Psychological Treatments for Chronic Pain

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Introduction: Chronic pain is defined as pain that persists beyond the expected time of healing (Loeser, 1991). The Institute of Medicine (2011) estimates that 100 million Americans experience some form of persistent pain with an estimated cost to society of $600 billion per year. Jensen and Turk (2014) note that the prevalence of chronic pain now exceeds the accumulated rate of heart disease, diabetes and cancer. Gatchel & Oordt (2003) point out that chronic pain has multifactorial etiology that includes biological, psychological, social, and cultural factors. There is a wide array of biomedical treatments for chronic pain. However, the efficacy rates for these treatments have not been satisfactory (Chou et al., 2009; Turk & Theodore, 2011; Institute of Medicine, 2011) leading patients and their health care providers to seek other forms of treatment. This article will focus on psychological approaches to treating chronic pain.

Psychological factors: Psychological factors that may contribute to the experience of pain include mood, attention, quality of sleep, feelings of helplessness, depression, and anxiety, as well as beliefs about causation and ability to cope with or manage pain (Gatchel, 2004; Jensen & Turk, 2014; Williams, 2010) . The presence of psychological factors in chronic pain does *not* rule out the presence of biomedical factors; patients often interpret the identification of psychological factors to mean that the health care provider thinks that their pain is "all in their head" or, even worse, that they are "crazy." This may lead to wariness in trying psychological treatments that might be helpful in reducing and managing chronic pain.

Theory: The neuromatrix theory of pain posits that the perception of painful stimuli does not result from the brain's passive registration of tissue trauma, but from its active generation of subjective experiences through a network of neurons known as the neuromatrix (Melzack, 2001). May (2008) showed that changes in interacting areas of the brain that make up the "pain matrix" can differentiate chronic pain sufferers from healthy controls. The regions of the brain in this pain matrix include those identified in the affective, sensory, and cognitive elements of pain (Rainville et al., 1997; Luu & Posner, 2003; Jackson et al., 2006). These brain differences in patients with chronic pain are *not* believed to play a causative role in the development of chronic pain, but rather are the *result* of the chronic pain. These brain changes may negatively affect not only the patient's experience of the pain, but also the patient's ability to manage and cope with the pain as well as participate effectively in activities of daily living.

Opioids: In an article discussing psychological treatments of chronic pain it is important to point out that patients with chronic pain are frequently treated with increasingly large doses of opioid pain medications such as hydrocodone and oxycodone for an extended period of time. These central nervous system depressant medications may interfere with cognitive functioning. They can also produce emotional effects such as irritability, which may interfere with social and occupational functioning. The development of opioid dependence is another risk of chronic opioid use.

Cognitive behavior therapy: A variety of psychological treatments are available for treating patients with chronic pain. One such treatment, with evidence-based support (Williams et al., 2012), is cognitive behavior therapy (CBT). CBT can target the cognitions, emotions and behaviors associated with chronic pain, such as, beliefs related to chronic pain that negatively affect a patient's functioning. For example, the belief that, "My life is ruined because I can't do what I used to do," might be reframed to, "There are other activities I can do that will meet the goals I had for my former activities." In a controlled study of CBT with chronic pain, Smeets et al. (2006) showed that change in pain beliefs was the mediator in improvements in pain intensity as well as disability status. The research has not shown strong evidence for long-term maintenance of the positive effects of treatment, suggesting that ongoing support might be helpful in maintaining the gains.

Acceptance and commitment therapy: Another psychological approach to treatment of chronic pain is Acceptance and Commitment Therapy (ACT). ACT for chronic pain is based on the theory that avoidance of pain and situations that might lead to pain results in lower quality of life, increased disability, and poor development of skills for coping with pain. Instead, ACT uses a mindfulness-based approach to teach acceptance of thoughts and feelings. A number of randomized controlled trials (RCTs) provide support for the effectiveness of ACT in coping with chronic pain (McCracken & Vowles, 2014).

Mindfulness-based stress reduction: Mindfulness-based stress reduction (MBSR) is another psychological intervention that has been used to treat chronic pain (Kabat-Zinn, 1982). Studies have shown improvements in pain ratings, other medical symptoms, psychological functioning, and decreased use of medical services. Cherkin et al. (2016) showed MBSR and CBT to be equally superior to Treatment as Usual (TAU) in treating chronic low back pain.

Interdisciplinary treatment: Due to the ever-increasing evidence for the multifactorial causation of chronic pain, interdisciplinary treatment is gaining increasing recognition as the gold standard for treating chronic pain (Institute of Medicine, 2011; Monson et al., 2012; Gatchel et al., 2014). Interdisciplinary treatment programs for chronic pain typically include medical monitoring, physical activity (e.g., physical therapy,

exercise, yoga) and a psychological component (e.g., psychotherapy, biofeedback). Interdisciplinary programs commonly focus on teaching the patient pain self-management strategies, thereby reducing their dependence on health care providers.

Biofeedback: Biofeedback involves measuring a pain-related physiological parameter in a patient in "real time" and "feeding back" the measurement information to the patient and therapist via a computer with monitor. The purpose of the biofeedback is to facilitate the patient's ability to influence the physiological parameter being measured. Patients can learn not only to influence their physiology, but also to identify cognitive and situational triggers for changes in physiology. These triggers can then be addressed by the therapist in psychotherapy. The most common biofeedback modalities used in chronic pain treatment are electromyography (EMG), thermal (blood vessel constriction: BVC) and heart rate variability (HRV).

EMG biofeedback treatment is used to treat the chronic muscle tension that leads to chronic muscle pain. Electrodes are placed on the skin in the area of the affected muscles. Patients are then taught how to influence the levels of muscle tension and are able monitor their progress via the computer. Patients also learn that their muscle tension fluctuates as they experience different emotions, providing direct evidence for the mind-body connection. Evidence for the efficacy of EMG biofeedback is strongest for temporomandibular joint disorder (TMD), tension headaches, and migraine headaches (Crider et al., 1999; Schwartz & Andrasik, 2003). Clinical observation of benefit supports the use of EMG biofeedback in the treatment of neck and back pain as well as fibromyalgia, though the research evidence isn't strong (Mayo Clinic Health Letter, 2013).

Heart rate variability (HRV) biofeedback involves the use of paced breathing to increase self-regulation of the autonomic nervous system. Using external sensors, the patient's cardiac and respiration rates are measured and this information is displayed for the therapist and patient via computer with monitor. The patient is then taught to breathe at a rate of ten or fewer breaths per minute in order to induce a state of autonomic "balance." Autonomic balance can be described as a physiological state in which sympathetic activation is decreased and parasympathetic activation increased. It may be that this change in autonomic activity affects the previously mentioned "pain matrix" in the brain to reduce the patient's experience of the pain. Studies by Hallmann et al. (2011) and Schmidt et al. (2013), showed decreased levels of pain in patients with neck pain and TMD respectively.

Future directions: Although there have been many advances in the understanding and treatment of psychological components of chronic pain, there is still much work to be done, both in research and practice. A collaboration between researchers and clinicians is indeed warranted, in order to address the barriers to clinical improvement and to disseminate and apply the large body of research to clinical practice in a more impactful manner. For example, the first author (Harpin) has 40 years of clinical experience in

chronic pain and a growing body of research that suggests that the way individuals with chronic pain relate to themselves may impact their functional impairment and how they respond to treatment. Often people with chronic pain judge themselves harshly for their pain conditions, and/or refuse to prioritize their self-care because of long-held beliefs about putting the needs of others ahead of their own. A treatment program has been developed at the Sharp Hospital's Pain Rehabilitation Program to address this need, incorporating evidence-based psychotherapeutic modalities as well as a novel focus on self-compassion.

One of the co-authors of this article (Gammon, 2016) conducted a controlled trial of the outpatient interdisciplinary self-compassion-based intervention at the Sharp Pain Program. One-hundred-twenty-six patients participated in one of two mindfulness- and acceptance- based interventions. 1) (TAU) comprising behavioral therapy, biofeedback, and physical therapy; or 2) Therapeutic Self-Care (TSC), a structured 12-week group intervention in which TAU modalities were integrated within a self-compassion framework. Self-compassion, pain and depression were measured at baseline, and post-intervention. Both interventions demonstrated comparable statistically significant reductions in depression. Significant improvements in self-compassion and pain were observed only in the TSC condition, although the between-group differences in these domains were not significant. Additionally, improvements in self-compassion in the TSC group were significantly related to improvements in depression and pain. The results of this study suggest that self-compassion may be an important treatment target for individuals with chronic pain. Gammon's study reflects a much larger movement in the field to develop and assess integrative treatments for chronic pain that promote self-management of chronic pain and refine our understanding of which treatment approaches are most beneficial for which patients.

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