

# Pain, Anxiety, Depression, and Psychological Evaluation and Treatment

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## Educational Objectives

1. Describe the application of case formulation and cognitive/behavioral (or functional) analyses in the evaluation and management of chronic pain and associated problems.
2. Review the current state of the art in the psychological evaluation and treatment of mood and sleep disturbances in chronic pain patients.
3. Discuss ways of addressing some of the important clinical issues experienced by those employing psychological treatments for mood and sleep disturbances in chronic pain patients.
4. Describe recent developments in psychological evaluations and treatments for mood and sleep disturbances in chronic pain patients.
5. Identify possible research topics for improving the delivery and outcomes of psychological treatments for mood and sleep disturbances in chronic pain patients.

## Introduction

Psychological treatments for pain are based on the premise that psychological factors, such as anxiety, depression, beliefs, and environmental contingencies, contribute to the experience and impact of pain. It has even been questioned whether psychological treatments should be employed if psychological contributors to a patient's presenting pain

problems cannot be identified [59]. Inherent in this perspective is the expectation that before implementing a psychologically based treatment for a patient in chronic pain, the clinician must assess what psychological factors are contributing to that patient's presenting problems. Typically, this would entail gathering a range of relevant data from an interview with the patient and from other sources, such as questionnaires, spouse reports, behavioral or performance data, and reports from other clinicians [11,44]. Such data allow us to characterize a given patient, ideally in relation to normative data, so we can tell where the patient sits relative to others with similar pain problems [54]. However, that does not automatically indicate what sort of treatments or what treatment targets should be contemplated. Thus, knowing that a patient is high or low for anxiety or depression, for example, does not tell us what might be influencing these clinical features. It may be their pain, but it could also be unhelpful beliefs about their pain or the significance of their pain to their lives, or there may be other factors quite unrelated to their pain.

To make sense of the whole picture presented by a given patient we need to think about the relationships between the various features of the case that emerge from our initial assessment. The position taken in this chapter is that this process is fundamental to providing treatment that is targeted to the accessible contributors to a patient's presenting problems and is therefore more likely to be effective

than a treatment that is instigated without regard to these contributors. This is known as a case-formulation approach.

Case formulation has typically been associated with cognitive and cognitive-behavioral therapies (CBT) [34,58], but the approach has featured in biopsychosocial perspectives on pain as well [17]. CBT-based approaches to pain originated in the 1980s [70], utilizing the findings that overly negative thoughts (cognitions) about pain, its meaning for the person in pain, and related prospects were associated with more distressing levels of pain, as well as worse mood and more maladaptive behaviors (which, in turn, could promote more unhelpful thoughts). Chief among these unhelpful cognitions is pain catastrophizing, or beliefs about pain that are overly alarmist and helpless [67]. Cognitions such as catastrophizing are thought to act as mediators between pain and common clinical associates of pain, especially depression, with the consequence that depression is worsened, often along with disability [68]. Since the early studies of catastrophizing, it has also been found that other cognitions, such as pain self-efficacy beliefs [51], fear-avoidance beliefs [71], pain acceptance [48], and a sense of injustice [66], can also play mediating roles between pain and disability or distress.

In addition to the influence of unhelpful cognitions, many behavioral responses to pain have also been found to contribute to poor outcomes. These "unhelpful" behavioral responses include avoidance of activities associated with pain (or in anticipation of pain), "pain-dependent" behavior patterns (e.g., being overly active when pain is reduced but then quite inactive when pain is aggravated as a consequence), and high levels of medication use [1]. While some of these "unhelpful" behaviors appear to be reinforced (or maintained) by their immediate consequences (e.g., reduced pain), others seem to be reinforced by enduring social contingencies (e.g., spouse responses [50] and work-injury rehabilitation schemes [19]). Accordingly, evaluation of both pain cognitions and behaviors should also entail social/environmental contexts that may be contributing as cues or reinforcers for unhelpful cognitions and behaviors. The same point would apply to possible biological (somatic) responses as well [17].

Turk et al. [70], and others [31], have argued that modifying these unhelpful cognitions and behaviors, as well as their environmental contingencies, could reduce their negative impact and promote better adjustment to pain. In the years since 1983, a

substantial body of evidence has accumulated to support these propositions. Not only have psychologically informed treatments, like multidisciplinary CBT for chronic pain, that are based on these perspectives, become almost standard practice across the world, but their efficacy has been repeatedly supported by randomized controlled trials (RCTs) [29,74], and their effectiveness in clinical practice has been well documented as well [8]. The most recent Cochrane review of psychological treatments for chronic pain [74] concluded that CBT is an empirically supported treatment for chronic pain. However, concerns have been raised at the relatively small *average* effect sizes for CBT in the studies meeting the stringent inclusion criteria for the Cochrane reviews, often in the range of 0.2–0.5 [49]. Williams et al. [74] suggested that rather than more efficacy trials (RCTs) reporting group means, what we needed now was to seek answers to questions such as "Which components of CBT work for which type of patient on which outcome/s, and to try to understand why" (p. 2).

Guzman et al. [23], from their systematic review and meta-analysis of multidisciplinary biopsychosocial rehabilitation programs, concluded that the more intensive programs (in terms of amount of time and comprehensiveness of content) achieved better functional outcomes with chronic low back pain patients compared to less intensive approaches. This finding is consistent with the RCTs reported by Haldorsen et al. [25] and Williams et al. [74] and has been interpreted as supporting the importance of adequacy of "dose" or comprehensiveness in these treatments. However, the meaning of "dose" in this context is debated [73].

The question of content and dose is not just an academic one; witness the ongoing pressure to trim comprehensive programs in favor of cheaper, briefer versions. This trend challenges the viability and effectiveness of many comprehensive programs, as we have seen in the United States [62]. Quite apart from the question of which bits of these programs should be trimmed in the interest of reducing costs, there is also the important question of what is necessary to achieve meaningful benefits for patients. For example, high levels of adherence to the self-management strategies taught during a CBT program are related to significantly better outcomes, both at the end of treatment and 12 months later [52,53]. If a program is too cursory, even if cheap, it is unlikely that adherence will reach levels required for clinically meaningful outcomes.

It follows from these lines of argument that if we are to achieve better outcomes for our patients we will need to ensure that as much as possible, treatments are tailored to the patient's presenting problems and characteristics, especially to the factors that seem to be contributing to their problems. While group-based pain management/rehabilitation programs have strong social merits (e.g., peer support) and have been studied most in RCTs, one of the concerns raised about them is that they may not deal as well as possible with individual differences between patients. Thus, the benefits for each participating patient in a group could be smaller than if they were addressed more individually. To date, however, there are insufficient RCTs of group versus individual psychologically informed treatments to answer this question. Nevertheless, it may be possible to enhance the applicability and effectiveness of these treatments, whether in a group or individual format, if we placed more emphasis on a case formulation approach from the start. One approach to this end has been to try to match treatment protocols to subgroups of individuals sharing some common features (e.g., high fear-avoidance scores) [69]. However, so far, these attempts have not yielded the anticipated benefits [6], and one possible explanation is that a predetermined treatment protocol may not be flexible enough to accommodate the differences between patients. An individualized, formulation-based approach may offer

an advantage and an opportunity for more of a single case design analysis [40]. Such an approach also sits more comfortably with a hypothesis-testing perspective, whereby the formulation provides the hypotheses which can then be tested, and confirmed or not. If not, then a new hypothesis may be considered or the adequacy of the intervention could be reviewed, before another trial. This approach requires a comprehensive assessment and case formulation before treatment can be planned. The next section will describe how the assessment data can be used to make a case formulation.

### Case Formulation Using a Biopsychosocial Framework

As the term implies, a biopsychosocial case formulation should attempt to describe not only a patient's presenting problems, but also the biological, psychological, and social/environmental contributors to these problems that are identified in the initial evaluation of the patient. While these can be described in text format for a report, it may be more useful to use a visual presentation when discussing it with a patient. An example of the approach commonly used by the author is presented in Fig. 1. As discussed in the previous section, the formulation should be tailored specifically to the individual patient. For this example, a typical chronic pain case is used as the basis for the

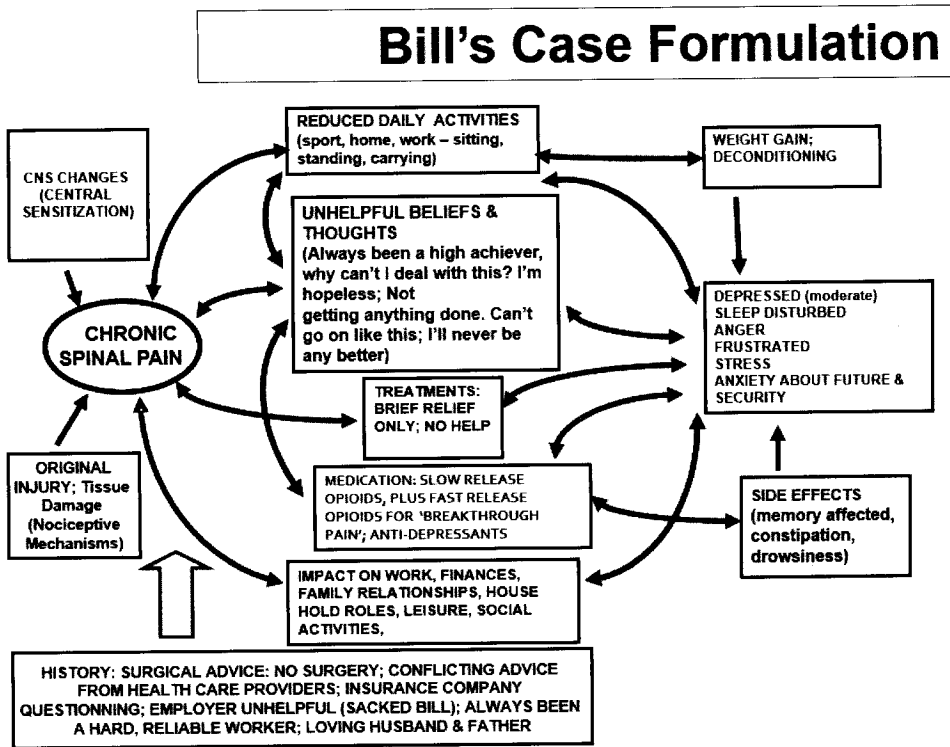


Fig. 1. Visual presentation of case formulation.

**formulation.** This example is intended for educational purposes, and any resemblance to a particular person is accidental.

### Case Study

Bill is a 36-year-old married man, with two school-aged children, who has been reporting ongoing neck and low back pain for over 2 years. His pain developed following an accident at his workplace that caused soft-tissue injuries that were expected to resolve in a week or two. But despite several investigations and trials of physical therapy, medication, and injections of steroids, his pain has persisted. He has tried to return to his job as a building inspector, but due to his limited ability to sit, stand, or to use a computer for more than short periods, he has not been successful. As a result, he has lost his job and is dependent on workers' compensation insurance payments for financial support, but these payments are reducing over time, and there is no guarantee that they will continue for much longer as the insurance company has had medical advice that Bill is not seriously injured and should be able to do some work. He is angry about this and feels his employer could have done more to help. His wife has had to increase her work hours to bring in more money, but she is finding this stressful as she is also having to do more at home to make up for Bill's inability to do his normal share of the household chores. Their two children (aged 8 and 10 years) are worried about their father and try to help their parents by doing some household chores after school, but Bill feels guilty about this and tries to do more of the chores himself, although doing so often aggravates his pain.

He is spending his days mostly at home, apart from visits to his doctor and physical therapist (his third therapist, but he gets only brief relief from massage). At home he spends much of his time resting, but when his pain is less severe he tries to do as much as possible around the house in an attempt to help his wife, but it is frustrating as it often results in worse pain, which he manages by taking hot showers, resting, and taking a short-acting opioid medication for what he has been told is breakthrough pain. He is also taking a slow-release opioid medication, but he reports little benefit. He rates his pain as usually about 7/10 despite this medication. The medication also causes the common side effects of constipation, trouble concentrating, and generalized tiredness, but he is reluctant to stop taking it in case the pain gets worse as he fears he will not be able to cope with that. He

has tried an anticonvulsant medication as well, but he disliked the side effects, so he stopped taking it quite quickly. He also saw a surgeon some months ago after a MRI scan, but was told that surgery was not likely to help him. This advice left him confused and unsure about his options as his own doctor had thought surgery was an option. He is still worried that his doctors have missed something and fears he is never going to fully recover, and he is starting to think he will have to give up looking for work as he doubts he could work while his pain persists.

His mood is generally depressed, and while he is not suicidal at present, he is worried he could get to that if he cannot see any hope for the future. His doctor suggested that he might like to see a psychologist, but Bill thinks this means his doctor has started to think his problems are mental and not physical. Bill believes that if only his pain could be relieved everything would get back to normal, and he fails to see how a psychologist could help with his physical problems. His sleep is also disrupted, and while he reports getting off to sleep with the help of his opioid medication and a low dose (10 mg) of a tricyclic antidepressant, he usually wakes after a couple of hours and then has trouble getting back to sleep for the rest of the night. As a result he says he feels tired most of the time and often has an afternoon nap. He has not lost his appetite, but thinks he eats for comfort too much and has been putting on weight. He also reports often feeling irritable and finds that he and his wife are having more arguments than he can remember having in the past. He has never been depressed before and has always been very healthy, so he is finding the limitations of his current lifestyle very frustrating and hard to accept. He is also conscious that he has gradually withdrawn from most of his friends and has not played tennis or golf, his favorite sports, for months. His limited sitting ability has meant that he has trouble traveling for more than 30–40 minutes before having to stop. As a result, the family has not been away on vacation for more than 2 years, which compounds his sense of guilt and the feeling that he is letting his family down. But he does not know what he can do to get out of this situation.

How might we help Bill? No treatments seem to have helped, and nothing new seems to be on offer. Clearly, besides his chronic pain he is also quite depressed and is experiencing marked sleep disturbance, and he has become significantly disabled in his daily lifestyle. Most aspects of his life have been affected, and he sees no end to it. If we think that

psychological treatment could help him, how might we start?

## Case Formulation

One option would be to share with Bill all the information we have about him to develop a formulation describing all the presenting problems and how they seem to have developed over time. If we could come to an agreement with him on this formulation, then the options for helping him would become clearer. Fig. 1 illustrates how such a formulation might look. Below we will outline some of the key messages, considerations, and steps.

### *i) Key messages:*

"I accept your experience of pain" (validation) [12].

Explaining the basics: differentiating between acute and chronic pain.

### *ii) The importance of communication skills:*

The ability of clinicians to communicate with patients is critical to the implementation of treatments that require collaboration [42].

### *iii) Common errors by clinicians in communicating with patients [43]:*

Not exploring patients' beliefs.

Not referring to patients' beliefs in explanations of a condition.

Not checking patients' understanding of explanations provided.

### *iv) Advantages of using a diagram of formulation:*

It helps to show the patient that the clinician has listened to him/her.

It is an opportunity for the patient to modify the clinician's interpretation.

The patient can take a copy home to share with his/her family.

As a result, it provides a good chance that the clinician and patient can come to agreement on the patient's problems and the contributing factors—an essential first step in establishing a working therapeutic relationship [7].

### *v) Steps for developing the formulation with the patient:*

Bearing the previous considerations in mind, the clinician should try to use a "Socratic" approach (as much as possible avoiding the impression of telling patients what is wrong with them, but instead, drawing the answers from the patients so that the result reflects their own responses). For example, after confirming that the patient's pain has persisted for an extended period, and explaining key differences between acute and chronic pain, the clinician

can ask what has happened to the patient's activity levels, and in this case, Bill would say that they have declined. That can be added to the diagram with an arrow from the words "chronic pain." Then Bill can be asked what he thinks would happen to his body as a result of reduced activity, and his answer (loss of fitness, increased weight) can be added to that, with the arrow from "reduced activity." Then he could be asked what he thinks the effect the increased weight and reduced fitness have on his activity level, leading to an arrow back to "reduced activity." The same approach can then be used with mood, starting by asking how stopping so many of his previously normal activities has affected his mood. This step can be followed by asking how his altered mood (feelings of depression, frustration, etc.) have affected his activities (made him less interested in doing things, or conversely, at times overdoing things, leading to more pain), with the overall effect of compounding the effects on his lifestyle.

This process should continue until the patient's major problems, their contributors and effects, and their interactions have been identified and represented in the diagram. At this point, the clinician and patient can reflect on what has been produced. Specifically, the clinician can ask if the formulation is accurate, and the patient is most likely to agree (as all the information came from him/her), but further changes can be added until the patient is happy that the formulation is accurate. It is often the case that this is the first time he or she has seen the pain in this way, and it can be a moment of enlightenment, allowing him/her to make sense of a lot of what has happened since the chronic pain developed. Importantly, it also affords an opportunity for following up on this new perspective with a discussion about options for intervention and why these options need to target several aspects of the formulation, including the use of multiple disciplines and modalities. In patients who find it difficult to see why they should see a psychologist, for example, this process can help to address this (understandable) concern as it should be clear that multiple aspects of the patient's presentation will be targeted and that the "psychological" aspects are only part of the whole plan.

## Next Steps

Once the patient has agreed with the formulation, then we can begin planning how we can address the targets identified in the formulation. However, while the formulation provides a comprehensive perspective

of the case, it does not tell us exactly how we should intervene. For example, two people may share sleep difficulties, but they may have different contributors that will require different approaches. Accordingly, if a cognitive-behavioral approach is proposed, a functional analysis of the specific problems to be targeted is recommended. It is also unlikely that with a patient as complex as Bill that simply targeting one or two of the problems identified will be sufficient. However, in this session we will illustrate how we might address disturbed mood (depression, anxiety, and stress) and disturbed sleep as these problems are often major impediments to rehabilitation in patients like Bill. For further reading on this issue the following text is recommended:

### Recommended Reading

Main CJ, Keefe FJ, Jensen MP, Vlaeyen J, Vowles K, editors. *Fordyce's behavioral methods for chronic pain and illness*, republished with commentaries. Philadelphia: IASP Press (Wolters Kluwer Health); 2015.

## Cognitive-Behavioral Evaluation and Treatment of Pain-Related Anxiety and Depression

When pain persists, it is often accompanied by depression and anxiety [21]. The relationships between pain and depression or anxiety are reciprocal, with increases in pain related to increases in depression and anxiety and vice versa [20]. Many patients with chronic pain report pain-related problems with depression and anxiety [16].

In recent years there has been growing recognition of the limitations of psychotropic medications in the treatment of pain-related depression and anxiety [35,57]. Many patients with chronic pain report that they have failed to respond to multiple prior trials of psychotropic medications. In addition, side effects related to the long-term use of these medications (e.g., weight gain and drowsiness) can limit activity tolerance and prevent patients from engaging in exercise programs that are critical to regaining function. In light of these limitations and concerns, there is growing interest in behavioral and psychological interventions for managing depression and anxiety in patients with chronic pain.

Cognitive-behavioral therapy is the most widely used, empirically validated psychological approach to managing depression and anxiety in patients

with persistent pain [13]. This section reviews this approach and is divided into three parts. The first presents a case illustration and cognitive-behavioral analysis. The second describes specific behavioral therapy and cognitive therapy techniques for addressing depression and anxiety. The final part highlights several common clinical issues in this area.

### Depression and Anxiety in the Context of Persistent Pain: A Case Illustration

Sandy is a 55-year-old grandmother who has had daily back and leg pain for the past 3 years. Sandy describes herself as someone who had always led an active and involved life. In fact, her pain started when she was doing a yoga workout. Over time, Sandy has become much more inactive. She stopped working because of pain and no longer sees her friends from work. She recently asked her daughter to stop bringing her grandchildren over to the house. Sandy's husband Ed is worried that she seems down and depressed most of the time. He says that all she seems to want to do is watch TV. He reports that Sandy is also very anxious and avoids going out or answering the phone for fear that she might have to interact with one of her old work friends. Ed wants to help but is not sure what to do.

A key step in cognitive-behavioral treatment is functional analysis, i.e., delineating situations, behaviors, and consequences that are associated with a problematic emotion such as depression or anxiety [3,13,32].

### A Cognitive-Behavioral Analysis of Sandy's Depression

Sandy and Ed both reported that Sandy's feelings of depression varied over the day. *Situations* or antecedents most likely to precede an increase in depression were those that reminded her she is no longer working. Sandy had worked for the past 5 years as a receptionist in a very busy office setting. Sandy describes herself as a "people person" and reported that her job was a perfect fit. Sandy states that she faces frequent reminders of the fact that she is not working (e.g., seeing the bus she used to take to work passing by her house each day, seeing her husband going off to work, and receiving mail from her disability insurance company).

*Behaviors* related to depression were also evident. When Sandy felt more depressed, she acted and thought differently than at times when her mood was better. For example, when depressed, Sandy spent more time reclining and watching TV. Ed said she

was becoming more withdrawn. Recently she has begun watching TV alone in the bedroom rather than with him. Sandy found it hard to cope with her inability to work or to do things with her friends. She reports thoughts such as "I am worthless," "I'll never be able to work again," "My pain will never improve," and "I can't cope with this any longer."

*Consequences* of Sandy's problematic behaviors and thoughts were clearly evident. First, her husband Ed was confused about what to do. Should he show concern (e.g., by taking over tasks and encouraging her to rest more)? Or, should he be more critical (e.g., to motivate her)? Second, given her sedentary lifestyle, Sandy had few distractions from pain. Finally, Sandy had gained weight and gotten out of shape and found that she had more pain when she tried to walk or exercise.

### **A Behavioral Analysis of Sandy's Anxiety Problem**

*Situations* likely to trigger Sandy's feeling anxious were social in nature. If she went out of the house, she feared she would encounter one of her former coworkers and have to explain her pain to them. Although work had been a major source of friendships, it was much harder seeing or interacting with former coworkers. Recently, Sandy had been having anxiety episodes before and during visits from her daughter and grandchildren.

*Behaviors*, both problematic thoughts and actions, related to social anxiety were also evident. Worrying about seeing former coworkers brought up thoughts such as "I'll always be useless as a worker" or "No one really understands or cares about what I am dealing with." Periods of high anxiety were characterized by rapid heart rate and irregular heartbeats, which led to visits to the local hospital's emergency room and negative cardiac workups. Because of her fears, Sandy was spending most of her time at home. She routinely refused to go out to dinner with Ed or even go shopping. Ed noted that, because of anxiety, Sandy was avoiding visits with her daughter and grandchildren and that she often cancelled planned visits with them or failed to answer phone calls.

*Consequences* of Sandy's avoidance of anxiety were noted. Both she and Ed reported that when she took steps to avoid seeing former work colleagues or friend, her anxiety would decrease substantially. Anxiety reduction seemed to be fueling her avoidant tendencies in a vicious cycle that led to more frequent anxiety episodes and more inactivity.

### **Cognitive-Behavioral Treatments for Pain-Related Depression and Anxiety**

A variety of cognitive-behavioral treatment techniques can be used in treating depression and anxiety in patients with persistent pain [39]. In patients such as Sandy, becoming more active socially represents a key therapeutic goal. Given that she is someone who historically enjoyed interacting with others, gradually getting her back into social situations is likely to provide her with a sense of pleasure that can help reduce her depressed mood. Sandy's anxiety episodes and avoidance of others was seen as a major barrier to activating her. For this reason, treatment first addressed her social anxiety.

### **Treatment Components for Managing Pain-Related Anxiety**

Cognitive-behavioral treatments for anxiety disorders represent a gold standard against which other psychological treatments can be compared [18].

#### ***Exposure-Based Treatments***

In exposure-based treatments, patients are asked to actively approach situations that increase their anxiety. With repeated trials of exposure, numerous benefits typically occur, including less anxiety, a reduction in urges to avoid feared situations, and a decrease in avoidance behaviors [18].

The first step in exposure is to develop a hierarchy of feared situations ranging from those that are least to those that are most anxiety provoking. Sandy and Ed generated a list of situations that caused her to feel anxious and arranged the items from least to most anxiety provoking. Several underlying themes were evident. First, all of the situations were social in nature. Second, the anxiety level varied depending on the length of time Sandy might spend with a person and whether the exposure took place at home or in a public place. Third, interacting with a neighborhood friend was much easier than interacting with a former coworker.

The second step in exposure is a series of "behavioral experiments" in which the patient is asked to confront feared situations. These assignments are described as "experiments" to emphasize that they provide opportunities to learn about anxiety and how it might be managed. Having a willing partner such as Ed who is aware of the assignments and supportive of treatment can enhance treatment outcome. In Sandy's case, the initial assignments focused on the items in her hierarchy that were

less anxiety provoking (going for a short walk in the neighborhood with her best friend, inviting several friends over to her house for coffee, and babysitting her grandchildren for an hour). She was asked to work on these tasks and then report back on what she learned. Sandy's response to these assignments was typical in that her anxiety would gradually build as the time approached for her to do the assignment, would peak during the first few 10 minutes of the task, and then gradually drop off the longer she was in the feared situation. Ed was very pleased with Sandy's progress and worked with her to set weekly activity goals and support her in achieving them. During weekly treatment sessions, tasks from the hierarchy were assigned, and Sandy's progress in completing the assignments was discussed.

### ***Relaxation Techniques***

Deep relaxation is incompatible with anxiety, and for this reason training in relaxation methods can provide patients with an effective coping strategy for managing anxiety episodes [45] that occur during behavioral experiments. Relaxation is particularly appropriate for patients, like Sandy, who experience high physiological arousal (e.g., heart rate speeding) when anxious.

*Progressive relaxation* involves slowly tensing and relaxing major muscle groups, starting with the muscles in the feet and legs and progressing to those in the face and scalp. Regular practice leads to substantial decreases in tension, anxiety, and physiological arousal [45]. Sandy and Ed were trained in a 15-minute progressive relaxation exercise. They were given a CD of relaxation instructions and encouraged to practice together and on their own. The rationale for involving Ed was that, by learning relaxation, he could better coach and encourage Sandy to practice. In addition, Ed admitted to feeling anxious himself when Sandy had severe anxiety episodes, and thus relaxation training could potentially provide a way for him to keep his own anxiety under control. Sandy and Ed developed a routine of practicing with the relaxation CD as a couple just before going to bed.

*Applied relaxation* is a technique that helps patients generalize relaxation skills to daily situations where anxiety or tension is particularly challenging [26]. Applied relaxation is a brief procedure in which an individual scans major muscle groups throughout the body and simply lets go of any excessive tension that is noticed. Sandy and Ed learned to use this procedure, both during daily activities that might increase Sandy's

pain (e.g., climbing stairs or walking) and during anxiety episodes. Both of them reported that applied relaxation especially helped Sandy manage peak periods of anxiety that occurred during the more challenging behavioral experiments.

### ***Cognitive Therapy Techniques***

Cognitive therapy involves identifying and changing overly negative thoughts that might be contributing to problematic feelings (e.g., anxiety) and behaviors (e.g., avoidance) [4]. The first step is learning to recognize overly negative thoughts. Sandy was asked to keep a daily record of times when she felt particularly anxious using a "three-column technique" in which she recorded the activating event (Column A), the negative thoughts that occurred in response to the event (Column B), and the emotional and behavioral consequences of those thoughts (Column C). To illustrate, in one of Sandy's recordings the event was having coffee on her own at a bakery that she used to visit with friends from work, the negative thought was "I will never be able to handle it if someone asks me about my pain," and the consequences were increased anxiety and avoidance behaviors (e.g., sitting in a corner where people were less likely to see her and reading a book so she would not make eye contact).

The second step in cognitive therapy is challenging the negative thought and replacing it with a more adaptive thought. A helpful approach is to use key questions such as "What is the evidence that your thought is true?" or "Is this thought working for you or against you?" In the situation described above, Sandy was predicting that she would be unable to talk with someone about her pain. This prediction may or may not be true, so one approach to challenging the thought would be to ask her to list evidence for the statement being true, e.g., (1) my anxiety will increase, (2) it will be hard for me to cope, and (3) I will feel a lot worse after talking with them; and then to list evidence that the statement is false: (1) I don't know for sure how I will react, (2) I don't have a crystal ball, and (3) I may feel worse afterwards, but also may feel better that I at least tried to talk with them. After weighing the evidence, patients often are able to take a different perspective on the situation and are more open to changing their thinking. At this point they are encouraged to develop a more adaptive thought that can be used instead of the overly negative thought. In Sandy's case this new thought might be: "It may be hard for me to explain my pain, but I am capable and willing to give a brief explanation and



then move on to other topics of conversation." The final step is to use this adaptive thought in real-life situations where anxiety is likely to be a problem.

Cognitive therapy can influence and be influenced by other CBT techniques [4,47]. For example, both Sandy and Ed felt that working through Sandy's negative thought records made it easier for Sandy to follow through on her assigned behavioral experiments and to make it more likely that she would use applied relaxation when she needed it. Sandy commented that the successes she experienced with exposure and relaxation-based methods made it easier for her to question the validity of her overly negative thoughts and to believe more strongly in the validity of her more adaptive thoughts.

### **Treatment Components for Managing Pain-Related Depression**

Two common and well validated cognitive-behavioral treatments for depression are behavioral activation via goal setting and cognitive therapy [4,47].

#### ***Behavioral Activation Via Goal Setting***

Behavioral theorists maintain that depression occurs when events such as an illness, injury, or loss lead to a decrease in the level and range of activities that are positively reinforcing [47]. In Sandy's case, goal setting was facilitated by the fact that she had already successfully completed a number of behavioral experiments to cope with her anxiety. As a result she was already more open to the possibility that she not only could put herself into social situations that were difficult for her but also could manage any distress that might result.

One approach to behavioral activation is *values-based goal setting* [71]. It involves having patients identify personally relevant values, set goals related to these values, and then work on achieving these goals. Sandy's depression was linked to the fact that she highly valued being productive, a value that she felt she could no longer live up to because she was no longer working. Goal setting focused on helping her identify other types of activities (e.g., volunteer work) that might enable to continue to pursue her valued goal of being productive. She and Ed identified a range of volunteer activities in the community that might give her a sense of accomplishment and productivity. These activities included things she could do in the next few weeks (e.g., making calls to older people who were not able to get out of their house or stuffing envelopes for charity organizations) to things

she could do in the next few months (e.g., volunteer on a daily basis to help in the office at her church or volunteer to make regular calls for a political candidate). Specific activity goals were set each week, and Sandy and Ed committed to work on them as a couple. Sandy reported a gradual improvement in her mood as she worked on these goals. Over time, her activity goals revolved around volunteering each day for several hours at the office of her church. As a volunteer there, she was able to provide concrete suggestions and help people dealing with a particular issue or task. She stated "I really feel I have something to offer when I'm volunteering there" and said she felt more like herself again.

A second approach to goal setting is *traditional goal setting* [41]. This approach uses brainstorming to help patients generate a list of potentially reinforcing activities or events. The range of activities generated via brainstorming is broad and varied. Once activities and events are identified, they are evaluated in terms of how achievable they are, and action plans are developed to implement the goals. To begin this process, Sandy and Ed were introduced to the rules of brainstorming ("Anything goes," "No criticism," "Mix and match," and "The more goals the better") and then encouraged to generate as many goals as they could. The brainstorming exercise resulted in quite a few goals, some of which were more realistic than others. Next, Sandy and Ed were asked to evaluate the goals in terms using the R-A-C-E criteria, i.e., according to whether they were realistic—R, achievable—A, concrete—C, and explicit (in terms of a time deadline)—E. Each goal was rated with a 1 to 5 scale based on how well they fulfilled these criteria. Sandy and Ed then selected several goals from the list (going out to a new coffee shop three times a week, starting a walking program) to work on in the next week.

Working on these goals not only helped Sandy feel less depressed but also improved her relationship with Ed. Although it was sometimes a struggle, Sandy was able to achieve many of her weekly goals. Sandy noted that, even though she was more active physically, she was having less pain and feeling much better. Interestingly, she and Ed were able to find ways of modifying some of the unrealistic goals identified in the brainstorming (e.g., taking a round-the-world trip) to make them more achievable (e.g., watching travel documentaries and videos, visiting places in the region that had never been to, and joining a travel group whose members gave regular presentations on their trips).

### ***Cognitive Therapy***

Cognitive therapy was initially developed for the treatment of depression [4]. The cognitive therapy techniques described above for management of Sandy's social anxiety can be readily adapted for the management of depression. Sandy's ability to use cognitive therapy methods to manage her depression was enhanced for several reasons. First, owing to the fact that she was less depressed, it was harder to believe in the validity of thoughts such as "I am worthless" or "I can't cope with this any longer." Second, her experience in using cognitive therapy for managing anxiety made her more confident that she could use similar methods for dealing with depression.

Sandy used a daily diary record to record episodes when she felt more depressed. Several themes emerged. First, the activities and events that tended to trigger depression were related to her work status. Second, the negative thoughts recorded were typical of those described by Beck [4] as the "cognitive triad" of thoughts, that is, negative thoughts about oneself, negative thoughts about the social environment or world, and negative thoughts about the future.

A useful strategy is changing such thoughts that trigger depression is identifying which thought is most challenging for the patient and working on that thought. In Sandy's case the thought was "I am useless." This thought occurred frequently throughout the day and, if she ruminated on it, it would increase her feelings of depression. Sandy stated that her belief in this thought was reinforced by the fact that she was no longer working in a paid position. When asked how she might challenge this thought, Sandy chose to focus on the question "What if my friend was thinking this way—what would I say to her?" She acknowledged that she had friends who did not work and that she did not consider them useless. In fact, many of them contributed in other ways, such as in their roles as family members or in helping others in the community. She stated that if a friend was not working, she would tell that friend that he or she was useful and valued. As she considered this response she began to question her own tendency to label herself as useless. She agreed that a more adaptive coping thought would be "It's true I can't do paid work, but I am a useful person and can do many things." Sandy was given the assignment of using this coping statement in situations where she began to think she was useless. Over time, she found that the coping statement was easier to use, helped her react in a less

negative and automatic fashion to reminders of her old work situation, and reduce her depression.

### **Clinical Issues**

A number of clinical issues arise when using cognitive-behavioral treatment methods for managing anxiety and depression in patients with persistent pain

One concern expressed by patients is whether the focus on anxiety and depression implies that their pain is psychological in origin and not "real pain" [32]. This concern may arise early in treatment or may come up when patients find that CBT treatments that reduce their anxiety and/or depression also reduce their pain. One of the best ways of addressing this concern is to present and periodically reinforce a model of pain (e.g., the gate control theory, or neuromatrix theory) that emphasizes that pain is a multidimensional experience that influences and is influenced by sensory, affective, and cognitive dimensions [32]. Such models help patients understand the complexity of pain and better appreciate the impact of psychological treatments.

A second concern is that some patients take a passive approach to their pain. In such cases, health care professionals are seen as the source of solutions for persistent pain problems (e.g., prescribing the correct medication, performing the right surgery), and the patient's role is more passive (e.g., taking medications, following the advice given). There is growing recognition that some patients are not ready to commit to such an action-oriented approach typified by CBT [28,33]. Patients who are at a precontemplation stage of readiness to adopt an active coping approach show poorer outcomes and are more likely to prematurely drop out of multidisciplinary pain treatment [33]. Motivational interviewing techniques are often helpful in such cases [28]. Patients, for example, can be asked to complete a decisional balance exercise in which they first list the pros and cons of engaging in a CBT program and then list the pros and cons of continuing with their present approach to managing pain. This exercise often helps patients understand that their current, more passive approach to coping is not working well for them and motivates them to engage in the more active approach of CBT.

In CBT, patients are asked to complete regular assignments such as daily diary records and behavioral experiments. A third clinical issue is that some patients follow through well with such assignments and others do not. There is evidence that adherence

to assignments is related to larger effect sizes for most outcomes of CBT [53]. Patients who complete assignments are also more likely to maintain their treatment gains. Attention to issues of homework completion needs to be an early and continuing focus in treatment [33]. Strategies to enhance compliance include: (1) providing a clear rationale for home assignments, (2) actively involving the patient in setting realistic goals for assignments, (3) positively reinforcing patients for completing assignments, and (4) teaching patients how to use problem solving to deal with obstacles to home practice.

## Sleep and Pain

### Sleep Interruption and Pain Processing

Sleep is of fundamental relevance for physical and mental health. Disturbed sleep leads to changes in the immune system and in cognition (e.g., memory formation), to give only a few examples. However, sleep disturbances appear to be not only the cause but also the consequence of health problems. Pathophysiological conditions such as fever and mental disorders such as depression are regularly associated with changes in sleep quality and quantity [15].

The experienced quality of sleep is of utmost relevance for the evaluation of the health status of an individual. If an individual does not feel refreshed after sleep but feels without energy, irritated, and tired during the day, the existence of a sleep problem should be considered. However, there are also objective signs of disturbed sleep. An actometer may reveal irregular sleep-wake rhythms, prolonged times in bed, and enhanced physical activity at night. In a sleep laboratory equipped with electroencephalography (EEG), electromyography (EMG), and electrooculography (EOG), the whole sleep architecture can be evaluated. Initiation of sleep (e.g., increased latency) and maintenance of sleep (e.g., more awakenings during the night, especially in the early morning) may be disordered. Slow-wave sleep may be reduced to an extent that non-REM phases III to IV are completely missing; phases of arousal may become more common. These objective changes of sleep do not always converge with the subjective experience of disturbed sleep; the divergence may take the form of a sleep-state misperception (pseudo-insomnia) [38,65].

All of these briefly summarized alterations of sleep may be consequences of acute or chronic pain or may make an individual more vulnerable to pain. The latter perspective, namely that disturbed sleep

may contribute to the development and maintenance of pain, has been established for only about a decade, and it has led to the consideration of sleep therapy as part of management of pain [38]. The mutual influences of pain and sleep suggest that vicious cycles develop in some patients, with poor sleep producing more pain and vice versa.

Given that psychological problems like depression and anxiety are closely linked to pain and disturbed sleep, they should also be considered. In particular, depression is known for its strong association both with disturbed sleep (decreased REM latency, reduced slow-wave sleep, and early awakening) and pain complaints (headache and widespread pain). Thus, evaluation and management of pain must consider the triad of pain, disturbed sleep, and depression, which allows for additional negative effects of depression on pain via disturbed sleep at night [36].

In the following, the relationship between pain and disturbed sleep will be discussed in more detail, with a special emphasis on its consequences for pain management.

### Effect of Sleep Interruption on Pain

It has now been established that sleep deprivation or fragmentation causes hyperalgesia that cannot be explained by a general change in somatosensory perception. However, it has not yet been clarified which sleep stages are most relevant for this effect. The seemingly paradoxical effects of sleep deprivation on pain-evoked brain potentials (being reduced) and subjective pain report (being amplified) suggest complex changes in gating mechanisms. As the effects of sleep interruption on pain and emotions can be dissociated, a common mechanism of action seems unlikely. Together with results from animal research, the finding that endogenous conditioned pain modulation is impaired by sleep interruption suggests that the serotonergic system mediates the effect of sleep deprivation on pain perception. However, other neurotransmitters and neuromodulators still have to be considered [30,37].

Most of the evidence described above comes from experimental studies of total or partial sleep deprivation. It may well be that such intense forms of sleep interruption are necessary in order to find effects because correlations between sleep measures (assessed during normal nighttime sleep) and pain parameters (assessed the next morning) are of weak or moderate strength in healthy volunteers (unpublished

data). This might mean that the pain system requires major changes in the sleep system to be affected.

### **Effects of Pain on Sleep Architecture and Quality**

Painful stimuli frequently produce sleep disruption and phases of arousal both in clinical and experimental conditions. These changes may contain micro-arousals, sleep-stage shifts, or full awakenings. However, even if painful events do not completely interrupt sleep, they lead to a variety of other more reflex-like reactions during all sleep stages, which are more likely to occur in association with arousal than alone. Cardiac activation represents a robust sympathetically mediated effect independent of the state of vigilance. Notwithstanding these reactions, incorporation of painful stimuli into dream content remains limited. Furthermore, when painful stimuli interrupt sleep, the cortical response presents a late component, suggesting that the stimulation has to be cognitively processed in order to produce subsequent arousal. The sleeping brain seems to protect sleep by identifying the threat level of stimulation and by keeping stimulus processing as long as possible at an unconscious level [5,46].

### **Sleep Disorders in Patients with Chronic Pain**

The prevalence of sleep disorders is higher in patients with chronic pain than in the general population. Specific forms of chronic pain stand out in this respect, including rheumatoid arthritis and chronic back pain. In these pain conditions, sleep disorders are as frequent as they are in mood disorders. The prevalence rates vary considerably among studies. However, the existence of sleep problems should always be considered in patients with chronic pain. Sleep disorders are not restricted to classical insomnia. Patients with chronic pain may also experience sleep apnea, restless leg syndrome, or periodic leg movements during sleep. The most frequent subjective complaints are difficulties in initiating and maintaining sleep, waking up too early, not feeling refreshed in the morning, and excessive daytime sleepiness. Changes in sleep architecture include sleep fragmentation, decreased sleep efficiency, and reduced slow-wave sleep. There has been a major debate about whether the alpha-delta intrusions into non-REM sleep are a characteristic of chronic pain, particularly in fibromyalgia. However, evidence has accumulated that alpha-delta intrusions occur not only in pain-related forms of sleep disorder, but also in healthy individuals [9,56].

### **Pain Problems in Patients with Sleep Disorders**

A trend in the literature suggests that the temporal effect of sleep on pain may be stronger than that of pain on sleep. This means that whereas sleep disorders may be symptomatic accompaniments of chronic pain, sleep disorders may be etiological precursors of future pain problems. Moreover, several large prospective studies suggest that good sleep increases the chance that chronic pain will remit over time [14]. From a clinical standpoint, these findings strongly suggest that eliminating sleep disruption by making it an intervention target may help to prevent and treat chronic pain. However, it is important to note that it is not clear whether different mechanisms are at play when sleep disturbance is involved in the development of new incident pain as opposed to exacerbation of existing pain. Furthermore, it also remains to be clarified which types of pain manifest preferentially due to sleep disorders (e.g., musculoskeletal pain, neuropathic pain), with the following exception. Chronic daily, morning, or "awakening" headache patterns are soft signs of a sleep disorder. Furthermore, sleep disturbances (e.g., changes in the regular sleep-wake rhythm, oversleeping, and schedule shifts) are acute headache triggers for migraine and tension-type headache. Snoring and sleep disturbance are independent risk factors for progression from episodic to chronic headache [14,55,60].

### **Common Etiology of Sleep Disorders and Chronic Pain**

Given that 10% to 30% of Western populations report chronic pain, of which half also have sleep complaints, it can be inferred that there is a significant etiological overlap between these conditions. However, there is not likely to be an all-encompassing etiological model to explain the overlap and chronic pain and sleep complaints. Theoretical models ought to be specific for certain sleep disorders and certain types of chronic pain. For example, restless legs syndrome (RLS) is characterized by an urge to move, frequently associated with dysesthesias, which can also have painful characteristics. The potential shared mechanisms between RLS and pain may involve sleep deprivation/fragmentation effects, inducing an increase in markers of inflammation and a reduction in pain thresholds. These features may be modulated by several neurotransmitters with a dominance of monoaminergic dysfunctional circuits [22].

Table I  
Procedures for the diagnosis of sleep disturbances

Information for diagnosis	Anamnesis Substance use: alcohol, nicotine, drugs, medications Medical examination: laboratory tests, where required other apparatus diagnostics Where required, actometry Where required, polysomnography
Behavior analysis/functional analysis	Present sleep behavior, exploration of sleep symptoms, including initiating and maintaining factors Present psychosocial conflicts and stress History of sleep disturbance
Psychometric evaluation	Pittsburgh Sleep Quality Index (PSQI) Consensus Sleep Diary (CSD)

Source: Modified from Spiegelhalder et al. [65].

As fibromyalgia patients often report sleep problems, the central nervous system processes that normally regulate sleep may be disturbed. These mechanisms are also hypothesized to link chronic widespread pain, sleep alterations, and mood disorders. EEG findings in patients with fibromyalgia, specifically their non-restorative sleep and the pathophysiology of pain, support the hypothesis of a conceptual common mechanism called “central sensitization” [64]. Cluster headache (CH) is characterized by unilateral attacks of severe pain accompanied by cranial autonomic reactions. Patients with CH also suffer from sleep-related complaints and alterations of their chronobiology. There are speculations that changes in the autonomic system and in hypocretinergic signaling contribute to CH. At the root of these mechanisms are changes in hypothalamic and brainstem nuclei that are detrimental to the normal regulation of sleep and may cause headache [2].

Treating Pain by Managing Sleep

There is now sufficient evidence that the treatment of chronic pain cannot be successful when accompanying sleep disturbances are not normalized [63]. Although available data are still limited, there is little doubt that poor sleep is an important risk factor

for the development and maintenance of pain and that good sleep is a relevant predictor for a satisfactory recovery from pain. Thus, the management of sleep should become an integral part of the treatment of pain. Thus, it is clear that sleep evaluation is also a necessary diagnostic task to inform the pain therapist how to start and continue a comprehensive intervention. Necessary steps in sleep evaluation for the diagnosis of sleep disturbances are given in Table I, which makes it obvious that there is an overlap with the procedures necessary for pain evaluation.

Ideally, the decision has to be made whether pharmacological or nonpharmacological treatment approaches fit better. For this decision, the types of sleep disturbances and pain problems, other medical and psychological comorbidities, other treatment approaches, and the patient’s treatment preferences have to be considered. Usually, however, patients have already received numerous trials of medications to manage sleep disturbances, typically from their general practitioners, before they are referred to sleep experts. Therefore, even psychotherapists who specialize in the psychological treatment of sleep disorders require profound knowledge about pharmacological approaches. The most common pharmacological approaches are listed in Table II.

Table II  
Relevant hypnotics

Substance Class	Examples
Antihistamines	Diphenhydramine, doxylamine
Sedative benzodiazepines	Estazolam, temazepam, flurazepam
Nonbenzodiazepines	Zaleplon, zolpidem, zopiclone (“z-drugs”)
Sedative antidepressants	Amitriptyline, doxepin, trazodone
Low-potency neuroleptics	Melperone, pipamperone, prothipendyl
Herbal medicinal products	Valerian, amber, hops
Melatonin	Ramelteon

Before sleep therapy is considered, education about sleep hygiene should take place and might sometimes be sufficient. Since this form of psychoeducation is mainly up to sleep experts and not general practitioners, it is often offered to patients when the first pharmacological attempts to treat the sleep disorder have already begun. But whenever it is offered, education about sleep hygiene should never be missed. Important rules for sleep hygiene are given in Table III.

Cognitive-behavioral therapy (CBT) for sleep disorders has shown to be as effective as drug treatment for the management of sleep problems. It offers a variety of techniques. A general approach to decrease arousal is given by various *relaxation techniques* focusing either on somatic (e.g., Jacobson) or cognitive relaxation. The method of *stimulus control* makes use of the principle of classical conditioning. The patient should go to bed when sufficient tiredness makes falling asleep very likely and should only stay in bed for maintaining nighttime sleep. Eventually, the bedroom becomes a conditioned stimulus for sleeping. Sleeping in other environments and during the daytime is not allowed. *Sleep restriction* is a useful procedure if sleep efficiency is low. This means that only a small percentage of the time in bed is spent sleeping. The time in bed is restricted until sleep efficiency is high again. For example, a patient lying in bed for 9 hours but sleeping only 5 hours is now not allowed to spend more than 7 hours resting in bed. Stimulus control and sleep restriction are often combined. *Paradoxical intention* is the only purely cognitive procedure that has been specifically evaluated for insomnia, whereas a variety of other cognitively techniques have mainly been applied and

tested in combination therapies. The patient must intend to have a poor night's sleep. This intention meets the fears of the patient. Under this perspective, nothing worse than expected can happen to the patient. The CBT mainly consists of combinations of the techniques described and is therefore routinely offered in multidimensional programs. CBT in this form has proven to be as efficacious as pharmacological approaches in the short term and more efficient in the long term. If mental disorders like depression are additionally associated with the combination of a sleep disorder and chronic pain, they have to be considered in management, as explained in other sections of this chapter [61,63,65].

Summary

There is no longer any doubt that sleep has a major impact on pain and that poor sleep is a risk factor for the initiation and maintenance of chronic pain. Since pain can also cause sleep to deteriorate, vicious cycles are easily established. Further complications can result when there are mood or anxiety disorders in addition. Without sufficient treatment of sleep, long-term recovery from chronic pain is unlikely. Therefore, the evaluation and treatment of sleep disturbances are essential components of the management of patients with chronic pain. Besides a variety of pharmacological approaches, psychoeducation for better sleep hygiene and CBT are of proven efficiency in ameliorating sleep disorders.

Recommended Reading

Lavigne G, Sessle BJ, Choinière M, Soja PJ. Sleep and pain. Seattle: IASP Press; 2007.

Conclusions and Research Questions for the Future

This chapter has attempted to provide a practical guide to the application of CBT-based treatments for some of the common psychological problems presented by patients seeking help in managing chronic pain. The clear theme running throughout is that these treatments are not a one-size-fits-all approach and that before commencing treatment the clinician must first evaluate each patient on a case-by-case basis. Fundamental to this approach is that patients must play an active and informed role in their own treatment, and so a collaborative approach to treatment is essential. This collaboration begins with the initial assessment, leading to a formulation of the

Table III  
Rules for sleep hygiene

Do not have caffeinated drinks after lunch.
Avoid alcohol as far as possible, and do not use it as a hypnotic.
Do not use appetite suppressants.
Be physically active on a regular basis.
Decrease gradually all physical and mental efforts before going to bed.
Introduce a bedtime ritual.
Provide a pleasant atmosphere in the bedroom.
Go to bed only when you are tired.
Do not look at your alarm clock or wristwatch during the night.

Source: Modified from Spiegelhalter et al. [65].

presenting problems that is done in such a way as to ensure that both clinician and patient develop a shared understanding of what they are confronting. But that is only the first step. Developing an intervention for the problems identified (such as depression and sleep disturbance) requires closer examination, typically using a cognitive/behavioral (or functional) analysis that highlights contributing factors (e.g., thoughts, settings, cues, and consequences) for that problem. The treatment is then tailored according to results of that analysis.

Common clinical issues raised during these treatments were also considered. These issues include options for overcoming difficulties in engaging patients in self-management, dealing with a patient's concern that psychological treatments might imply there is a psychological basis to chronic pain, considering possible interactions with other treatments that might have been provided simultaneously, and determining the place of different techniques. Further readings should assist in exploring these issues more thoroughly. These issues also suggest possible research topics. The first section of the chapter suggests that rather than more trials comparing CBT with other treatments, it would be more useful to consider questions such as: "Which components of CBT work for which type of patient on which outcome/s, and why?" [74]. These challenges still stand, and the case formulation approach described in this chapter, for example, could be used as the basis for such investigations. This approach may require more *N-of-1* designs than the traditional large group comparison studies, but despite exhortations to try such methods, they remain rare in the pain literature.

Beyond these research questions about which treatment is best for which patient, it is also evident that we need more research on ways to enhance the effectiveness of components of treatment. For example, there has been very little research on the best ways of presenting case formulations as a means of engaging reluctant patients, or ways of enhancing adherence to treatment, particularly with tasks like agreed homework between therapy sessions. Similarly, very few studies have tried to tease out the effective ingredients in multimodal treatment programs, especially those aimed at patients with multiple (comorbid) diagnoses [24]. Transdiagnostic approaches have been proposed as one option in these scenarios, but more research in chronic pain populations is urgently needed [39]. Psychoeducation is frequently included in treatment plans, but it

is time consuming, and with the rapid expansion of online educational resources it might be wondered if they could be used to supplement or replace the role of the therapist or clinician. Recent developments in the delivery of CBT-based treatments online also present opportunities for comparative effectiveness studies between clinician-led treatments and totally online protocols that have no clinician input for the types of patients (and complex problems) presenting at pain clinics. To date there have been some impressive outcomes reported, and it may be wondered if we actually do need the sorts of clinician-patient interactions described in this chapter, but how representative the participants in these online courses have been of patients referred to pain clinics remains to be established [10].

In relation to research questions for sleep disturbance, despite recognition of the importance of improved sleep for better pain management, we do still not know what are the best possible components of sleep management (CBT or other types of treatment) to be included in multimodal pain treatment programs. Also, sleep disorders are not a homogenous condition, and it is highly unlikely that idiopathic insomnia, restless-leg syndrome, and sleep apnea, for example, interact with pain in a similar fashion. Improved differential diagnosis of sleep disorders would be helpful, but personalized approaches for treatment have yet to be delineated. Equally, it is not clear what might be the necessary "dosage" of treatment for sleep problems, but there are likely to be synergies in multimodal treatments that also target anxiety and depression in people with chronic pain.

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