Pain Education With Therapeutic Exercise in Chronic Nonspecific Low Back Pain Rehabilitation: A Critically Appraised Topic

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Clinical Scenario: Low back pain is widely prevalent in the general population as well as in athletes. Therapeutic exercise is a low-risk and effective treatment option for chronic pain that can be utilized by all rehabilitation clinicians. However, therapeutic exercise alone does not address the psychosocial aspects that are associated with chronic low back pain. Pain education is the umbrella term utilized to encompass any type of education to the patient about their chronic pain. Therapeutic exercise in combination with pain education may allow for more well-rounded and effective treatment for patients with chronic nonspecific low back pain (NS-LBP).

Clinical Question: Does pain education combined with therapeutic exercise, compared with therapeutic exercise alone, improve patient pain in adults with chronic NS-LBP over a 2- to 3-month treatment period? **Summary of Key Findings:** A thorough literature review yielded 8 studies potentially relevant to the clinical question, and 3 studies that met the inclusion criteria were included. The 3 studies included reports that exercise therapy reduced symptoms. Two of the 3 included studies support the claim that exercise therapy reduces the symptoms of chronic NS-LBP when combined with pain education, whereas one study found no difference between pain education with therapeutic exercise. **Clinical Bottom Line:** There is moderate evidence to support the use of pain education along with therapeutic exercise when attempting to reduce symptoms of pain and disability in patients with chronic NS-LBP. Educational interventions should be created to educate patients about the foundation of pain, and pain education should be implemented as a part of the clinician's strategy for the rehabilitation of patients with chronic NS-LBP. **Strength of Recommendation:** Grade B evidence exists to support the use of patient education with therapeutic exercise for decreasing pain in patients with chronic NS-LBP.

Keywords: chronic pain, patient education, treatment-based classification

Clinical Scenario

Low back pain (LBP) is widely prevalent in the general population as well as in athletics. Though the prevalence is variable depending on the sport, up to 94% of the athletic population will have LBP over their lifetime.¹ Chronic nonspecific LBP (NS-LBP) is defined as idiopathic LBP that lasts for 12 weeks or more.²⁻⁴ Chronic NS-LBP can have a long and tedious treatment that often is not a straightforward process. Psychosocial factors have been well established to have an association with chronic LBP⁵⁻⁷ as has the advocacy for including strategies to address these factors during treatment, even in athletes.⁸ The lack of structural deformity or tissue damage associated with chronic NS-LBP can leave both the patients and the clinicians frustrated with the slow rehabilitation process. Common tools utilized by sports medicine clinicians for treating chronic NS-LBP, such as the treatment-based classification system, do not necessarily translate to chronic pain and notably do not take psychosocial factors into consideration.⁹

Therapeutic exercise is a low-risk and effective treatment option for chronic pain, which can be utilized by all rehabilitation clinicians.¹⁰ However, as with the treatment-based classification, therapeutic exercise alone does not address the psychosocial aspects that are associated with chronic LBP. Opioid medications have historically been subscribed for chronic pain,¹¹ but physicians

should prescribe with caution due to the mainstream opioid abuse epidemic. Not only do opioids have a high risk for addiction, but also there is inconclusive evidence that their persistent use is effective for pain management.¹¹

Pain education is the umbrella term utilized to encompass any type of education to the patient about their chronic pain. Different studies use different terms, such as Neurophysiological Pain Education, to describe their specific methods of educating the patient. Moseley and Butler's¹² "Explaining Pain" intervention set out to utilize the biopsychosocial model to treat chronic pain. The educational intervention seeks to educate patients about the biology of pain "to shift one's conceptualization of pain from that of a marker of tissue damage or disease to that of a marker of the perceived need to protect body tissue."^{12(p808)} Pain education differs from cognitive behavioral therapy, another commonly utilized pain management technique, in that cognitive behavioral therapy is psychotherapeutic in nature and is not in the scope of practice of the rehabilitation clinicians.^{13,14} Utilizing pain education alone would encounter similar limitations that utilize solely therapeutic exercise does—it would make the biopsychosocial model of patient-centered care incomplete as they focus individually on different aspects of chronic pain care. Therapeutic exercise in combination with pain education may allow for more well-rounded and effective treatment for patients with chronic NS-LBP.

Clinical Question

Does pain education combined with therapeutic exercise, compared with therapeutic exercise alone, improve patient pain in adults with chronic NS-LBP over a 2- to 3-month treatment period?

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Summary of Search, Best Evidence Appraised, and Key Findings

- The literature was searched for studies that investigated the effects of exercise therapy and pain education in patients with chronic NS-LBP.
- The literature search returned 8 possible studies (3 randomized controlled trials, 2 meta-analysis, 1 observational study, 1 validation study, and 1 case comparison study) related to the clinical question. Three studies met the inclusion criteria and were included.²⁻⁴
- The 3 studies²⁻⁴ included reports that exercise therapy reduced symptoms.
- Two of the 3 included studies²⁻⁴ support the claim that exercise therapy reduces the symptoms of chronic NS-LBP when combined with pain education.
- One study² found no difference between pain education with therapeutic exercise and only therapeutic exercise through patient-reported pain.

Clinical Bottom Line

There is moderate evidence to support the use of pain education along with therapeutic exercise when attempting to reduce symptoms of pain and disability in patients with chronic NS-LBP.²⁻⁴ A patient's perception of pain can be improved based on specific management and control. Therefore, educational interventions should be created to educate patients about the foundation of pain and to create an image of pain that embodies the need for the body to heal. Pain education should be implemented as a part of the clinician's strategy for the rehabilitation of patients with chronic NS-LBP.

Strength of Recommendation

Grade B evidence exists to support the use of patient education with therapeutic exercise for decreasing pain in patients with chronic NS-LBP.

Search Strategy

Terms Used to Guide Search Strategy

- Patient/Client Group: adults with chronic NS-LBP
- Intervention (or Assessment): pain education with therapeutic exercise
- Comparison: therapeutic exercise alone
- Outcome(s): pain rating scale

Sources of Evidence Searched

- PubMed
- The Cochrane Library

- MEDLINE
- CINAHL
- EBSCO
- Additional resources obtained via review of reference lists and hand search

Inclusion and Exclusion Criteria

Inclusion Criteria

- Studies that used either the visual analog scale or numerical pain rating scale
- Limited to pain education and therapeutic exercise versus therapeutic exercise
- Limited to studies available in English
- Limited to studies conducted in the last 10 years (2010–2019)

Exclusion Criteria

- Studies in which the participants were prescribed cognitive behavioral therapy
- Studies that included participants with acute LBP
- Studies that included participants with diagnosed structural abnormalities associated with their LBP
- Studies that included participants with chronic/systemic illnesses

Results of Search

Three relevant studies²⁻⁴ were located and categorized as shown in Table 1 (based on Levels of Evidence, Centre for Evidence-Based Medicine, 2011).

Best Evidence

The studies²⁻⁴ in Table 2 were identified as best evidence and selected the inclusion criteria for the critically appraised topic.

Implications for Practice, Education, and Future Research

Two of the 3 studies²⁻⁴ appraised for this topic found that patients who had pain education along with therapeutic exercise experience a greater improvement in self-reported pain rating scale compared with patients who only had therapeutic exercise. Sports medicine and rehabilitation clinicians should consider utilizing pain education in the management of patients with chronic NS-LBP. Methods such as Moseley and Butler's "Explain Pain"¹² can aid in reducing patient-reported pain intensity when combined with a therapeutic exercise program. In addition, improvements in functional

Table 1 Summary of Study Designs of Articles Retrieved

Level of evidence	Study design	Number located	Author (year)
2	Single-blind randomized controlled trial	3	Dufour et al (2010) ² Bodes Pardo et al (2018) ³ Pires et al (2015) ⁴

Table 2 Characteristics of Included Studies

	Dufour et al (2010) ²	Bodes Pardo et al (2018) ³	Pires et al (2015) ⁴
Study design	Randomized controlled trial	Randomized controlled trial	Randomized controlled trial
Participants	<p>286 patients with chronic NS-LBP between January 2002 and November 2003 were referred by general practitioners and rheumatologists in Copenhagen.</p> <p><i>Biopsychosocial education group (n = 129):</i> Age: • 18 < age ≤ 40 (46.6%) • 40 < age ≤ 60 (53.4%) Gender: • Male (43.4%) • Female (56.6%) VAS pain average (0–100 mm): 56.8 (19.8) <i>TE group (n = 143):</i> Age: • 18 < age ≤ 40 (49.7%) • 40 < age ≤ 60 (50.3%) Gender: • Male (43.4%) • Female (56.6%) VAS pain average (0–100 mm): 57.7 (19.9)</p> <p>Inclusion criteria: (1) LBP ≥ 12 wk with or without pain radiating into the leg(s) and (2) age of 18–60 y.</p> <p>Exclusion criteria: (1) symptoms of serious spinal pathology such as malignancy, osteoporosis, vertebral fracture, and spinal stenosis, (2) clinical symptoms of an acute herniated disk accompanied by nerve root entrapment, unstable spondylolisthesis, and spondylitis, (3) health conditions that prevented them from performing strenuous exercise, and (4) language problems.</p>	<p>65 patients recruited from 4 private physiotherapy practices and Alcala University were randomized into combined PE and TE group and TE-only group.</p> <p><i>TE group:</i> Age: 49.2 (10.5) (mean) Gender: • Male = 6 • Female = 22 <i>PE plus TE group:</i> Age: 44.9 (9.6) (mean) Gender: • Male = 6 • Female = 22 NPRS (0–10): 7.8 (1.2)</p> <p>Inclusion criteria: (1) aged between 20 and 75 y, (2) experiencing chronic NS-LBP for ≥6 mo, and (3) Spanish as native language.</p> <p>Exclusion criteria: (1) diagnosis of lumbar radiculopathy, (2) receiving treatment for their chronic NS-LBP at the time of the study, (3) pain related to tumors or infections, metastases, osteoporosis, inflammatory arthritis, or fractures, and (4) known mental disorders diagnosed by a physician.</p>	<p>62 participants recruited from a waiting list of a Portuguese outpatient clinic were randomly assigned to groups with either aquatic therapy alone or combined aquatic therapy and pain neurophysiology.</p> <p><i>Education group (n = 30):</i> Age: 50.9 (6.2) (mean) Gender: • Male = 10 • Female = 20 Pain intensity (0–100): 43.4 (22.9) (mean) <i>Control group (n = 32):</i> Age: 51.0 (6.3) (mean) Gender: • Male = 12 • Female = 20 Pain intensity (0–100): 42.4 (21.2) (mean)</p> <p>Inclusion criteria: (1) LBP ≥ 3 mo, (2) aged between 18 and 65 y, and (3) literate in Portuguese.</p> <p>Exclusion criteria: (1) clinical signs of an infection, tumor, osteoporosis, fracture, structural deformity, inflammatory disorder, radicular syndrome, or cauda equina syndrome, (2) history of back surgery or conservative treatment in the prior 6 and 3 mo, respectively, (3) pregnancy, and (4) cardiac and/or respiratory condition impediment to physical exercise.</p>
Intervention investigated	<p>Group A received a program of combined exercise, education, and pain management. They were reassured that there was no serious cause for their back pain and that the exercise program was safe and effective.</p> <p><i>12-wk program:</i> • Weeks 1–4: exercises completed 3 times per week for 2-h sessions and biweekly lessons on anatomy, postural techniques, and pain management for 10 h in total. • Weeks 5–8: 2-h exercise sessions twice a week at the study site and once at home. • Weeks 9–12: 2-h exercise sessions 3 times a week at home.</p> <p>Group B received a program of specific and intensive muscle training exercises to strengthen and shorten the muscles of the back and gluteus region for 1 h twice a week for 12 wk with a physiotherapist.</p>	<p>All participants received a TE program that consisted of motor control exercise for the lumbar spine, stretching, and aerobic exercise.</p> <p>The TE program was demonstrated and corrected to them during the first session, and then, those were completed at home everyday for a month, reexamined, and continued alone for 2 more months.</p> <p>The combined TE and PE group also received 2 education sessions lasting 30–50 min in small groups and a leaflet with the content.</p> <p>The PE content consisted of verbal explanation and visual presentation of the neurophysiology of pain.</p>	<p>All participants performed a 6-wk program consisting of 12 biweekly sessions of aquatic exercise based in a therapeutic pool. The PE program consisted of two 90-min sessions that addressed acute pain origin in the nervous system, transition from acute to chronic pain, central sensitization, the role of the brain in the perception of pain, psychosocial factors related to pain, cognitive and behavioral responses related to pain, flare-up management, and pacing.</p>

(continued)

Table 2 (continued)

	Dufour et al (2010) ²	Bodes Pardo et al (2018) ³	Pires et al (2015) ⁴
Outcome measures	<i>Primary:</i> (1) VAS <i>Secondary:</i> (1) RMDQ (2) SF-36	<i>Primary:</i> (1) NPRS for NS-LBP <i>Secondary:</i> (1) RMDQ (2) PCS (3) Central Sensitization Inventory (4) TSK-11 measures at baseline and at 1- and 3-mo postintervention (5) PGIC at 1- and 3-mo postintervention (6) Pressure pain thresholds and physical performance (finger to nose tests) measured by blinded assessors at baseline and 1-mo follow-up	<i>Primary:</i> (1) VAS (2) Quebec Back Pain Disability Scale <i>Secondary:</i> (1) TSK-11 assessed at baseline, 6 wk, and 3 mo
Main findings	<i>Primary outcome measures:</i> <ul style="list-style-type: none"> Group A had a 38.7-mm decrease in VAS pain average at the 3-mo follow-up. Group B had a 45.7-mm decrease in VAS pain average at the 3-mo follow-up. Neither group had a significant decrease in pain at the 3-mo follow-up ($P > .05$). There was no statistical significance ($P = .23$) between the groups. There was no significance ($P = .75$) between analgesic medication intake of both groups. <i>Secondary outcome measures:</i> <ul style="list-style-type: none"> Significant improvements in RMDQ occurred in both group A (24%) and group B (12%). Both group A and group B had a significant improvement ($P < .05$) in 8 out of 10 dimensions of the SF-36. 	<i>Primary outcome measures:</i> <ul style="list-style-type: none"> The TE group had a 3.0-point average decrease at the 3-mo follow-up ($P < .05$). The PE plus TE group had a 5.3-point average decrease at the 3-mo follow-up ($P < .05$). The PE plus TE group had a more statistically significant decrease in pain intensity compared with the TE group. The PE plus TE group had a significant difference in decreased pain intensity compared with the TE group ($P < .001$). <i>Secondary outcome measures:</i> <ul style="list-style-type: none"> The PE plus TE group had a greater significant improvement ($P < .001$) in RMDQ compared with the TE group. The PE plus TE group had a greater significant improvement ($P < .001$) in lumbar pressure pain thresholds compared with the TE group. The PE plus TE group had a greater significant improvement ($P < .05$) in finger-to-floor distance test compared with the TE group. The PE plus TE group had a greater significant improvement ($P < .05$) in PGIC compared with the TE group. 	<i>Primary outcome measures:</i> <ul style="list-style-type: none"> The education group had a 25.4-mm decrease in VAS pain average at the 3-mo follow-up ($P < .05$). The control group had a 6.6-mm decrease in VAS pain average at the 3-mo follow-up ($P > .05$). The education group had a significant decrease in pain intensity ($P < .05$) compared with the control group at the 3-mo follow-up. There was no significant decrease ($P = .09$) in functional disability for either group at the 3-mo follow-up. There was higher chance of the education group reporting benefits for pain intensity (58.6%) and functional disability (72.4%) from the intervention compared with the control group (40.7% and 44.4%, respectively). <i>Secondary outcome measure:</i> <ul style="list-style-type: none"> There is no statistical correlation with pain intensity and functional disability affecting kinesiophobia.
Level of evidence	2	2	2
Validity score	N/A	N/A	N/A
Conclusion	Both groups showed long-term improvement in pain and disability scores with only minor differences in statistical results between groups. Further research needs to be conducted to decide if one intervention is more effective than the other.	Implementing a PE program combined with TE is found to be more effective in reducing pain, disability, and pain catastrophizing compared with solely therapeutic education in patients with CLBP. This article can be used for further research on CLBP and effective interventions to decrease pain and disability. This study can only be used for short-term outcomes no longer than a time frame of 3 mo.	Beginning treatment with PE, followed by aquatic therapy is clinically more effective in regard to the reduction of pain and functional disability than only implementing aquatic therapy for patients with CLBP. This study can be used for research on short-term outcomes within a time frame of 3 mo. Further research is necessary to determine a better understanding of how PE influences pain intensity and disability in long-term effects and outcomes past a time frame of 3 mo.

Abbreviations: LBP, low back pain; N/A, not applicable; NPRS, numerical pain rating scale; NS-LBP, nonspecific low back pain; PCS, pain catastrophizing scale; PE, pain neurophysiology education; PGIC, Patient Global Impression of Change; RMDQ, Roland-Morris Disability Questionnaire; SF-36, Short Form-36; TE, therapeutic exercise; TSK-11, Tampa Scale for Kinesiophobia; VAS, visual analog scale; CLBP, chronic low back pain.

disability and kinesiophobia have also been observed following this intervention. Pain education is a tool that can help clinicians to practice with a biopsychosocial and patient-centered model to give the best possible care.

While the purpose of this critically appraised topic was focused on evaluating change in patient-reported pain rating scales, other outcome measures were taken in these 3 studies that can be of clinical use for the rehabilitation clinician. Dufour et al² observed a

significant difference between the pain education and therapeutic exercise group, and the therapeutic exercise group alone in regards to the Roland–Morris Disability Questionnaire ($P = .003$) as well as the MOS Short Form-36 Health Survey, specifically in the physical functional and component ($P < .001$ and $P = .001$, respectively) in favor of the combined pain education and therapeutic exercise group. The authors did not find any significant difference in Global Perceived Outcome or ability to work. Bodes Pardo et al³ observed significant differences in pain intensity ($P < .001$), Roland–Morris Disability Questionnaire ($P < .001$), Pain Catastrophizing Scale ($P < .001$), Tampa Scale for Kinesiophobia ($P < .001$), lumbar pressure pain threshold ($P < .001$), and finger-to-floor distance ($P < .05$) when pain education plus therapeutic exercise group was compared with therapeutic exercise alone group. Pires et al⁴ found significant differences in pain intensity at 3-month follow-up favoring the pain education plus therapeutic exercise group, but no significant differences were found for kinesiophobia or functional disability between the groups.

Dufour et al² compared 2 different therapeutic exercise programs and did not find a significant difference between the 2 experimental groups in regards to patient-reported pain (Table 2). In their study, group A patients, who received pain education in addition to therapeutic exercise, gradually transitioned from physiotherapist-supervised exercise to home exercises over the 12 weeks. Group B, the therapeutic exercise only group, received supervised exercise over the entire 12 weeks. This detail could contribute to the nonsignificant finding in patient-reported pain due to uncontrolled variables, such as patient compliance and self-efficacy. Some limitations of the Bodes Pardo et al³ include a small sample size, no exclusion of selection bias, and what the participants did outside of the study was not recorded (other treatment, activity, etc). Limitations associated with the Pires et al⁴ study include a small sample size, no blinding of the physiotherapists conducting the therapeutic exercise and pain education, and there was no testing of the participants to record their understanding of pain education. A major limitation of the Dufour et al² article has previously been discussed.

The results highlighted in this appraisal directly echo similar theories of chronic pain, such as the fear-avoidance model.^{15,16} The fear-avoidance model theorizes a chronic pain cyclic effect of dysfunctional thought patterns and ideas of a patient living with chronic pain that keeps them from progressing in treatment despite the physical remission of previous pathology.^{15,16} Patients with LBP, regardless if it is specific or nonspecific pain,¹⁷ or if the patient is an athlete or nonathlete,⁸ have been associated with having elevated variables of the fear-avoidance model. Thus, including pain education along with therapeutic interventions is a necessary component of managing patients with chronic NS-LBP and may help reduce pain and increase function compared with therapeutic exercise alone.

Future research in this area should look at whether pain education reduces the duration of rehabilitation for chronic NS-LBP as well as to investigate long-term versus short-term effects of this combination. Future research considerations should also focus on whether pain education along with therapeutic exercise is efficacious in athletic populations as athletes tend to have different motivations and stressors that could affect the results on these interventions.¹⁸ This CAT should be reviewed in 2 years or when additional best evidence has been published that may change the clinical bottom line for the research question posed in this review.

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