

A Practical Guide to Integrating Behavioral and Psychologically Informed Approaches into Physical Therapist Management of Patients with Chronic Pain

Leslie Russek, PT, DPT, PhD, OCS¹
Carolyn McManus, PT, MS, MA²

¹Physical Therapy Department, Clarkson University, & Physical Rehabilitation, Canton-Potsdam, Potsdam, NY

²Outpatient Rehabilitation Department, Swedish Medical Center, & Department of Research, Puget Sound VA Health Services, Seattle, WA

ABSTRACT

Background and Purpose: Research shows that integrating behavioral and psychosocial approaches into physical therapist practice results in improved outcomes for patients with chronic pain, however, many physical therapists are unfamiliar with these approaches. **Methods:** Integration of clinical practice guidelines with findings from the literature and practical recommendations. **Findings:** There are a variety of ways in which physical therapists can integrate behavioral and psychologically informed approaches into standard physical therapy for patients with chronic pain. Experts recommend identifying each patient's pain personality and selecting the approaches that are best suited for each patient. Approaches include pain education, cognitive behavioral techniques, mindfulness, relaxation, biofeedback, and exercises that emphasize relaxation, breathing, and mindfulness. **Clinical Relevance:** This article provides suggestions for how physical therapists can integrate behavioral and psychosocial approaches into therapy for patients with chronic pain. **Conclusion:** Physical therapists can use the approaches in this article to enhance care for patients with chronic pain.

Key Words: mind-body, mindfulness, pain education, pain management

BACKGROUND

Physical therapy literature has recently emphasized the importance of a biopsychosocial, or psychologically informed approach to managing chronic pain.¹ The biomedical approach can be effective for acute pain.² Acute pain is typically proportional to peripheral nociception and treatment of the injury or disease decreases nociception and pain.² However, chronic pain persists after the time needed for tissue healing; chronic pain is considered an error in central processing resulting from abnormal neural plastic-

ity.^{3,4} Chronic pain is often more strongly related to psychological and social factors affecting the patient than to tissue damage.^{5,6} Hence, to increase the likelihood of a favorable outcome, interventions should address these psychological and social factors.

Clinical practice guidelines for chronic pain recommend that treatment of chronic pain: use a biopsychosocial approach, always include exercise, include a cognitive behavioral approach, be sensitive to culture, include active self-management and not invalidate pain complaints because of psychosocial problems.⁷ Behavioral approaches have been shown to be effective in decreasing pain, increasing function,^{8,9} and reversing some of the neurological changes that occur with chronic pain.¹⁰ Physical therapists who can integrate a biopsychosocial approach into management of chronic pain can be more effective than purely physical interventions.¹¹ However, many physical therapists lack the training to apply psychologically informed treatment approaches.^{12,13} The purpose of this article is to familiarize physical therapists with concepts and terminology related to biopsychosocial approaches to chronic pain management, and to provide strategies that physical therapists can apply in the clinic.

The Complexity of Pain Perception: Making the Case for the Biopsychosocial Model

Pain is a subjective experience that does not correspond linearly to nociceptive input, but is additionally modulated by cognitive and emotional factors.^{14,15} A patient's stress level, expectations, beliefs and attention can directly impact pain perception and endogenous pain inhibitory and facilitatory mechanisms.¹⁶⁻¹⁹ Stress has been implicated in the exacerbation of several chronic pain conditions such as chronic back pain,²⁰ fibromyalgia,²¹ rheumatoid arthritis,²² and pelvic pain.²³ Supporting this premise, labo-

ratory research on rodents identified both peripheral and central mechanisms generated stress-induced hyperalgesia.^{18,24,25} The cognitive lens adopted by a patient through which he or she experiences pain can have a powerful impact on the pain experience. For example, treatment expectations substantially influence pain perception.¹⁷ In addition, changing the meaning of pain from negative to positive can significantly increase pain tolerance through activation of endogenous opioid and cannabinoid inhibitory mechanisms.¹⁶ Researchers also suggest that cognitive factors impact dorsal horn neuron sensitization through modulation of descending pathway inhibitory and facilitatory mechanisms.¹⁹ The effective treatment of pain requires an appreciation of the complex contributions that these and other psychological factors make to pain perception.

Recognizing Pain Personality Types

Two classification systems (Table 1) for pain personalities have been identified: 'fear-avoidance' and 'pain-persistence.'²⁶ Others have described 4 clusters of pain behaviors: well-adapted, dysfunctional, distressed with little social support, and psychophysiologically reactive.^{27,28} Research shows that assigning patients to treatment approaches matched to pain personality resulted in better outcomes than random assignment.^{28,29} Improved outcomes may be due to decreased drop-out rates.²⁸ Although pain personality is relatively stable, studies show that 30% of patients not receiving treatment change characteristics over a 2 to 4 week period.^{28,30} The evolving nature of pain personality means that pain personality, like physiological presentation, needs to be reassessed on an ongoing basis.²⁸ Nicholas and George¹ described a variety of tools for assessing patients' pain beliefs, including pain self-efficacy, catastrophizing, fear-avoidance, and kinesiophobia. It can also be helpful to determine the patient's pain readi-

Table 1. Pain Behavior Clusters

Classification	Characteristics	Recommended Approaches
Fear-avoidance vs pain-persistence		
Fear- avoidance ²⁶	Pain-avoidant behavior, fear of pain, catastrophizing, hypervigilance, social reinforcement for pain behaviors	Decrease focus on symptoms, set functional goals, gradual increase in activity in spite of symptoms, reinforce healthy behaviors, ignore pain behaviors, graded exposure, movement visualization
Pain- persistence ²⁶	Ignore or deny pain, continue activity in spite of pain, set unrealistic goals, ignore physical limits, low social support	Realistic goal-setting, pacing, alternating activity & inactivity, cognitive restructuring, gradually progressed conditioning exercises, gradual increase in activity, assertiveness training
Pain behavior clusters		
Well-adapted	Low levels of pain, distress, and interference with life; high self-efficacy and activity	Pain education and pain coping skills, cognitive behavioral therapy
Dysfunctional ²⁸	High pain intensity, interference with activity, pain behavior, social support and solicitousness; negative pain self-talk	Operant restructuring (reinforce healthy behaviors and do not reinforce pain behaviors), cognitive behavioral therapy
Distressed with little social support ²⁸	Low self-efficacy, social support, solicitousness of others; “punished” rather than rewarded for pain behavior; high affective distress and perceived daily stress	Cognitive behavioral therapy including stress and pain management, help managing dysfunctional relationships
Psychophysio- logically highly reactive ²⁸	High stress-reactivity, muscle tension, daily stress; low social support, little reinforcement for pain behavior, low activity due to pain	Relaxation, biofeedback, cognitive behavioral therapy

ness to change as patients in the precontemplation, action, and maintenance stages of change are more likely to take an active role in self-management and more likely to be successful in a multi-disciplinary pain management program.^{31,32}

Behavioral and Psychologically Informed Interventions

A variety of psychologically informed or behavioral approaches to managing chronic pain have been described (Table 2) and these strategies overlap considerably. The basic premise of these cognitive behavioral approaches is that thoughts, beliefs, and expectancies influence mood and physiological processes, including pain perception. People can learn more adaptive behaviors as well as ways of thinking and feeling, and these changes can alter pain.^{1,33} Mann et al³⁴ described a variety of psychosocial, environmental, and physical factors that can influence the effectiveness of self-management.

The text, below, provides more detail about each approach.

Pain Education

Pain education provides patients with an understanding of the multiple factors that give rise to the experience of pain. A recent systematic review of neurophysiology pain education concludes that for chronic musculoskeletal disorders, this education strategy may have a positive impact on pain, disability, catastrophizing, and physical performance.^{35,36} Topics covered can include the anatomy of the nervous system, neuroplasticity, peripheral and central sensitization, and how the brain processes nociceptive information. Patients learn that pain is due to a complex interaction of multiple factors and does not arise because of incoming messages from the peripheral nervous system alone. They can grasp the transformative insight that hurt does not mean harm. Louw³⁷ and Butler and Moseley³⁸ have produced excellent resources

for patient education; additional resources are listed at the end of this article. Key take home concepts for patients include: (1) pain perception shares neuropathways with cognition and emotion,^{14,15} (2) the brain can generate pain in the absence of tissue damage,³⁹ (3) sensitive nerves in the spinal cord can amplify pain-related messages sent to the brain in the absence of tissue damage,⁴ (4) the body's stress response can amplify pain generating mechanisms,⁴⁰ and (5) active self-management is the key to improvement.³⁴

Mindfulness

Mindfulness meditation is the deliberate training of the mind to rest in the present moment with a quality of attention that is stable, accepting, curious, and friendly toward everything that arises.⁴¹⁻⁴⁴ A comprehensive literature review concludes that in chronic health conditions, including chronic pain, rheumatoid arthritis, fibromyalgia and post-traumatic stress disorder, mindfulness training contributes to improved coping, well-being, quality of life, and health outcomes.^{16,42-47}

Physical therapists can integrate basic concepts of mindful awareness into patient care. For example, patients may have internalized destructive messages about their bodies from media images, childhood influences, or physical or emotional trauma. Add feelings of anger, fear, and confusion that can accompany persistent pain, and patients may be conflicted about and alienated from their bodies. Physical therapists can help patients heal this alienation through integrating the qualities of mindful attention when teaching body awareness. Patients can be invited to notice physical sensations with a quality of attention that is stable, kind, and curious. They can be asked to let go of pre-conceived ideas about their bodies and listen as if for the first time. They can be encouraged to let go of the struggle with their bodies and their pain. Patients can have the direct and healing experience of a stable, compassionate awareness that can observe their bodies and pain yet not be identified or defined by it.

Mindful awareness is also an especially helpful response to catastrophic thinking. Patients are coached to observe their present moment experience and the negative stories they generate about their present moment experience. Patients are asked to be curious, to notice how catastrophic thinking is often about the future, and to observe its influence on distress and pain. Although life is unpredictable, the present moment is often manageable and where patients have the power to

Table 2. Brief Description of Behavioral and Psychologically Informed Treatment Approaches

Approach	Summary
Pain education	Chronic pain neurophysiology, disconnect between pain and tissue damage (hurt ≠ harm), central and peripheral sensitization, impact of stress and negative thinking, pain coping skills
Mindfulness	Non-judgmental, accepting and kind attention to the present moment
Breathing	Diaphragmatic breathing
Relaxation	Diaphragmatic breathing, mindfulness, biofeedback, visualization, progressive muscle relaxation
Problem-solving	Identifying problems, generating ideas, prioritizing, implementing solutions
Cognitive restructuring	Identifying automatic negative thoughts or catastrophizing, challenging negative thoughts and replace with healthy coping strategies
Operant restructuring	Reinforcing health-behaviors and not reinforcing pain behaviors
Pacing	Time-based rather than project or pain-based
Pleasant activity scheduling	Selecting and planning pleasant activities
Sleep hygiene	Managing sleep habits to optimize sleep
Biofeedback	Using devices to provide physiological feedback to relax muscles, increase skin temperature, decrease sympathetic response
Exercise	Mind-body activities, graded motor imagery, quota-based progression, progressive exposure
Cognitive behavioral strategies	See Table 3
Pain coping skills	See Table 3

make skillful choices. Physical therapists can invite patients to take a “mindful” breath, bring awareness back to the present moment, and focus on the skillful choices that can be made here and now.^{42,43}

Relaxation

Stress increases pain and fatigue.^{18,48-50} Decreasing stress is like ‘turning down the volume’ on pain. Many people with chronic pain conditions breathe in a shallow manner.⁵¹ Diaphragmatic breathing has been shown to reduce sympathetic nervous system activity and acute pain perception^{52,53} while deep and slow breathing decreases pain and autonomic activity.⁵² Body awareness activities such as yoga, qigong, and tai chi, which also focus on slow and effective breathing, are also helpful for relaxation and pain management.⁵⁴ There are many other relaxation strategies such as: (1) progressive relaxation,

(2) relaxation visualization, and (3) autogenic training that patients can employ to manage their symptoms. Progressive relaxation involves selectively tensing and relaxing major muscle groups throughout the body.⁵⁵ A brief progressive relaxation intervention has been shown to increase nociception flexion reflex threshold and reduce stress ratings in healthy adults.⁵⁵ Research also suggests that progressive relaxation can decrease pain,⁵⁶ improve quality of sleep,^{56,57} and decrease fatigue.⁵⁷ Relaxation visualization is another technique that may be beneficial to patients. Relaxation visualization involves imagining oneself in a safe and relaxing environment, such as a beach or hot tub. While performing relaxation visualization, patients should use several senses and imagine the feel, the smell, and the sounds of this relaxing environment. A third type of relaxation training is autogenic training. Autogenic

training involves imagining that your hands and feet feel very warm and heavy.²⁹ Autogenic training has been shown to increase parasympathetic activation.⁵⁸ Patients should be encouraged to practice one or more of the techniques that suit their personalities and schedules.

Problem-solving skills

Patients with chronic pain often struggle to identify and solve problems that contribute to their pain and stress.⁵⁹ Instead, patients with chronic pain are more apt to use negative, destructive, or catastrophizing problem-solving styles. As a result, they struggle to meet home or work demands and conflicts with family or co-workers.⁵⁹⁻⁶¹ Physical therapists can help patients identify problems, generate potential solutions, prioritize options, find ways to implement solutions, and assess effectiveness.^{28,62} For example, a patient who experiences an acute exacerbation of a chronic condition as a result of doing yard work can be guided to identify factors (eg, lifting, bending over, working too long, bad body mechanics, etc) that may have contributed to the acute exacerbation and suggest potential solutions (eg, using a wheel-barrow, working sitting down, taking frequent breaks, and practicing proper body mechanics). Problem solving is also helpful for managing acute exacerbations. Patients should have a set of strategies (perhaps in writing for times of panic) that they can use to manage exacerbations independently (eg, relaxation, meditation, heat or ice, stretching exercises).

Cognitive restructuring

People with chronic pain tend to catastrophize (make a crisis out of everything) and have automatic negative thoughts.^{63,64} Physical therapists help patients replace catastrophizing with calming self-statements and replace automatic negative thoughts with healthy coping strategies.^{28,33,62} For example, if a patient goes into crisis because of a recent exacerbation, a physical therapist can point out that a patient previously had several good days and that the exacerbation was due to significantly increased activity. We can point out that the patient actually felt so good that she did too much (what an awesome response) and that the exacerbation is already subsiding (she is capable of managing exacerbations), and that next time she could pace herself to avoid exacerbations. Patients can calm themselves by repeating statements such as “Hurt does not mean harm” or “If I stay calm my nerves will stay calm.” Patients

might not fully believe in the positive statements at first, but they can gradually change their thinking process with practice.

Operant restructuring

Operant restructuring is a psychological term for the concept that people continue behaviors that are positively reinforced and decrease behaviors that are not reinforced.^{28,29} Pain behaviors may be unintentionally reinforced by solicitous family members or health care providers who reward pain behavior with sympathy or solicitousness.²⁸ For example, people who complain about their pain, grimace, moan, or guard may be relieved of unpleasant housekeeping chores or rewarded with hot packs and massage in the clinic. Instead, clinicians and family members should reward healthy behaviors, such as increased activity and “healthy” soreness after increased exercise.^{28,33}

Patients can develop a conditioned response that increases pain.³³ For example, when physical therapists ask patients to think about their pain (“Rate your pain,” or “Describe your pain”), it may increase pain intensity through hypervigilance. If we have those same patients exercise, they may then associate exercise with increased pain intensity even though it may be hypervigilance rather than exercise that increases their pain. If patients then come to expect increased pain after exercise, they may be more likely to develop increased pain even with innocuous exercise.³³ Anticipatory fear and anxiety may therefore increase both peripheral and central sensitivity. Physical therapists may inadvertently reinforce negative operant learning by encouraging patients to stop activities or exercise when they (patients) complain of pain.³³ We can instead reinforce health behaviors by explaining that soreness is a good sign that patients are challenging their bodies in beneficial ways that will make them stronger and healthier.^{16,65}

Pacing

Patients should use time-based pacing rather than activity- or pain-based pacing. Activity and pain-based pacing can lead to an over-activity “yo-yo” because patients continue the activity past their physical tolerance. People with chronic pain tend to overdo it when they feel relatively well, but then suffer an exacerbation and are unable to do anything for several days.²⁶ Those inactive days contribute to deconditioning, resulting in even less tolerance to activity when attempted later. In contrast, time-based pacing encourages the patient to assess how

long he can do an activity before causing an exacerbation so that he can stop the activity at 10% to 20% below that threshold. During an exacerbation, patients should be encouraged to decrease activity, perhaps to 50% of normal, but not discontinue it entirely. Time-based pacing also avoids negative feedback operant learning by having patients stop an activity (reward) for complaining of pain.³³

Pleasant activity scheduling

People with chronic pain tend to neglect pleasant activities for a variety of reasons: belief that they do not deserve to enjoy themselves, as punishment for not being able to do “work” activities, inability to do previously enjoyed activities and failure to identify new activities, or because of generalized depression.⁶⁶ However, pleasant activities are important both as motivators and as ways to maintain a positive attitude, healthy social relationships, and successful experience with more normal life activities.⁶⁶ Patients should therefore be encouraged to identify appropriate pleasant activities and actually schedule them or set goals to be able to do them in the near future.⁶² Patients can also learn to apply pacing skills and activity-rest cycles to help them achieve pleasant activity goals.¹⁵

Sleep hygiene

Since chronic pain is exacerbated by poor quality sleep,^{67,68} sleep hygiene can be beneficial.^{68,69} Patients should relax before bedtime (eg, meditation, diaphragmatic breathing, yoga, a hot bath). They should avoid the television and computer at bedtime, as these activities tend to be stimulating. The bedroom should be a comfortable, dark, warm, and quiet place at bedtime. Patients with chronic pain should avoid caffeine, nicotine, and alcohol, especially in the evening. Daily exercise improves sleep.⁷⁰ Although the popular media often suggest that vigorous exercise within 3 hours of bedtime interferes with sleep, recent research suggests that exercise just before bedtime is beneficial.⁷⁰ The bed should be reserved for sleep and intimacy and not used for paying bills or watching television. Finally, if unable to sleep within 20 minutes, patients should be advised to get up and go to a different room and do something relaxing so they do not develop patterns of sleeplessness in bed.

Biofeedback

Biofeedback can be helpful for patients who struggle with standard forms of relaxation training.⁵⁸ Electromyogram (EMG)

biofeedback teaches patients how to relax tense muscles; it provides immediate feedback and is easy to teach patients; however, EMG units are expensive (\$2,000–4,000). Galvanic skin response (GSR), which monitors sympathetic nervous system activity, is more difficult for patients to control; GSR is relatively inexpensive (\$200–400) and new interactive video games using GSR may provide patients access to this technology at home. Heart rate variability (HRV) is a newer form of biofeedback that provides immediate feedback and cues breathing to facilitate relaxation. Although the exact mechanism of HRV is not yet known, it works through decreasing the stress response.^{71,72} Since HRV units are about \$130, motivated patients can purchase one for home use. Skin temperature can also be used as biofeedback; units are inexpensive (\$20–40) but, like GSR, it can be difficult for patients to learn to regulate skin temperature. See McKee⁷³ for more information about implementation and effectiveness of biofeedback.

Exercise

According to clinical practice guidelines,^{2,7} exercise is an essential component of any chronic pain management program. In addition to exercises specific to patient complaints (eg, core stabilization for low back pain), they often need conditioning exercises to compensate for their decreased activity level. Graded exercise should be progressed using a quota system rather than pain. Identify a baseline of activity that can be tolerated and, when that quota is met, the quota is increased. Inability to meet the quota results in no reinforcement.^{1,74} Mind-body exercises such as yoga, tai chi, and qigong can be beneficial for easing patients into activity while facilitating breathing, relaxation, and body awareness.⁵⁴

Graded motor imagery is a recent approach that addresses problems with body awareness through a graded process of left/right judgment, visualization, and then mirror visual feedback.⁷⁵ If patients are extremely fearful of specific movements or activities, graded exposure provides a transition to progressively more stressful activities. Patients start with simple visualization of a position or movement through simplified versions of the feared activity and progress to the feared activity itself.^{1,74}

Pain coping skills and cognitive behavioral strategies

Pain coping skills and cognitive behavioral strategies are overlapping sets of approaches

including those described above. Table 3 lists patient skills and strategies typically included in each approach. While research sometimes rigidly includes each component of a pre-set selection of skills,¹³ clinicians may select strategies believed to be most appropriate or most acceptable to the patient.^{34,76} Given the different pain personalities of patients, this mix and match approach may optimize compliance and effectiveness.^{28,77}

Challenges in Working with People with Chronic Pain

Physical therapists face multiple challenges when treating patients with persistent pain. These include patients' often complex psychosocial problems and negative attitudes, as well as the physical therapists' empathy limits and time management. Patients may have a history of repeated treatment failures that can create negative expectations or anger. Poor communication skills, depression, and personality issues that create interpersonal problems elsewhere in patients' lives may also present problems in the clinic.^{34,78} Psychiatric problems are beyond the scope of this article though patients may at times benefit from this type of intervention.

Most patients with chronic pain have psychosocial issues that alter the likelihood that self-management approaches will be successful,³⁴ and they make working with these patients challenging.^{78,79} When patients with chronic pain have psychological and social problems beyond our training and experience, patients benefit from referral to psychological resources. In-person or online support groups can also be helpful, as well as books and websites that promote pain self-management (Appendix). For optimal patient care and to avoid therapist burnout, physical therapists need to know their own limits and their scope of practice when providing psychological support to distressed patients.^{12,79}

Patients with chronic pain often present with maladaptive attitudes toward their body, symptoms, and exercise. Misconceptions about exercise, skepticism of a mind-body treatment approach, and problems with pacing activities can all obstruct the rehabilitation process. All of these factors can reduce a patient's motivation to participate in physical therapy and maintain consistency with a home exercise program.^{11,12,79} Patient education and mindful movement training, such as tai chi, yoga, qigong, and Feldenkrais, can help transform maladaptive ideas in to more functional views that promote patient success. In addition, coaching patients to

Table 3. Pain Coping Skills¹³ and Cognitive Behavioral Strategies⁷

Pain Coping Skills	Cognitive Behavioral Strategies
<ul style="list-style-type: none"> • Pain education • Progressive muscle relaxation • Activity-rest cycles and pacing • Pleasant activity scheduling • Identifying and challenging negative thoughts • Calming self-statements • Distraction • Pleasant imagery • Problem solving • Exacerbation management 	<ul style="list-style-type: none"> • Pain education • Importance of active self-management • Wellness behaviors • Pleasant activity scheduling • Avoiding negative thinking • Elimination of fear-avoidance or pain-persistence • Progressive activity/exercise • Time-based rather than task-based pacing • Not using pain as a guide

set SMART goals (ie, specific, measurable, achievable, relevant, time limited), "to start low and go slow," and to remember that they are "sore but safe" as they challenge their tissues can promote patient success.

Patients with chronic pain often arrive with multiple physical and emotional complaints that can take considerable clinic time if not well managed, and the thought of adding behavioral techniques on top of already demanding treatments can be daunting. Physical therapists should shift emphasis away from passive interventions (eg, modalities, massage, manual therapy) toward active interventions. Patients should be given more responsibility for self-management through self-care and activities of daily living training that includes both physical and behavioral strategies. Patient education about chronic pain physiology and optimal treatment approaches is essential to elicit patient buy-in to an increasingly hands-off intervention.²⁷

Treating patients with chronic pain can be stressful for several reasons: their conditions are complex, treatment failures are common, patients have high levels of distress, and they can be very demanding.⁷⁹ Working with these patients can contribute to physical therapist stress and burnout. Suggestions to help therapists minimize their own stress:⁸⁰

- Reach out to your support system and discuss your experience with colleagues;
- Get mentoring from more experienced therapists;
- Attend to your own wellness through mindfulness, relaxation, exercise, etc;
- Remember that, although you are responsible for providing evidence-based treatment, multiple factors influencing outcomes are beyond your control;
- Remember that patients are ultimately

responsible for their active engagement in therapy;

- Be aware of when a patient triggers your stress reaction and take the time to re-center;
- Be kind and compassionate with yourself by talking to yourself as you would to a colleague treating a challenging patient;
- Review what went well at the end of each day rather than focusing on frustrations;
- Be at peace with pain and problems you cannot relieve in spite of your best efforts.

SUMMARY

Clinical practice guidelines recommend that management of chronic pain use a biopsychosocial approach, include a cognitive behavioral approach, include active self-management, and yet not invalidate pain complaints because of psychosocial problems. This paradigm shift from a biomedical to biopsychosocial approach requires that physical therapists encourage patients to make active changes in both behaviors and thought processes related to pain. We can use an awareness of psychological principles to more effectively educate patients. Physical therapists have an important opportunity to make a difference in the lives of people with chronic pain through integration of behavioral and psychologically informed methods into physical therapy intervention.

(References continued on page 14)

Appendix. Helpful Books, Resources, and Websites

Helpful Books and Resources	Helpful Websites	
<ul style="list-style-type: none"> • Branch R, Wilson R. <i>Cognitive Behavioural Therapy for Dummies</i>. Hoboken, NJ: John Wiley & Sons; 2010. (patient resource) • Butler D, Moseley L. <i>Explain Pain</i>. Adelaide: Noigroup Publications; 2003. (PT and patient resource) • Caudill M. <i>Managing Pain Before It Manages You</i>. New York, NY: Guilford Press; 2008. (patient resource) • Flor H, Turk D. <i>Chronic Pain: An Integrated Biobehavioral Approach</i>. Seattle, IASP Press; 2011. (PT resource) • Kabat-Zinn J. <i>Mindfulness for Pain Relief</i> (CD). Sounds True, Inc; 2009. (patient resource) • Kabat-Zinn, J. <i>Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain and Illness</i>. New York, NY: Del Publishing Co; 1991. (patient resource) • Louw A. <i>Why Do I Hurt?</i> Minneapolis, MN: Orthopedic Physical Therapy Products; 2013. (patient resource) • Otis J. <i>Managing Chronic Pain: A Cognitive Behavioral Approach</i>. New York, NY: Oxford University Press; 2007. (patient resource) • Russek LN. Chronic Pain. In: O'Sullivan S, Schmitz T, Fulk G, eds. <i>Physical Rehabilitation</i>. Philadelphia, PA: F.A. Davis; 2013. (PT resource) • Schubiner H. <i>Unlearn Your Pain</i>. Available through Dr. Schubiner's website: www.unlearnyourpain.com (patient resource) • Sluka K. <i>Mechanisms and Management of Pain for the Physical Therapist</i>. Seattle, WA: IASP Press; 2009. (PT resource) • Turk D, Winter F. <i>The Pain Survival Guide: How to Reclaim Your Life</i>. American Psychological Assn; 2005. (patient resource) • Vierck E, Kassin S, Vierck CJ. <i>Chronic Pain for Dummies</i>. Hoboken, NJ: John Wiley & Sons; 2011. (patient resource) 	Organization/Purpose	Website
	American Academy of Pain Medicine Professional organization for physicians has some patient educational material.	www.painmed.org
	American Chronic Pain Association Provides education and peer support for patients and families.	www.theacpa.org
	American Pain Foundation Educational material for patients and families, including material specifically for military & veterans with chronic pain.	www.painfoundation.org
	Australian Transport Accident Commission An extensive selection of physical and psychosocial outcome measures. Go to Provider Resources, Clinical Resources, then Outcome Measures.	www.tac.vic.gov.au
	Carolyn McManus Information regarding programs at Swedish Medical Center, for veterans and also audio guided relaxation programs.	www.carolynmcmamus.com
	Change Pain A modular approach to understanding pain and its management. Educational resources for clinicians.	www.change-pain.co.uk/
	Hunter Integrated Pain Service YouTube patient education video. "Understanding Pain: What to do about it in less than 5 minutes?"	YouTube link: youtube/4b8oB757DKc www.hnehealth.nsw.gov.au/pain
	Institute for Clinical Systems Improvement (ICSI) Assessment & management of chronic pain. Clinical practice guideline on chronic pain.	www.icsi.org/guidelines_and_more/gl_os_prot/search for guidelines on pain
	International Association for the Study of Pain (IASP) Professional organization for researchers, clinicians, and educators. Have some public education resources.	www.iasp-pain.org
	Mayday Pain Project Educational information for providers, patients, and specific sections for caregivers.	www.painandhealth.org
	California Department of Industrial Relations Medical Treatment Utilization Schedule (MTUS). Medical Treatment Guideline for chronic pain.	www.dir.ca.gov/dwc/MTUS/MTUS_RegulationsGuidelines.html select "Chronic pain medical treatment guidelines"
	Neil Pearson, PT Canadian physical therapist discusses nervous system sensitization in a 3-part video.	www.Lifeisnow.ca
	Pain Treatment Topic Educational material for clinicians, patients, and families. Links to resources on many other sites. Comprehensive section on pain assessment tools.	www.pain-topics.org
	Pain.com Educational modules and articles for clinicians.	www.pain.com
	PainAction Educational material for patients. Includes self-management tools. Integrated with clinician educational site PainEDU.com.	www.painaction.com
PainDoctor.com Educational material for patients and families.	www.paindoctor.com	
PainEDU.org Educational material for clinicians and educators. Includes downloadable PowerPoint lectures. Integrated with patient education site PainAction.	www.painedu.org	
UMass Center for Mindfulness List of mindfulness based stress reduction programs.	w3.umassmed.edu/MBSR/public/searchmember.aspx	

REFERENCES

- Nicholas MK, George SZ. Psychologically informed interventions for low back pain: an update for physical therapists. *Phys Ther*. 2011;91(5):765-776.
- California Department of Industrial Relations. *Chronic Pain Medical Treatment Guidelines, in Medical Treatment Utilization Schedule (MTUS)*, 2009. http://www.dir.ca.gov/dwc/DWCPropRegs/MTUS_Regulations/MTUS_ChronicPainMedicalTreatment-Guidelines.pdf. Accessed March 10, 2014.
- Wang R, King T, De Felice M, Guo W, Ossipov MH, Porreca F. Descending facilitation maintains long-term spontaneous neuropathic pain. *J Pain*. 2013;14(8):845-853.
- Woolf CJ. Central sensitization: implications for the diagnosis and treatment of pain. *Pain*. 2011;152(3 Suppl):S2-S15.
- Bergbom S, Boersma K, Overmeer T, Linton SJ. Relationship among pain catastrophizing, depressed mood, and outcomes across physical therapy treatments. *Phys Ther*. 2011;91(5):754-764.
- Young Casey C, Greenberg MA, Nicassio PM, Harpin RE, Hubbard D. Transition from acute to chronic pain and disability: a model including cognitive, affective, and trauma factors. *Pain*. 2008;134(1-2):69-79.
- Institute for Clinical Systems Improvement (ICSI). *Assessment and Management of Chronic Pain: in Health Care Guideline*, 2011. https://www.icsi.org/_asset/bw798b/ChronicPain.pdf. Accessed March 10, 2014.
- Cunningham NR, Kashikar-Zuck S. Nonpharmacological treatment of pain in rheumatic diseases and other musculoskeletal pain conditions. *Curr Rheumatol Rep*. 2013;15(2):306.
- Sveinsdottir V, Eriksen HR, Reme SE. Assessing the role of cognitive behavioral therapy in the management of chronic nonspecific back pain. *J Pain Res*. 2012;5:371-380.
- Seminowicz DA, Wideman TH, Naso L, et al. Effective treatment of chronic low back pain in humans reverses abnormal brain anatomy and function. *J Neurosci*. 2011;31(20):7540-7550.
- Asghari A, Nicholas MK. Pain self-efficacy beliefs and pain behaviour. A prospective study. *Pain*. 2001;94(1):85-100.
- Foster NE, Delitto A. Embedding psychosocial perspectives within clinical management of low back pain: integration of psychosocially informed management principles into physical therapist practice—challenges and opportunities. *Phys Ther*. 2011;91(5):790-803.
- Nielsen M, Keefe FJ, Bennell K, Jull GA. Physical therapist-delivered cognitive-behavioral therapy: a qualitative study of physical therapists' perceptions and experiences. *Phys Ther*. 2014;94(2):197-209.
- Wiech K, Ploner M, Tracey I. Neurocognitive aspects of pain perception. *Trends Cogn Sci*. 2008;12(8):306-313.
- Wiech K, Tracey I. The influence of negative emotions on pain: behavioral effects and neural mechanisms. *Neuroimage*. 2009;47(3):987-994.
- Benedetti F, Thoen W, Blanchard C, Vighetti S, Arduino C. Pain as a reward: changing the meaning of pain from negative to positive co-activates opioid and cannabinoid systems. *Pain*. 2013;154(3):361-367.
- Martenson ME, Cetas JS, Heinricher MM. A possible neural basis for stress-induced hyperalgesia. *Pain*. 2009;142(3):236-244.
- Sprenger C, Eippert F, Finsterbusch J, Bingel U, Rose M, Buchel C. Attention modulates spinal cord responses to pain. *Curr Biol*. 2012;22(11):1019-1022.
- Bingel U, Wanigasekera V, Wiech K, et al. The effect of treatment expectation on drug efficacy: imaging the analgesic benefit of the opioid remifentanyl. *Sci Transl Med*. 2011;3(70):70ra14.
- Pincus T, Burton AK, Vogel S, Field AP. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. *Spine*. 2002;27(5):E109-E120.
- Martinez-Lavin M. Fibromyalgia: when distress becomes (un)sympathetic pain [published online ahead of print 2012]. *Pain Res Treat*. 2012. doi:10.1155/2012/981565.
- Eijsbouts AM, Murphy EP. The role of the hypothalamic-pituitary-adrenal axis in rheumatoid arthritis. *Baillieres Best Pract Res Clin Rheumatol*. 1999;13(4):599-613.
- Heim C, Ehlert U, Hanker JP, Hellhammer DH. Abuse-related posttraumatic stress disorder and alterations of the hypothalamic-pituitary-adrenal axis in women with chronic pelvic pain. *Psychosom Med*. 1998;60(3):309-318.
- Chen X, Green PG, Levine JD. Stress enhances muscle nociceptor activity in the rat. *Neuroscience*. 2011;185:166-173.
- Quintero L, Cardenas R, Suarez-Roca H. Stress-induced hyperalgesia is associated with a reduced and delayed GABA inhibitory control that enhances post-synaptic NMDA receptor activation in the spinal cord. *Pain*. 2011;152(8):1909-1922.
- van Koulil S, Kraaijaak FW, van Lankveld W, et al. Cognitive-behavioral mechanisms in a pain-avoidance and a pain-persistence treatment for high-risk fibromyalgia patients. *Arthritis Care Res (Hoboken)*. 2011;63(6):800-807.
- Burns JW, Kubilus A, Bruehl S, Harden RN. A fourth empirically derived cluster of chronic pain patients based on the multidimensional pain inventory: evidence for repression within the dysfunctional group. *J Consult Clin Psychol*. 2001;69(4):663-673.
- Flor H, Turk D. *Chronic Pain: An Integrated Biobehavioral Approach*. Seattle, WA: IASP Press; 2011.
- Jensen MP. Psychosocial approaches to pain management: an organizational framework. *Pain*. 2011;152(4):717-725.
- Broderick JE, Junghaenel DU, Turk DC. Stability of patient adaptation classifications on the multidimensional pain inventory. *Pain*. 2004;109(1-2):94-102.
- Gersh E, Arnold C, Gibson SJ. The relationship between the readiness for change and clinical outcomes in response to multidisciplinary pain management. *Pain Med*. 2011;12(1):165-172.
- Kerns RD, Habib S. A critical review of the pain readiness to change model. *J Pain*. 2004;5(7):357-367.
- Thieme K, Turk DC. Cognitive-behavioral and operant-behavioral therapy for people with fibromyalgia. *Reumatismo*. 2012;64(4):275-285.
- Mann EG, Lefort S, Vandenkerkhof EG. Self-management interventions for chronic pain. *Pain Manag*. 2013;3(3):211-222.
- Louw A, Puentedura EL, Mintken P.

- Use of an abbreviated neuroscience education approach in the treatment of chronic low back pain: a case report. *Physiother Theory Pract*. 2012;28(1):50-62.
36. Meeus M, Nijs J, Van Oosterwijck J, Van Alsenoy V, Truijien S. Pain physiology education improves pain beliefs in patients with chronic fatigue syndrome compared with pacing and self-management education: a double-blind randomized controlled trial. *Arch Phys Med Rehabil*. 2010;91(8):1153-1159.
 37. Louw A. *Why Do I Hurt? A Patient Book About the Neuroscience of Pain*. Minneapolis, MN: International Spine and Pain Institute; 2013.
 38. Butler D, Moseley L. *Explain Pain*. Adelaide: Noigroup Publications; 2003.
 39. Apkarian AV, Hashmi JA, Baliki MN. Pain and the brain: specificity and plasticity of the brain in clinical chronic pain. *Pain*. 2011;152(3 Suppl):S49-S64.
 40. Olango WM, Finn DP. Neurobiology of stress-induced hyperalgesia [published online ahead of print May 22, 2014]. *Curr Top Behav Neurosci*. 2014. PMID: 24850075
 41. Bishop SR. What do we really know about mindfulness-based stress reduction? *Psychosom Med*. 2002;64(1):71-83.
 42. Merkes M. Mindfulness-based stress reduction for people with chronic diseases. *Aust J Prim Health*. 2010;16(3):200-210.
 43. Reiner K, Tibi L, Lipsitz JD. Do mindfulness-based interventions reduce pain intensity? a critical review of the literature. *Pain Med*. 2013;14(2):230-242.
 44. Veehof MM, Oskam MJ, Schreurs KM, Bohlmeijer ET. Acceptance-based interventions for the treatment of chronic pain: a systematic review and meta-analysis. *Pain*. 2011;152(3):533-542.
 45. Davidson RJ, Kabat-Zinn J, Schumacher J, et al. Alterations in brain and immune function produced by mindfulness meditation. *Psychosom Med*. 2003;65(4):564-570.
 46. Gard T, Holzel BK, Sack AT, et al. Pain attenuation through mindfulness is associated with decreased cognitive control and increased sensory processing in the brain. *Cereb Cortex*. 2012;22(11):2692-2702.
 47. Holzel BK, Carmody J, Vangel M, et al. Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Res*. 2011;191(1):36-43.
 48. Light KC, White AT, Tadler S, Jacob E, Light AR. Genetics and gene expression involving stress and distress pathways in fibromyalgia with and without comorbid chronic fatigue syndrome [published online ahead of print 2012]. *Pain Res Treat*. 2012. doi:10.1155/2012/427869.
 49. Martinez-Lavin M. Biology and therapy of fibromyalgia. Stress, the stress response system, and fibromyalgia. *Arthritis Res Ther*. 2007;9(4):216.
 50. McEwen BS, Kalia M. The role of corticosteroids and stress in chronic pain conditions. *Metabolism*. 2010;59 Suppl 1:S9-S15.
 51. Ozgocmen S, Cimen OB, Ardicoglu O. Relationship between chest expansion and respiratory muscle strength in patients with primary fibromyalgia. *Clin Rheumatol*. 2002;21(1):19-22.
 52. Busch V, Magerl W, Kern U, Haas J, Hajak G, Eichhammer P. The effect of deep and slow breathing on pain perception, autonomic activity, and mood processing—an experimental study. *Pain Med*. 2012;13(2):215-228.
 53. Chalaye P, Goffaux P, Lafrenaye S, Marchand S. Respiratory effects on experimental heat pain and cardiac activity. *Pain Med*. 2009;10(8):1334-1340.
 54. Tan G, Craine MH, Bair MJ, et al. Efficacy of selected complementary and alternative medicine interventions for chronic pain. *J Rehabil Res Dev*. 2007;44(2):195-222.
 55. Emery CF, France CR, Harris J, Norman G, Vanarsdalen C. Effects of progressive muscle relaxation training on nociceptive flexion reflex threshold in healthy young adults: a randomized trial. *Pain*. 2008;138(2):375-379.
 56. Chen YL, Francis AJ. Relaxation and imagery for chronic, nonmalignant pain: effects on pain symptoms, quality of life, and mental health. *Pain Manag Nurs*. 2010;11(3):159-168.
 57. Dayapoglu N, Tan M. Evaluation of the effect of progressive relaxation exercises on fatigue and sleep quality in patients with multiple sclerosis. *J Altern Complement Med*. 2012;18(10):983-987.
 58. Mitani S, Fujita M, Sakamoto S, Shirakawa T. Effect of autogenic training on cardiac autonomic nervous activity in high-risk fire service workers for post-traumatic stress disorder. *J Psychosom Res*. 2006;60(5):439-444.
 59. van den Hout JH, Vlaeyen JW, Heuts PH, Zijlema JH, Wijnen JA. Secondary prevention of work-related disability in nonspecific low back pain: does problem-solving therapy help? A randomized clinical trial. *Clin J Pain*. 2003;19(2):87-96.
 60. Tan EP, Tan ES, Ng BY. Efficacy of cognitive behavioural therapy for patients with chronic pain in Singapore. *Ann Acad Med Singapore*. 2009;38(11):952-959.
 61. Tan G, Teo I, Anderson KO, Jensen MP. Adaptive Versus Maladaptive Coping and Beliefs and Their Relation to Chronic Pain Adjustment. *Clin J Pain*. 2011;27(9):769-774.
 62. Rundell SD, Davenport TE. Patient education based on principles of cognitive behavioral therapy for a patient with persistent low back pain: a case report. *J Orthop Sports Phys Ther*. 2010;40(8):494-501.
 63. Linton SJ, Nicholas MK, MacDonald S, et al. The role of depression and catastrophizing in musculoskeletal pain. *Eur J Pain*. 2011;15(4):416-422.
 64. Nicholas MK, Linton SJ, Watson PJ, Main CJ. Early identification and management of psychological risk factors ("yellow flags") in patients with low back pain: a reappraisal. *Phys Ther*. 2011;91(5):737-753.
 65. Benedetti F, Amanzio M. The placebo response: how words and rituals change the patient's brain. *Patient Educ Couns*. 2011;84(3):413-419.
 66. Cuijpers P, van Straten A, Warmerdam L. Behavioral activation treatments of depression: a meta-analysis. *Clin Psychol Rev*. 2007;27(3):318-326.
 67. Castro MM, Daltro C. Sleep patterns and symptoms of anxiety and depression in patients with chronic pain. *Arq Neuropsiquiatr*. 2009;67(1):25-28.
 68. Davies KA, Macfarlane GJ, Nicholl BI, et al. Restorative sleep predicts the resolution of chronic widespread pain: results from the EPIFUND

- study. *Rheumatology (Oxford)*. 2008;47(12):1809-1813.
69. Jungquist CR, O'Brien C, Matteson-Rusby S, et al. The efficacy of cognitive-behavioral therapy for insomnia in patients with chronic pain. *Sleep Med*. 2010;11(3):302-309.
 70. Buman MP, Phillips BA, Youngstedt SD, Kline CE, Hirshkowitz M. Does nighttime exercise really disturb sleep? Results from the 2013 National Sleep Foundation Sleep in America Poll. *Sleep Med*. 2014;15(7):755-761.
 71. Hallman DM, Olsson EM, von Scheele B, Melin L, Lyskov E. Effects of heart rate variability biofeedback in subjects with stress-related chronic neck pain: a pilot study. *Appl Psychophysiol Biofeedback*. 2011;36(2):71-80.
 72. Van Diest I, Verstappen K, Aubert AE, Widjaja D, Vansteenwegen D, Vlemincx E. Inhalation/exhalation ratio modulates the effect of slow breathing on heart rate variability and relaxation [published online ahead of print August 26, 2014]. *Appl Psychophysiol Biofeedback*. 2014. PMID: 25156003
 73. McKee MG. Biofeedback: an overview in the context of heart-brain medicine. *Cleve Clin J Med*. 2008;75 Suppl 2:S31-34.
 74. George SZ, Stryker SE. Fear-avoidance beliefs and clinical outcomes for patients seeking outpatient physical therapy for musculoskeletal pain conditions. *J Orthop Sports Phys Ther*. 2011;41(4):249-259.
 75. Priganc VW, Stralka SW. Graded motor imagery. *J Hand Ther*. 2011;24(2):164-168; quiz 169.
 76. Bennell KL, Ahamed Y, Bryant C, et al. A physiotherapist-delivered integrated exercise and pain coping skills training intervention for individuals with knee osteoarthritis: a randomised controlled trial protocol [published online ahead of print July 24, 2012]. *BMC Musculoskelet Disord*. 2012. doi:10.1186/1471-2474-13-129.
 77. van Koulil S, van Lankveld W, Kraaimaat FW, et al. Tailored cognitive-behavioral therapy and exercise training for high-risk patients with fibromyalgia. *Arthritis Care Res (Hoboken)*. 2010;62(10):1377-1385.
 78. Saper JR. "Are you talking to me?" confronting behavioral disturbances in patients with headache. *Headache*. 2006;46 Suppl 3:S151-156.
 79. Klyman CM, Browne M, Austad C, Spindler EJ, Spindler AC. A workshop model for educating medical practitioners about optimal treatment of difficult-to-manage patients: utilization of transference-countertransference. *J Am Acad Psychoanal Dyn Psychiatry*. 2008;36(4):661-676.
 80. Stebnicki MA. Stress and grief reactions among rehabilitation professionals: Dealing effectively with empathy fatigue. *J Rehabil*. 2000;66(1):23-29.

Every accomplishment begins with the decision to start!

CONTINUING PHYSICAL THERAPY EDUCATION

LEARNING
Your Way

Scan the QR code and go to the Web site for details about courses, fees, and educational credit.

ORTHOP WWW. .ORG

ADDITIONAL QUESTIONS?

Call toll free: 800-444-3982 or visit our Web site

APTA
Designed for Individual Continuing Education