

# Cognitive-Behavioral Approaches to Chronic Pain

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## Focus Points

- The cognitive-behavioral approach is the most commonly utilized psychological approach in treating patients with chronic pain.
- Cognitive-behavioral approaches include hypnosis, relaxation (eg, guided imagery, progressive muscular relaxation, meditation, music therapy), biofeedback, coping skills training, cognitive restructuring, supportive and group therapy, and stress-management techniques.
- The integration of psychological interventions with conventional medical methods in the treatment of chronic pain is essential.

## Abstract

*The cognitive-behavioral approach is the most commonly utilized psychological approach in treating patients with chronic pain. Cognitive-behavioral approaches include hypnosis, relaxation (including guided imagery, progressive muscular relaxation, meditation, and music therapy), biofeedback, coping skills training, cognitive restructuring, supportive and group therapy, and stress-management techniques. The primary component of the cognitive-behavioral approach is relaxation therapy, which is a systematic method of gaining awareness of physiologic processes and attaining both a cognitive and physiologic sense of tranquility. A National Institutes of Health Technology panel, conducting an extensive scientific review of the literature, concluded that the evidence is "strong" (its highest rating) for the effectiveness of relaxation in reducing chronic pain. Specific relaxation strategies that have been shown to reduce levels of pain include guided imagery, progressive muscle relaxation, and meditation. Despite the generally accepted efficacy of these methods with pain patients, their relative ease of implementation, and their very low side-effect profile, barriers still exist with the integration of psychological therapies into standard medical care.*

## Introduction

The psychological intervention with patients with chronic pain is an integral part of a multidisciplinary approach to pain management. The overall goal of pain management is to return the patient to a more optimal level of functioning. Improved functionality rather than cure of pain is often the focus of pain management. Many pain patients have difficulty accepting that the primary treatment goal is improved functionality rather than pain relief.

The most commonly utilized psychological approach in treating patients with chronic pain is the cognitive-behavioral approach. The goal of cognitive-behavioral treatments is to enable the patient to reframe the belief that pain is uncontrollable to a belief that pain can be under his or her control.<sup>1,2</sup> It is based upon the theory that thoughts, emotions, and behavior can influence the pain experience. Although the pain is not "cured," the patient may be better able to cope with it. A National Institutes of Health (NIH) technology assessment conference on the efficacy of mind-body approaches for the treatment of chronic pain and insomnia found "strong" to "moderate" evidence to support the use of relaxation techniques, hypnosis, cognitive-behavioral therapy (CBT), and biofeedback in reducing chronic pain.<sup>3</sup> Meta-analyses with cancer patients have similarly concluded that cognitive-behavioral methods for cancer pain are more effective than no treatment or

attention-placebo and do have additive effects over that found with hypnosis or imagery alone.<sup>4,5</sup> Patients benefit from these nonpharmacologic approaches when delivered by trained professionals rather than a patient's untrained use.<sup>6</sup>

A recent evidence-based review<sup>7</sup> of patients suffering with chronic low back pain found that psychological interventions resulted in positive effects on pain intensity, pain-related interference, health-related quality of life, and depression. Cognitive-behavioral and self-regulatory treatments (hypnosis, biofeedback, and relaxation) were the most effective treatments.

The initial step is educating the patient about the mind-body relationship. The effectiveness of this step depends on the patient's defensiveness, level of knowledge about the mechanism of pain, and attitudes about the mind-body relationship. Cognitive-behavioral approaches include hypnosis, relaxation (eg, guided imagery, progressive muscular relaxation, meditation, music therapy), biofeedback, coping skills training, cognitive restructuring, supportive and group therapy, and stress-management techniques.

## Hypnosis

Hypnosis is a particularly effective therapeutic technique with pain patients. It has been used and studied largely in cancer pain related to procedures, surgery, and chemotherapy. Up to 90% of patients can benefit from the use of hypnosis.<sup>8,9</sup>

Hypnosis not only induces relaxation and a passive disregard of intrusive thoughts, but can also introduce specific goals through suggestions. These suggestions enable patients to experience analgesia or reinterpretation of their pain. Posthypnotic suggestions allow the patient continued use of the new behavior and assistance in recreating the relaxed state when needed following termination of hypnosis. Suggestion appears to be the most important element in reducing pain.<sup>10</sup> It is unclear what the exact mechanism is to explain the efficacy of hypnosis,<sup>8</sup> with theories ranging from reductions in peak somatosensory event-related potentials<sup>11</sup> to decreased cortical arousal with increased occipital regional bloodflow in areas involved with mental absorption and attention.<sup>10,12</sup> Length of treatment with hypnosis does not add to its effectiveness<sup>8,13</sup> and individuals vary widely in their hypnotic susceptibility for reasons that are largely unknown.

In a study by Spiegel and Bloom,<sup>14</sup> women with metastatic breast carcinoma pain undergoing weekly group therapy with self hypnosis had significantly lower pain ratings over 1 year than a control group. In another study, patients undergoing hypnosis reported a significant reduction in oral mucositis pain associated with bone marrow transplantation.<sup>15</sup> An NIH consensus conference on symptom management in cancer noted that hypnosis is particularly helpful with procedural pain and mouth sores.<sup>16</sup> A review of outcome studies utilizing hypnosis with chronic pain patients concluded that hypnosis is "consistently superior" to no treatment but only equally as effective as other treatments.<sup>17</sup> There is conflicting evidence about the use of the term "hypnosis" with patients, with a meta-analysis showing that it increases efficacy beyond relaxation and imagery,<sup>9</sup> but another study indicating the reverse.<sup>18</sup>

## Relaxation

The primary component of the cognitive-behavioral approach is relaxation therapy, which is a systematic method of gaining awareness of physiologic processes and attaining both a cognitive and physiologic sense of tranquility.<sup>19</sup> Relaxation training is currently one of the most widely used cognitive psychological techniques in the management of chronic pain. Relaxation training acts on pain by lowering anxiety,<sup>20</sup> altering sympathetic activity,<sup>21</sup> and reducing generalized arousal and muscle tension,<sup>22</sup> as well as by its cognitive effects of distraction.<sup>3,22</sup> Studies report the effectiveness of relaxation in reducing pain,<sup>23</sup> with one study reporting pain reduction in 38% of advanced cancer patients in a hospice.<sup>24</sup> A comprehensive review of the literature on relaxation training and pain supports the effectiveness of this approach with patients with pain.<sup>25</sup> An NIH Technology panel, conducting an extensive scientific review of the literature, concluded that the evidence is "strong" (its highest rating) for the effectiveness of relaxation in reducing chronic pain.<sup>3</sup>

Although relaxation/imagery has been noted to significantly affect pain in a palliative care setting,<sup>26</sup> research reviews have found that relaxation training is more effective than no treatment with chronic pain but only equally as effective as other self-regulation techniques.<sup>17</sup> Often, the initial step of relaxation training is learning controlled diaphragmatic breathing which diverts the patient's attention and can induce the relaxation effect by itself.

Live relaxation as well as audiotaped relaxation produced significant positive changes in pain sensation, intensity, and severity, in cancer pain patients.<sup>27</sup> The live method was most effective. A meta-analysis of 15 studies evaluating the effects

of relaxation on treatment side effects noted a statistically significant reduction in pain.<sup>13</sup> Specific relaxation strategies that have been shown to reduce levels of pain include guided imagery, progressive muscle relaxation, and meditation (Table 1).<sup>15,28-30</sup>

**TABLE 1**  
**RELAXATION<sup>15,30,31</sup>**

***Guided Imagery***

Imagery-based relaxation methods may be most effective with pain.<sup>15</sup> Typically, a patient is guided through an image and taught to substitute sensations such as warmth or numbness for pain. Imagery can distract patients from pain or, alternatively, can be taught to focus on their pain and modulate it.

***Progressive Muscular Relaxation***

Patients are taught to alternately tense and relax major muscle groups throughout the body, learning to differentiate feelings of tension from relaxation, and to apply these skills in painful situations. Progressive muscle relaxation is recommended if muscle tension is thought to be a major contributing factor to the patient's pain,<sup>30</sup> or if the patient has difficulty visualizing images.

***Meditation***

Meditation is "the intentional self-regulation of attention from moment to moment."<sup>31</sup> Concentration meditation focuses attention on a point or object such as a mantra. Mindfulness meditation emphasizes detached observation of a changing field of objects. Mindfulness meditation enables a detached view of pain sensations, resulting in lower levels of reactivity to pain.

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## **Guided Imagery**

Relaxation methods may be most effective with pain when used with imagery.<sup>15</sup> Imagery-based relaxation may reduce pain through more of a structured focus than non-imagery based relaxation methods. A review of the literature on behavioral interventions for cancer treatment side effects concludes that methods involving relaxation and imagery hold the greatest promise for benefit to cancer patients.<sup>31</sup>

Guided imagery has patients focus on a multisensory imaginary scene. Focusing on the different sensory modalities of the scene can make the image more engaging. Typically, the image is elicited from the patient, and the patient is guided through the image, substituting sensations such as warmth or numbness for pain. Patients need to set aside time to practice in a comfortable position without any interruptions. Imagery can work as an effective distraction technique. An alternative use of imagery is to have the patient focus on the pain rather than distract away from it. In this technique, the patient might visualize the pain as a color, for example, red, and makes it less bright until it turns light pink corresponding to lower pain intensity.

## **Progressive Muscular Relaxation**

In progressive muscular relaxation, patients are taught to alternately tense and relax major muscle groups throughout the body. Only non-painful muscle groups and body locations are used. Patients learn to recognize and differentiate feelings of tension from relaxation and then apply these skills in situations that are painful. Sixteen muscle groups can be initially tensed and relaxed. The number of muscle groups is reduced as the patient becomes more proficient. The patient is instructed to focus on the pleasantness of the relaxation phase. Progressive muscle relaxation is recommended if a muscle tension is thought to be a major contributing factor to the patient's pain<sup>29</sup> as well as with the patient who has a difficult time visualizing images.

## **Meditation**

Meditation is defined as “the intentional self-regulation of attention from moment to moment.”<sup>30</sup> Concentration meditation, involving the focused attention on a point or object such as a mantra, differs from mindfulness meditation, which emphasizes detached observation from one moment to the next of a changing field of objects. The primary advantage of mindfulness meditation is the ability to adapt a detached view of the pain sensation, which can lead to an “uncoupling” of the affective from sensory interpretation of pain. As a result, patients have lower levels of reactivity to pain. A study of 51 refractory chronic pain patients going through a mindfulness meditation program showed that 65% experienced a reduction of >33% in their pain ratings.<sup>30</sup>

## Music Therapy

Music therapy has been defined as the use of specifically prescribed music under the supervision of a music therapist to aid in the physiologic, psychological, and emotional integration of an individual.<sup>32</sup>

Music therapy can have a beneficial effect on mood and pain when given a choice of music<sup>33</sup> as a method of relaxation and distraction.<sup>34</sup> Diversional and associative qualities of music may distract a patient’s attention from the adverse nature of a stimulus. Music may also have a powerful impact on reducing the emotional components of pain such as fear and anxiety, thus mediating the very perception of pain. Individual music preferences is an important factor to consider.<sup>35</sup>

A recent review of the literature on the effectiveness of music in alleviating pain in the palliative care setting is positive.<sup>36</sup> Music therapy can be an effective independent intervention for providing pain relief in cancer patients.<sup>33</sup> Although music therapy can be an effective intervention in the relief of pain,<sup>37,38</sup> the literature in this area is scant, anecdotal, and lacking studies with good research design.<sup>26</sup>

Music may stimulate the release of endogenous opiates in the central nervous system, which can modulate the perception of the sensory and affective components of pain.<sup>36</sup> Other potential mediating mechanisms that have been postulated include an increased sense of control, reduction in anxiety, regulation of muscle tension, and distraction.<sup>39,40</sup> Music therapy may enable patients to control their pain by distracting their attention away from the pain and by changing their emotional experiences.<sup>32,41</sup> Music may also distract by inhibiting pain through selective attention that is mediated by the thalamus, which alerts the prefrontal cortex to the sound rather than to the painful stimulus.<sup>42</sup>

## Biofeedback

Biofeedback can be a particularly effective modality for teaching chronic pain patients relaxation as well as self-regulation of physiologic processes. Patients learn to modify specific physiologic processes based on auditory and/or visual feedback. It is based on the educational paradigm that learning occurs with feedback which then enables a desired response. Ongoing physiologic processes (such as muscle tension or surface electromyogram, temperature, heart rate, sweat gland activity, or basal skin response, and breath rate) can be monitored, and visual (through graphs, images, or games) and auditory feedback (through tones or music) are provided. The latest application of biofeedback is neurofeedback, which teaches patients to regulate electroencephalograph activity or brain waves.

Body sensors attached to a computer enable the patient to achieve relaxation, which can increase pain tolerance, decrease emotional distress, and even relax specific muscle spasms. Physiologic self control leads to a sense of control, better coping skills, and hopefulness. Pain syndromes with which biofeedback is most effective include headaches, transmandibular joint dysfunction, myofascial pain syndrome, fibromyalgia, and pain exacerbated by stress or anxiety (Table 2).

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**TABLE 2**  
**SYNDROMES THAT BIOFEEDBACK MOST EFFECTIVELY TREATS**

Headaches

Transmandibular joint dysfunction

Myofascial pain syndrome

Fibromyalgia

Pain exacerbated by stress/anxiety

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## Coping Skills Training

Patients can learn to adopt more effective active coping styles rather than the passive ineffective coping styles such as catastrophizing, avoidance, and denial. Coping-skills training can be effective methods in reducing pain, particularly those who do not respond to hypnosis or imagery alone (Table 3).

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**TABLE 3**  
**ACTIVE COPING SKILLS**

*Patients can adopt effective active coping styles rather than ineffective passive coping styles such as catastrophizing, avoidance, and denial. Active coping styles include:*

***Family Support***

Family and friends can support "wellness behaviors" over "pain behaviors."

***Physical Therapy***

Physical therapy mitigates the negative influence of deconditioning that many patients experience.

***Activity Pacing***

Learning to schedule rest periods enables patients to retain active lifestyles while avoiding overexertion. It also increases self confidence.

***Pain Diaries***

Pain diaries help patients identify stressful situations or times of day that exacerbate pain.

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Family members can be very helpful to the therapist in supporting patients' "wellness" behaviors rather than reinforcing "pain" behaviors. Decreased reliance on medications and utilization of the healthcare system as well as reduced level of subjective pain sensation are important but secondary treatment goals. The simultaneous engagement of physical therapy as part of the patient's recovery is essential as it mitigates the negative influence of deconditioning that many patients experience. Activity and physical therapy are often the focus of the psychological therapy and need to be continually inquired about and reinforced.

Activity pacing, which involves the scheduling of rest periods so that patients do not overdo an activity and sabotage their progress, can be very beneficial for many pain patients. Overexertion, which often results in increased pain and prolonged rest, often has negative sequelae such as increased muscle tension and increased utilization of medications. Teaching patients to schedule their daily activities into periods of moderate activity followed by limited rest can increase their self confidence.<sup>43</sup> Overly inactive patients are taught to initiate activities in a very limited fashion and gradually increase activities followed by rest. Patients are also taught to schedule pleasant and enjoyable activities during the day. Additionally, the use of pain diaries to help identify stressful situations or times of day that exacerbate pain can help patients regulate their behaviors and/or emotions to facilitate more adaptive pain coping skills.

## Cognitive Restructuring

Cognitive restructuring, or reframing, is often used very effectively as part of an overall cognitive-behavioral treatment approach for patients suffering from chronic pain. It is based on the theory that cognitions determine behavior, affect, and physiology (eg, increased muscle tension). Patients learn to identify, challenge, and eventually change self-defeating thoughts (eg, "I am worthless"). With this technique, pain patients are taught to identify maladaptive negative thoughts, which are often overgeneralizing, or catastrophizing statements about oneself or one's illness (eg, "pain means I need more surgery," "no one can help me") that pervade their thinking, and to replace them with more constructive and adaptive positive thoughts (eg, "I can still do many important things"). Patients are taught to use their adaptive thoughts when confronted with pain or situations that lead to pain. Unless patients practice, they may relapse in face of stressful and/or difficult situations, which can lead to increased depression and helplessness. Family and/or significant other support can be very influential in ensuring the promotion of the generalization and maintenance of the newly acquired cognitive skills.

## Supportive and Group Therapy

Group therapy has become a popular form of psychological intervention for the chronic pain patient.<sup>44</sup> A recent meta-analysis of randomized controlled trials of CBT for chronic pain found that most treatments were delivered in groups.<sup>45</sup> The advantages of group therapy are that pain patients learn they are not alone in their suffering, the group can be an effective support system, and patients can learn from other patients' pain coping skills. Patients will often accept challenges from other patients to improve functionality more readily than from an individual therapist whom the patient may feel does not understand or appreciate his or her pain. The major goals of group therapy often are to promote behavior change, educate patients, and provide social support.<sup>44</sup> Social support can be influential in reducing psychological disability.

## Stress Management

Many patients with chronic pain feel high levels of stress as the result of repeated medical interventions that have failed to provide relief. Often, stress-management interventions can be very helpful. Many patients readily acknowledge that stressors, such as return to work issues and conflicts with family and friends, can exacerbate pain. Reducing perceived stress can be very helpful in reducing levels of pain. The initial step in stress-management programs is to identify one's stressors in daily life. This is frequently followed by cognitive-behavioral methods such as relaxation training and cognitive restructuring. Other important stress-management interventions that can be particularly helpful to chronic pain patients include using time management techniques, sharing feelings and problems, using humor, and participating in physical exercise.

Time management consists of creating daily task lists arranged by priority, complete with time estimates. Done properly, time management is effective for pain patients who are overwhelmed by their illness, their pain, and trying to reintegrate back into their work and social lives. Time management is an important intervention, particularly for "workaholics" or very disorganized patients. Time management consists of instructing patients to make daily lists of tasks to be done, prioritizing them with regard to their importance, estimating the amount of time each task takes, and possibly delegating the ones that others can do. If done properly, time-management methods can relieve a significant amount of stress for pain patients who often feel overwhelmed trying to cope with their illness and pain as well as to reintegrate back into their work and social lives (Table 4).

**TABLE 4****STRESS-MANAGEMENT INTERVENTIONS*****Sharing Feelings and Problems***

Sharing stressful issues with close friends, other pain sufferers, or professionals prevents patients from internalizing fears and frustrations. Patients with strong support systems have been shown to cope more effectively with stress.

***Humor and Recreation***

The use of humor facilitates stress reduction. Similarly, making time for fun, such as involvement in recreational activities, is a good distraction from stress.

***Regular Exercise***

If medically feasible, physical exercise on a regular basis is an especially effective stress reducer. Chronic pain patients should only initiate a physical exercise program with the guidance of a physiatrist or physical therapist.

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Sharing feelings and problems with others such as significant others, patients, or professionals can be an effective method of relieving stress. Patients often have great difficulty coping with their functional limitations, decisions about treatment, and the ensuing medical and psychological sequelae. Internalizing emotions or keeping them pent up is generally considered to be unhealthy and has been correlated with a variety of medical conditions including chronic pain. Patients with strong support systems have been shown to cope more effectively with stress.

The use of humor can be an effective stress reducer. Laughing at one's problems and taking a humorous perspective on difficult situations can facilitate stress reduction. Similarly, making time for fun by involving oneself in recreational activities can be a good distraction and break up the chronicity of stress.

If medically feasible, physical exercise on a regular basis, usually recommended to be done three times a week for 20–30 minutes, can be a particularly effective stress reducer. Patients who have been physically inactive need to be cautioned to avoid injury by starting out slowly. Chronic pain patients should never initiate a physical exercise program without the guidance of a physiatrist or physical therapist. Swimming is considered to be one of the best cardiovascular exercises, particularly good for chronic pain patients as there is limited stress placed on the joints.

## Cognitive-Behavioral Interventions With Children And Adolescents

Research on the use of cognitive-behavioral interventions with children and adolescents in pain is less extensive than with adults. Much of the relevant literature has focused on procedure-related pain, where distraction techniques are recommended for procedures in cancer pain,<sup>29</sup> particularly with children.<sup>46,47</sup> It is increasingly recognized that cognitive-behavioral interventions suitable for adults may not be appropriate in the pediatric setting. There may be specific cognitive-behavioral interventions for children and adolescents that are particularly efficacious. Since children often have active imaginations they are receptive to imagery and relaxation methods. Although cognitive-behavioral methods have been consistently demonstrated to be effective in relieving headaches in children, the evidence for other types of chronic pain has not been as conclusively demonstrated.<sup>48</sup> There are only anecdotal descriptions and case studies reporting on the usefulness of CBT in cancer pain patients.<sup>48</sup>

## Barriers to Integration of Cognitive-Behavioral Therapies

The integration of psychological interventions such as CBT with conventional medical methods in the treatment of chronic pain is essential. This is highlighted by reports of increased mortality, including reduced cancer survival, as a result of unresolved pain.<sup>49,50</sup> Additionally, the success of medical interventions such as surgery and spinal cord implantation in reducing pain has been shown to be largely dependent on psychosocial factors.<sup>51</sup> The interdisciplinary evaluation and treatment of these patients, requiring collaboration among healthcare professionals, is essential, widely practiced today, and considered to be the standard of care.<sup>52,53</sup> Multidisciplinary approaches that include a psychological component such as CBT reduce pain interference and work-related disability (Table 5).<sup>7</sup>

**TABLE 5****BARRIERS TO INTEGRATION OF COGNITIVE BEHAVIORAL THERAPIES**

Overemphasis on the biomedical model, both in clinical care and in medical education

Lack of standardization of cognitive-behavioral techniques

Lack of patient compliance in practicing these methods

Physician reluctance to prescribe for psychological methods due to:

- Lack of awareness of the benefits of psychological techniques
- Concern that the patient will see these methods as treatment for mental illness

Inconsistent and poor reimbursement by third party payers

Ill-defined credentialing criteria for providers of these treatments, and subsequently unreliable execution of these methods

Time intensiveness of psychosocial interventions

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Despite the generally accepted efficacy of these methods with pain patients, their relative ease of implementation, and their very low side-effect profile, barriers still exist with the integration of psychological therapies such as CBT into standard medical care.<sup>3</sup> First, there still remains an overemphasis on the biomedical model, both in clinical care and in medical education. Second, there is a lack of standardization of psychological techniques such as CBT. Third, there is a lack of patient compliance in practicing these methods. Fourth, there is a physician reluctance to prescribe for psychological methods due to lack of awareness of the benefits of these techniques and concern regarding patient perception that referral reflects mental illness. Fifth, inconsistent and poor reimbursement by third party payers hinder the delivery of services. Sixth, there are ill-defined credentialing criteria for providers of such services which create an unreliability in the delivery of these methods. Last, psychosocial interventions are time intensive and often necessitate many visits, which can impede physician and patient acceptance. These barriers to the integration and implementation of psychological therapies such as CBT in the management of pain can hopefully be overcome with physician and patient education as well as additional research.<sup>3</sup>

## Conclusion

With chronic pain, the emphasis is often on the medical intervention, considering the psychological intervention only when medical management has failed. This, however, may not be in the patient's best interest considering clinical experience shows that psychological techniques such as hypnosis are less effective in later stages when pain may be more severe<sup>54</sup> or when the patient may be suffering from drug-induced adverse effects<sup>55</sup> such as compromised cognitive function from high doses of opioids. This would argue for an earlier consideration of psychological techniques when pain levels are less severe or the patient is less medicated. This approach might also be beneficial for treatment side effects and might reduce medication requirements as well.

Chronic pain requires a multidisciplinary approach based on the conjoint utilization of interconnected specialties. The integration of cognitive-behavioral methods as an integral part of a psychiatric pain practice can only lead to more effective treatment of this very difficult-to-treat population. The utilization of these techniques has been demonstrated to improve the treatment outcome for the multitude of issues that these patients have. **PP**

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