:** Physical Component Summary; **MCS:** Mental Component Summary; **GAD-7:** General Anxiety Disorder 7; **SDS:** Self-Rating Depression Scale; **RCT:** Randomized Controlled Trial.



**Table 3.** Intervention parameters for each intervention's study.

Title	Group	Distribution	Frequency	Parameters (intensity/volume)	Duration
Galan-Martin et al., 2020	<b>PNE + TE</b> Therapeutic education plus therapeutic exercise	The PNE intervention aims to correct misconceptions about pain, reducing catastrophizing and fear- avoidance behaviors. Educational materials include infographics, videos, and printed resources. The program engages patients actively with visual aids and interactive content. Sessions balance information delivery with participation, using discussions and practical examples. Emphasizing lifestyle changes, the program prepares patients for the physical exercise component, following the Prochaska and Di Clemente model. Expected outcomes include reduced catastrophizing, kinesiophobia, and fear- avoidance, ultimately improving patients' quality of life by empowering them with knowledge and pain management strategies.	PNE: 6 sessions (10 hours)  TE: 6 weeks, 18 sessions (18 hours)	-	-

**Table 3.** Intervention parameters for each intervention's study.

Title	Group	Distribution	Frequency	Parameters (intensity/volume)	Duration
Galan-Martin et al., 2020	Conventional physiotherapy	The Physical Exercise (PE) program includes 18 sessions over six weeks, focusing on strength, coordination, balance, and aerobic capacity. Sessions incorporate dual tasks, gaming, and social interaction. Structured with warm-up, main exercise, and cooling-down phases, the program adapts to patients' functional status, aiming to improve motor control and reduce disability while ensuring safety and encouraging lifestyle changes.	CG: 15 sessions (15 hours)	-	-
		The control group receives standard care in primary care physiotherapy units, based on the protocols of Castilla y León. Treatment includes 15 sessions of thermotherapy and analgesic electrotherapy applied to the pain area. Additionally, patients follow exercise guidelines recommended by the Spanish Society of Physical Medicine and			

**Table 3.** Intervention parameters for each intervention's study.

Title	Group	Distribution	Frequency	Parameters (intensity/volume)	Duration
Ibrahim et al., 2023	<b>MCE + PE</b> Exercise plus education	- Active static stretching of muscles and connective tissue around the lumbopelvic region, hip, and leg	8 weeks, 16 sessions (2 per week).	Motor control exercise: 1st (10 repetitions – 7 seconds) 2nd (10 repetitions – 4 seconds / 10 repetitions – 7 seconds)	Motor control exercise 20-30 minutes per session.  Stretching 20 minutes.
	<b>MCE</b> Exercise group	-Unsupervised aerobic exercise in the form of continuous walking at the desired speed at home Motor control exercise based on exercise to improve the function of specific muscles of the lumbopelvic region and control of posture and movement.		3rd (10 repetitions / 10 repetitions – 5 seconds / 10 repetitions – 7 seconds)  Stretching (5 repetitions – 15 seconds / 5 repetitions – 30 seconds / 15 repetitions)	Aerobic exercise 30 min 5 times a week.  Education 1.5 hours.
	<b>PE</b> Education group	-Education based on the booklet 'The Back Book' and 'The Pain Toolkit' about postural hygiene, healthy behavior to understand pain, promote better behavior, catastrophizing, and integrate self-management.	8 weeks, 8 education sessions.		

**Table 3.** Intervention parameters for each intervention's study.

Title	Group	Distribution	Frequency	Parameters (intensity/volume)	Duration
McConnell et al., 2024	<b>VR-PNE</b> Therapeutic education in virtual reality format plus conventional physiotherapy	The intervention group participated in a comprehensive program combining Pain Neuroscience Education (PNE) and Virtual Reality (VR) sessions. PNE consisted of 12 sessions using PNE 2.0 software delivered via a VR headset, incorporating real-world footage and interactive CGI to teach pain management and relaxation techniques. Sessions were approximately 21 minutes each, focusing on understanding pain, emotional regulation, and mindfulness practices. Active strategies such as motivational interview and cognitive- behavioral therapy were applied to facilitate self-management.	6 weeks, 12 sessions	-	21 minutes

**Table 3.** Intervention parameters for each intervention's study.

Title	Group	Distribution	Frequency	Parameters (intensity/volume)	Duration
Zheng et al., 2022	IG Exercise plus education	- Education based on pain onset, understanding pain, sedentary behavior identification, and bad habits.	6 weeks, 1 education session per week.	Stretching: 1 repetition of 60 seconds / 2 repetitions of 15 seconds / 4 repetitions of 15 seconds	Exercise 20-45 minutes per session.
	CG Exercise	-Stretching of the lumbar spine (rolling, extension, rotation)	6 weeks, 3 sessions per week.	Strengthening: 4 repetitions of 15 seconds / 4 repetitions of 30 seconds	
		-Strengthening of the abdominal and lumbar area (hollowing, hip-single leg bridge, Superman, half plank)	6 weeks, 3 sessions per week.		

**CG:** Control Group; **IG:** Intervention Group; **PNE:** Pain Neuroscience Education; **TE:** Therapeutic Exercise; **PE:** Physical Exercise; **MCE:** Motor Control Exercise; **VR-PNE:** Virtual Reality Pain Neuroscience Education; **PT:** Physical Therapy; **CGI:** Computer-Generated Imagery.



**Figure 2.** Risk of bias for each study based on the RoB 2.0.

Study ID	D1	D2	D3	D4	D5	Overall	
Galan-Martin et al., 2020	+	+	+	+	+	+	<span style="color: green;">+</span> Low risk <span style="color: yellow;">!</span> Some concerns <span style="color: red;">-</span> High risk
Ibrahim et al., 2023	+	+	+	+	+	+	
McConnell et al., 2024	-	!	!	!	+	-	
Zheng et al., 2022	!	!	+	+	+	!	
	D1	D2	D3	D4	D5		
	Randomisation process	Deviations from the intended interventions	Missing outcome data	Measurement of the outcome	Selection of the reported result		

while the other study used the Visual Analogue Scale (VAS) (Galan-Martin et al., 2020). Only the study by Galan-Martin et al. (2020) found statistically significant differences in favor of the intervention group with education at 11 weeks and 6 months follow-up (MD=-40.9; 95%CI -46.7 -35.2). The other studies did not find statistically significant differences, although the trend was to observe a greater reduction in pain intensity in the group that combined education with exercise or conventional physical therapy (Ibrahim et al., 2023; McConnell et al., 2024; Zheng et al., 2022).

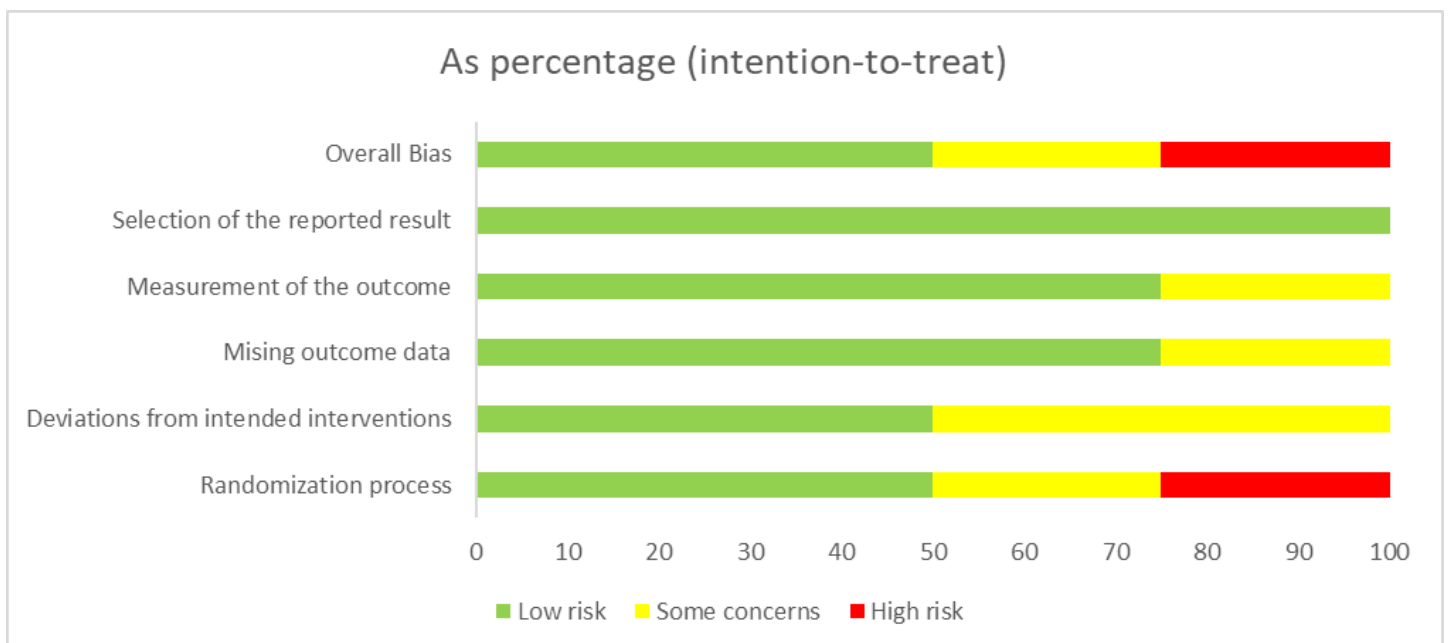
### Disability

Two studies assessed disability with the RMDQ (Galan-Martin et al., 2020; Zheng et al., 2022), and the other two studies used the ODI (Ibrahim et al., 2023; McConnell et al., 2024). Again, only the study by Galan-Martin et al. (2020) found statistically significant differences in favor of the education group at 11 weeks and 6 months follow-up (MD=-5.6; 95%CI -6.7 -4.5). The other studies did not find statistically significant differences (Ibrahim et al., 2023; McConnell et al., 2024; Zheng et al., 2022).

### Qualitative Analysis

The quality of evidence assessment based on the GRADE recommendations showed that the inclusion

**Figure 3.** Risk of bias per domain by RoB 2.0.



of therapeutic education in the treatment of chronic low back pain might reduce pain intensity and disability in the short and long term with a very low-quality evidence based on the results of one study with a large sample.

## DISCUSSION

For decades, research studies have shown that combining a therapeutic education program with exercise supervised by a professional is considered one of the most effective interventions for improving pain intensity and disability in patients with CLBP (Airaksinen et al., 2006; Van Tulder et al., 2006). Despite this, therapeutic education has historically been conceived as many practical applications, and not all have proven to be beneficial. For example, pain neuroscience education seems not to be effective when applied alone to diminish pain intensity and disability in the long term (Wood & Hendrick, 2019). Furthermore, the appropriate dose for such benefits to occur has not been determined in most situations (Parreira et al., 2017). In this line, our research determined that based on the available literature, the use of therapeutic education programs that involve behavioral change and combined with other active therapies such as therapeutic exercise prescription could be an option for addressing patients with CLBP regarding variables such as pain intensity and disability, with very low-quality evidence.

Currently, most data regarding dosage remain unknown, and there is considerable heterogeneity among different studies. However, in most cases, therapeutic education is more potent when applied in combination with active coping strategies. This situation highlights the importance of giving an active approach to the application of education through strategies such as exercise because, even in certain variables like disability, it can be decisive. A biobehavioral approach focused on modifying behavior and self-efficacy should always be included in the therapeutic education program and not merely mention the benefits of therapeutic exercise. Previous systematic reviews and meta-analyses have concluded that the application of therapeutic education alone or without a behavioral change approach through active coping strategies cannot guarantee improvement in

variables such as pain intensity or disability (Geneen et al., 2015; Watson et al., 2019). Nonetheless, when therapeutic education is combined in patients with CLBP and central sensitization with a passive technique such as soft tissue mobilization or various manual therapy techniques, it has also shown a significant reduction in pain, disability, and improvement in psychological variables such as catastrophizing and kinesiophobia compared to the manual therapy approach without education (Song et al., 2023). However, it should be noted that conducting therapeutic education without practical application through active coping strategies can be contradictory, as indicated by Louw et al. in 2017, since patient education models recommend active participation, improving important aspects of chronic pain such as self-efficacy (Louw et al., 2017).

Patients with CLBP present a high influence of psychological factors associated with their problem, which can directly impact their functionality and pain experience. At a neurophysiological level, it is known that there is increased participation of areas such as the dorsolateral prefrontal cortex or the parietal cortex, which are purely related to cognition and emotion, implying less activation of descending inhibitory pathways and thus greater pain perception and a significant influence of psychological factors (G. L. Moseley & Flor, 2012; Nijs et al., 2011). Previous studies demonstrate that therapeutic education is a valuable tool not only for reducing pain intensity but also for reducing the impact of factors such as fear of movement (Louw et al., 2011, 2016). Additionally, it has been observed that it is necessary to prescribe exercise in parallel to reinforce the concepts addressed in the education program and further reduce the psychosocial impact and improve clinical variables. Using this technique alone presents benefits, but with a small to moderate effect size (Rice et al., 2019; Tegner et al., 2018; Wood & Hendrick, 2019).

### Clinical implications

Therapeutic education with a behavioral approach might benefit those patients with chronic low back pain by providing them with coping strategies that improve their self-management. Active treatment modalities are needed in the management of chronic

pain conditions, and therapeutic education with a behavioral approach might favor patient involvement. By combining this intervention with exercise, therapeutic education could increase exercise treatment adherence, improving its effectiveness in the long term.

### Limitations

This study has several important limitations to consider when interpreting the results. The strict inclusion and exclusion criteria, which limited the inclusion of studies to those with pain education protocols intending to promote active coping behaviors, explain the low number of studies included in the review. This prevented the objective of conducting a meta-analysis. The heterogeneity between different comparisons and outcome measures also influenced this, preventing a meta-analysis model where the baseline variable was adjusted to increase the precision of the estimate with few studies. Lastly, the main objective of the present review was to evaluate the efficacy of a therapeutic education intervention based on a biobehavioral approach that could modify behaviors and provide coping strategies. However, none of the included studies assessed the possible changes made to behaviors to relate them to the improvements obtained in pain and disability.

### CONCLUSION

The combination of therapeutic education, based on modifying beliefs about pain and the relevance of active coping, with other therapies such as exercise or manual therapy, might reduce pain intensity and disability in patients with chronic low back pain, with very low-quality evidence.

### HIGHLIGHTS

- Therapeutic education and exercise may help reduce CLBP pain and disability.
- Active coping strategies could be important in managing chronic low back pain.
- More research is needed to validate the benefits of biobehavioral approaches in CLBP.

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**Annex 1.** Search strategy.

Database	Search	Terms	Filters
EBSCO host	Disability	low back pain + therapeutic education + disability	/
	Self-management	Low back pain + therapeutic education + self-management	/
PubMed	Disability	((low back pain[MeSH Terms]) AND (therapeutic education)) AND (disability)	Clinical trial + randomized controlled trial + most recent
	Self-management	((low back pain[MeSH Terms]) AND (therapeutic education)) AND (self-management)	Clinical trial + randomized controlled trial + most recent
Google Scholar	/	allintitle: low back pain pain education clinical OR trial	-acute -subacute -neurophysiology
	/	allintitle: pain education clinical OR trial "low back pain"	-acute -subacute