

Chronic Pain: Perspective on the Second Wave



Leah M. Adams and Dennis C. Turk

Chronic pain, typically assessed as pain that persists for longer than 6 months, remains a significant public health issue affecting millions of people worldwide (Goldberg & McGee, 2011). Based on epidemiologic data from the 2016 National Health Interview Survey (NHIS), the Center for Disease Control and Prevention (CDC) estimated that approximately 20% of adults had chronic pain and 8% had high impact chronic pain (i.e., chronic pain that inhibited daily functioning). Chronic pain has been linked to anxiety, depression, disability, dependence on opioids, as well as poor perceived health and health-related quality of life. In the United States chronic pain is one of the most common reasons adults seek medical care (Rasu et al., 2013).

Chronic pain is not a single, cohesive disorder. Instead, it is a generic classification that includes a wide range of disorders. Individuals with chronic pain comprise a disparate group, with varying underlying pathophysiology, and widely diverse impacts on quality of life, function, and demands on the healthcare provider and society (Turk & Okifuji, 2002). It is a mistake to characterize all individuals with chronic pain as chronic pain patients, as for the majority of the time they are simply people living with chronic pain. It is only when they are in the office of healthcare providers that they become “patients,” just as a person with diabetes has to self-manage and cope with the impact of the disease on their lives and do not refer to themselves as “diabetic patients.” Unfortunately, for many people as pain becomes more chronic, they often come to develop an identity as a disabled chronic pain patient (Gatchel et al., 2007). This belief can set the individual with pain up for passivity, a “sick person” role, withdrawal, helplessness, and the downward spiral

L. M. Adams

Department of Psychology, George Mason University, Fairfax, VA, USA

D. C. Turk (✉)

Department of Anesthesiology and Pain Medicine, University of Washington,
Seattle, WA, USA

e-mail: turkdc@uw.edu

continues. These self-perceptions contribute to greater demoralization, passivity and ultimately, disability (Flor & Turk, 2011).

The relationship between the subjective experience of pain and pathoanatomic findings is often poor (Brinjiki et al., 2014). Moreover, for many chronic pain disorders (e.g., low back pain, fibromyalgia, headache) there usually is no objective evidence of underlying pathology that explains the symptoms making the diagnosis often somewhat challenging.

Despite truly impressive advances in medical and surgical interventions, including the development of novel drug treatments, chronic pain persists, as do its psychological, emotional, and social impacts (Turk et al., 2011). This is not to say that improvement in chronic pain management and reduction of its impact on quality of life is impossible (Gatchel et al., 2007).

There is a growing consensus that all chronic pain conditions reflect an amalgam of biologic, psychological, and social factors that is best assessed with a multidimensional perspective to determine further evaluation and treatment options. The International Association for the Study of Pain has recently updated the original 1979 definition to reflect advancements in the understanding of pain and to acknowledge that pain may exist even in the absence of objective physical pathology (Raja et al., 2020). The revised definition states that pain is “an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage,” and is expanded upon by the addition of six key notes and the etymology of the word “pain” for further valuable context:

- Pain is always a personal experience that is influenced to varying degrees by biological, psychological, and social factors.
- Pain and nociception are different phenomena. Pain cannot be inferred solely from activity in sensory neurons (i.e., nociception).
- Through their life experiences, individuals learn the concept of pain.
- A person’s report of an experience as pain should be respected.
- Although pain usually serves an adaptive role, it may have adverse effects on function and social and psychological well-being.

International guidelines have proliferated for treating chronic pain using nonpharmaceutical, noninvasive, biopsychosocial therapies, as well as traditional medical modalities (e.g., Almeida et al., 2018; Qaseem et al., 2017; Van Wamneke et al., 2017).

The primary foci of treatments recommended for patients with chronic pain emphasize physical and functional improvements and gains in health-related quality of life, rather than an exclusive focus on “cure” or the complete elimination of pain (Flor & Turk, 2011; McCracken & Marin, 2014). There is support for the effectiveness of these multidisciplinary and multimodal treatments across several pain conditions (e.g., lower-back pain, fibromyalgia) (Guzmán et al., 2001; Hauser et al., 2009; Kamper et al., 2014). However, the results of these treatments have not always been consistent as evidence by meta-analyses (e.g., NICE, 2020; Williams et al., 2012). The NICE draft guideline does support the beneficial effects of

Cognitive-Behavioral Therapy (CBT, i.e., “second-wave”) and Acceptance and Commitment Therapy (ACT, a “third-wave” approach).

Much like chronic pain, psychological intervention has many manifestations with specific practices emanating from varied sources (i.e., theoretical orientations). Even though these conceptualizations and practices can be further categorized by psychotherapeutic paradigm (e.g., behavior therapy, psychoanalytic therapy), there are key differences within a paradigm that have emerged over time. In this chapter, we aim to highlight the contributions of CBT, the second wave of behavior therapy, namely, to the treatment of individuals experiencing chronic pain. We accomplish this by identifying primary distinctions between the approaches (i.e., conceptualizations, goals, practices) of the second wave and the first and third waves of behavior therapy, applying a CBT conceptualization to a sample case, and ending with an examination of the evidence base for each of the three waves. We believe that moving towards an understanding of *under which circumstances* and *for whom* each wave’s perspective and tools provide maximum benefit is a more fruitful endeavor than simply choosing a “top contender” across all conditions or all patients.

Variations in Chronic Pain Treatment Across Waves of Behavior Therapy

Although we emphasize differences in this chapter, it is evident that the three “waves” of behavior therapy share some common components, such as building a working alliance between therapist and patient, engaging patient motivation, and promoting self-management through patients’ actions (Table 1). In this section, we provide a brief overview of each wave’s foundational principles and discuss how they conceptualize the maintenance of chronic pain and pain interference. We also note the goals of psychological intervention for chronic pain according to each paradigm.

First Wave

First wave approaches to pain treatment focus on the roles of classical conditioning, operant conditioning, and social learning (de Jong et al., 2005; Goubert et al., 2011; Morley, 2011). First wave clinicians conceptualize behaviors like activity-restriction, avoidance of pain-exacerbating experiences, and visible pain behaviors (e.g., verbal reports, gestures, medical visits) using these concepts. Classical conditioning principles can help explain activity-restriction and avoidance of subsequent pain. For example, a person who experiences a pain flare-up while engaging in a favorite activity (e.g., gardening) may become “conditioned” (learn) to experience a negative emotional reaction the next time they are tending to their garden. Eventually, they

Table 1 Comparisons of three waves of behavior therapy approaches to chronic pain treatment

	First-wave	Second-wave	Third-wave
Assumptions regarding what maintains pain & pain-behaviors?	Reinforcement for pain behaviors Lack of positive reinforcement for “well” behaviors	Negative beliefs about pain Catastrophic thinking Low perceived control Low self-efficacy Reinforcement of pain behaviors Lack of positive reinforcement for “well behaviors”	Futile attempts to control one’s thoughts, feelings, and sensations Constant seeking of symptom relief, rather than striving for personal life goals and values
Goals for treatment	Modify pain-related behaviors	Promote self-management of pain Reduce pain-related distress Reduce pain-related interference Modify pain-related behaviors Correct maladaptive and unhelpful thoughts and beliefs related to pain Increase self-efficacy for pain management	Promote self-management of pain Reduce prominent role of pain Acceptance of pain Increase personal goal- and values-directed behavior
Techniques used in treatment	Engaging patient motivation Exposure Changing environmental contingencies	Alliance building Engaging patient motivation Guided training and practice with techniques Cognitive restructuring Relaxation training Activity pacing Assertiveness training Out-of-session practice	Alliance building Engaging patient motivation Values identification Mindfulness practice Metaphor Paradox

may avoid gardening entirely out of fear that they will experience more pain in the future. Notably, anticipatory fear acquired through such conditioning is used to explain why avoidance behavior is maintained.

Although practitioners of the first wave acknowledge that pain is largely a private experience, they emphasize that pain plays an important communication role and that publicly observable expressions of pain are reinforced by one’s environment (hence, operant conditioning), noting that pain interference persists due to reinforced pain-related behaviors (e.g., reduced physical activity, medication use, limited social interactions) and lack of positive reinforcement for “well” behaviors (Morley, 2011). The maintenance of pain behaviors can be understood through operant conditioning and social learning principles in which people directly

experience or learn from viewing others that some pain behaviors are reinforced. For example, a person whose partner provides more caring attention when they verbalize their pain experience or is able to briefly escape pain by resting will be reinforced to continue to speak up about their pain and to continue to avoid activity. Importantly, these behaviors may continue to occur despite potential disruption caused in the relationship (e.g., caregiver burden) or further physical deconditioning that contributes to subsequent pain.

Within the first-wave conceptualization of chronic pain treatment, intervention focuses on modifying pain-related behaviors (Morley, 2011). From a classical conditioning perspective, exposure to the feared and avoided behavior (e.g., physical activity) is key. Repeatedly engaging in the behavior produces progressively less pain than anticipated, which leads to reduced anticipatory fear, anxiety, and avoidance associated with the behavior (Boersma et al., 2004; de Jong et al., 2005). Operant conditioning and social learning principles are used in first wave interventions for chronic pain by changing environmental contingencies and settings where pain behaviors take place (Flor & Turk, 2011). For example, families can be taught to ignore pain behaviors in their loved ones, and instead reinforce wellness behaviors (e.g., Thieme et al. 2005). Operating in tandem, the combination of exposure to more activities and revised patterns of reinforcement can help move the attention away from pain and its associated behaviors to improved functioning and better quality of life.

Second Wave – Cognitive-Behavioral Therapy

First wave approaches emphasize overt behaviors largely to the exclusion of the interior workings (e.g., thoughts, emotions) of the person (Morley & Williams, 2015). The development of cognitive therapy in the 1960s, with its focus on the mediational role play by an individual's interpretation of their events, such as their beliefs about the situation and expectations about what may come, on their emotional and behavioral responses provided a new perspective to the treatment of chronic pain. The integration of the behavioral perspective and cognitive perspective into the cognitive-behavioral (CB) perspective is a hallmark of second wave approaches to chronic pain treatment. The CB perspective has a set of key assumptions (Turk & Meichenbaum, 1984). These include:

- Individuals are active processors of information rather than passive reactors.
- Individuals' thoughts (e.g., appraisals, attributions, expectancies) can elicit or modulate their affect and physiological arousal, both of which may serve as impetuses for behaviors. Conversely affect, physiological processes, and behavior can instigate or influence individuals thinking processes and the content of their thoughts.
- Behavior is reciprocally determined by the environment, contextual factors, and individuals.

- Individuals have learned maladaptive ways of thinking, feeling, and responding based on their experiences.
- In the same way as individuals are instrumental in developing and maintaining maladaptive thoughts, feelings, and behavior; they can, are, and should be considered as active agents of change of their own maladaptive modes of responding.

Although the American Psychological Association has deleted the hyphen from the original formulation (Meichenbaum, 1995), we believe the hyphen is important as it underscores the interaction of behavioral and cognitive principles. As we discuss later, it is important to distinguish between the general CB perspective and the particular techniques used within it; specific practices often reflect a single component (i.e., cognitive technique, behavioral technique), but are used jointly to reflect the contributions and interactions of both perspectives.

Applied to the treatment of chronic pain, CBT incorporated elements from the Gate Control Theory (GCT) of pain, which integrated psychological with physiological factors to understand the experience of pain (Melzack & Wall, 1965). According to GCT, a trio of systems, sensory-discriminative, motivational-affective, and cognitive-evaluative, are involved in the subjective experience of pain. Notably, the theory not only highlighted the presence of psychological processes in the interpretation of pain, but also postulated that both physiological and psychological factors can each amplify, attenuate, and moderate the perception of pain. This theory continues to provide a strong foundation for understanding and intervening upon chronic pain, spurring the development of subsequent frameworks that incorporate the influence of psychological factors into the pain experience, hence the biopsychosocial model (Gatchel et al., 2007; Jensen & Turk, 2014), under which many practitioners of second wave approaches to pain treatment operate.

The CBT perspective maintains the importance of pain behaviors, conditioning, and social learning indicative of the first wave approaches, but supplemented this conceptualization with the role of cognition and emotion. That is, second wave clinicians recognize that while specific behaviors are critical targets of pain treatment, how a person thinks about their pain and about their life in the presence of pain can have a significant impact on their quality of life. While the CBT conceptualization promotes the importance of psychological factors such as beliefs, expectations, and emotions [] in chronic pain, it is critical to note that it does not presume that pain is *caused* by psychological factors alone. Instead, these features are viewed as necessary to the understanding of how pain is experienced. There is an extensive literature examining the cognitive factors that contribute to the maintenance and progression of chronic pain and disability (Burns et al., 2003; Ehde et al., 2014). We highlight several primary cognitive factors that frequently emerge in this literature, including beliefs about pain, catastrophic thinking, self-efficacy, and perceived control.

Beliefs About Pain

Beliefs about pain develop over time, incorporating the individual's unique learning history (Adams & Turk, 2015; Flor & Turk, 2011). In this way, the combination of reinforced behaviors and conditioned responses contribute to the way in which people with pain interpret their pain experiences. Beliefs about pain play a key role in how people appraise their pain, including its perceived severity and impact, and on how they respond to pain. In an interesting study, Benedetti et al. (2013) induced pain in a group of pain-free adults. They found that when participants were told that the pain indicated that there was an "adverse event," they expressed a lower pain tolerance than those who were told that pain experienced was "beneficial to the muscles," highlighting the role that beliefs play in the subjective experience of pain. Experience of the same event (e.g., pain) can vary widely, in part, because of individual differences in interpretation of the event; these interpretations will lead to drastically different emotional (e.g., fear, anger) and behavioral (e.g., activity, rest) responses. This point reifies the significance of the CBT approach relative to the first wave – because behavior and emotions are influenced by one's interpretation of events, and not just the objective, observable characteristics of the event, an approach that fails to incorporate beliefs may misattribute and or miss-specify the relationships between pain experience and pain behavior.

Catastrophic Thinking

Catastrophic thinking is a cognitive style in which a person expects the worst possible outcome to occur due to a distorted negative view of their problems. As may be clear, this thinking style is particularly unhelpful in the context of chronic pain, with an abundance of evidence suggesting that it is often detrimental (Gatchel et al., 2007). Research highlights that people who endorse more catastrophizing thoughts report more intense pain, more pain-related interference, greater psychological dysfunction, and declines in social support relative to those who do not use this thinking style (Edwards et al., 2006; Quartana et al., 2009; Sullivan et al., 2001; Turner and Aaron, 2001).

In the Fear-Avoidance Model of pain, catastrophic and overly negative thoughts and beliefs about pain promote disabling fear and avoidance of the activity because people misinterpret their pain as a sign of significant injury or pathology, even though this is rarely the case for those with chronic pain (Crombez et al. 2012; Turk & Wilson, 2010). This catastrophic thinking leads to pain-related fear, hypervigilance, and then avoidance, disability, and distress. Importantly, the Fear Avoidance Model incorporates both cognitive (e.g., catastrophic thinking) and behavioral (e.g., activity avoidance) components to explain pain interference. A key benefit of explicitly noting the role of catastrophic thinking is that it represents a robust and modifiable mediator between the behavioral manifestations of activity restriction and avoidance described by conditioning processes mentioned above. In hundreds of

studies, catastrophizing has emerged as both a predictor of poor adjustment to pain and a specific target of intervention [e.g., Edwards et al, 2006].

Reduction of pain catastrophizing may moderate and mediate the outcome of both physical and psychologically focused rehabilitation for chronic low back pain (Bunzil et al. 2006; Goodin et al., 2009; Treharme et al., 2005). Therapies for chronic low back pain that explicitly target pain-related cognitions including, but not limited to, pain catastrophizing appear to be able to modify these cognitions (Bunzil et al, 2006; Goodin et al., 2009). There is also some preliminary data that those who benefit most in terms of pain and disability display the most significant changes in pain-related cognitions (Trompetter et al., 2015). It is important to note that other techniques not targeting catastrophizing thoughts per se, such as (but not limited to) third-wave approaches including mindfulness-based therapies (Day, 2017) and ACT (Feliu-Soler et al., 2018), have also reported decreases in pain catastrophizing after treatment (Vowles et al., 2007).

Perceived Control

When individuals believe that they cannot predict when they will experience pain or that they have no control over its impact, they may lose motivation to engage in self-management strategies needed to function well in the presence of pain. If one cannot control any aspects of experience related to pain, then what use would it be to try anything at all (e.g., medication, psychotherapy, physical therapy) - learned helplessness? Perceived control, then, is another important cognitive contributor that second wave behavioral therapists address in their conceptualization of chronic pain. Data suggest that, in general, people who are low in perceived control over their pain are more likely to feel helpless and report worse pain-related outcomes such as poorer satisfaction with life, worse adaptation to pain, and greater pain intensity (Keefe et al., 2004; Turner et al., 2007). In considering the role of perceived control in pain management, caution is warranted. Within the CBT perspective, practitioners acknowledge that a degree of perceived control over one's life and how it unfolds is relevant to stimulate action, but they also recognize that not all elements of the pain experience are under an individual's direct control. Evidence suggests that when actual control over a situation is low, repeated attempts to control pain or eliminate it may be iatrogenic (Crombez et al., 2008; Gilliam et al., 2010). In the case of chronic pain management from the CBT perspective, the Serenity Prayer provides appropriate guidance: "Grant me the serenity to accept the things I cannot change, courage to change the things I can, and wisdom to know the difference." Indeed, recognizing this difference between that which is under control and that which is not, supports the CBT approach's focus on reducing pain interference, rather than eliminating pain itself (McCracken & Turk, 2002; Turner & Romano, 2001).

Self-Efficacy

If perceived control represents a person's thoughts about the degree to which they can exert influence over their pain experience, self-efficacy represents the extent to which they view themselves as having the skills necessary to successfully perform the tasks needed to effectively do so in a given situation (Bandura, 1978). Within the CBT perspective, self-efficacy is another key cognitive component to target to maximize the benefit of pain treatment. A person's self-efficacy beliefs dictate in which activities they choose to engage, how much effort they put forth, and their degree of persistence in those activities. Self-efficacy can be modified through intervention, and research demonstrates that for people with chronic pain, improvements in self-efficacy can lead to reductions in pain interference, better physical functioning, and improved psychological adjustment (Keefe et al., 2004; Marks, 2001). The principal strategies proposed to increase self-efficacy are performance accomplishments, vicarious experience, verbal persuasion, and awareness of physiological states (Bandura, 1978). Attention to each of these sources of information is integrated into CBT.

Chronic Pain Treatment Within the CBT Approach

The goals of CBT for chronic pain map onto the emphasis on the roles of behavioral, cognitive, and affective factors in the maintenance and progression of chronic pain interference. Importantly, as mentioned above, CBT does not have an explicit focus on reducing or eliminating the experience of pain in and of itself. Instead, emotional distress related to pain and pain-interference are targets (Flor & Turk, 2011; Skinner et al., 2012). Behavioral goals within the CBT paradigm focus on improving physical function and social role function by helping individuals decrease maladaptive behaviors that do not serve their life goals. Affective and cognitive goals focus on identifying and correcting maladaptive thoughts and beliefs, especially related to fear, avoidance, and catastrophizing. Further, CBT for chronic pain emphasize building a person's self-efficacy (a personal judgment of how well one can execute courses of action required to deal with prospective situations, Bandura, 1978) for pain management, including encouraging adaptive levels of perceived control that recognize the potential to exert some influence over one's experience, while maintaining an awareness that some things exist beyond our control. Moreover, the CBT emphasis is not just on suppressing uncontrollable thoughts, which, as noted previously, can have negative unintentional consequences, but importantly on attending to maladaptive thoughts and attempting to restructure these by exploring their validity and considering alternative and more adaptive constructions.

Given the multiple aims of CBT for chronic pain, the techniques within it vary. Notably, CBT represent a variety of specific techniques, with some having origins in behavior therapy and others in cognitive therapy and hence the importance of the *hyphen* between cognitive and behavioral. There is no single, definitive CBT protocol, and most efforts under the generic CBT labelled several components in order to

accomplish the behavioral, cognitive, and affective goals of treatment (Ehde et al., 2014; Morley & Williams, 2015). What is common across CBT approaches are the inclusion of a structured and guided training; clinic and home practice of a variety of pain self-management skills, including relaxation techniques for stress management, activity pacing, assertiveness training; and cognitive restructuring as importance of thoughts as a key process.

Treatment of A Chronic Pain Patient: Ms. M

Ms. M was a 40-year old woman who presented to treatment with a 20-year history of chronic pain. Over the course of her pain diagnosis, she had tried many different medications for pain management. Though some medications helped initially, over time they were less effective. Ms. M acknowledged a negative relationship with her primary medical provider, noting that “they think I’m just making it all up”. Ms. M reported that her pain prevented her from maintaining a romantic relationship (though she endorsed desperately wanting to be in a relationship), strained her friendships, and disrupted her productivity at work. She described her evenings and weekends as “mostly spent on the couch, watching show after show on Netflix.” Ms. M presented to the first session of therapy stating that her life and her potential were “wasted” and with little hope that her circumstances could be improved.

Many of our thoughts throughout the day arise somewhat spontaneously and provide a running commentary of environmental events. These “automatic thoughts” often occur in response to or in anticipation of pain. In cognitive restructuring, patients are guided to become aware of negative thoughts that work against them and then examine whether the thought is true, partly true, or partly false, along with the degree to which the thought, even if partly true, is helpful to them in meeting their goals. Early on, Ms. M identified that many of her thoughts about pain focused on her feelings of helplessness, and contributed to her “giving up” and “giving in” with regard to engaging in efforts to reduce its impact. After identifying how such thoughts not only made her feel worse, but also guaranteed that she would “waste my [her] time,” Ms. M was taught how to come up more realistic, helpful, and less negative thoughts. Notably, Ms. M’s restructured thoughts acknowledged that she may not eliminate pain, but highlighted the ways in which she could still engage in meaningful activity and not waste her time, even in the face of pain. Thus, the emphasis was neither on crafting overly positive, unrealistic thoughts nor on suppressing maladaptive thinking.

By the time Ms. M began attending therapy, she engaged in very few routine activities throughout the day. Common to many chronic pain patients, she reported getting stuck in a “boom or bust” cycle in which she would maximize her activity in a given day, experience a pain flare-up following the activity, attribute that pain flare-up to new injury and then “rest” for the subsequent days, resulting in almost no activity, further reinforcing activity restriction, and strengthening her feelings of helplessness. Using graded exposure to physical movement, Ms. M learned that appropriately paced physical activity using proper body mechanics does not create

injury or pain exacerbations. She learned to pace her behaviors to avoid getting stuck in the “boom or bust” cycle, and ultimately changed her judgment that physical activity causes injury to the body. This is an illustration of using behavioral strategies to reduce feeling of helplessness. By the end of her time in CBT (approximately 12 weeks), Ms. M had reinitiated dating, reconnected with two of her closest friends, and had developed a daily routine, which included regular, mild physical activity. She reported improved mood, and though she still acknowledged mild to moderate pain intensity on many days, she noted that it rarely got in the way of her daily tasks.

Table 2 shows common components of CBT which includes exposure to activity that may have been avoided or restricted, with an emphasis on attending to and engaging with one’s thoughts to address cognitive errors or unhelpful thinking patterns that contribute to lowered quality of life. A key component is the provision of activities to be performed between sessions (i.e., homework); this work provides the opportunity to practice applying new skills and time to reflect upon their impact. CBT efforts also vary in the number of sessions and format of treatment, as it can be successfully delivered in various formats including in individual, group, or technologically-enhanced formats (Ehde et al., 2014).

Some criticisms raised about CBT are that it requires patients to engage in abstract reasoning, to have comfort with reading and writing, and written homework adherence. However, the content of CBT has been shown to be readily adapted and simplified for those with lower reading and cognitive function (Thorn et al. 2018). Moreover, CBT has been shown to be successful and readily adaptable for use with children and adolescents with chronic pain (Eccleston et al., 2014).

Table 2 Common components in second-wave behavior therapy approaches for chronic pain treatment

Practices
Motivational enhancement, patient engagement
Education: Pain, self-management, communication with significant others including health-care providers, adherence to treatment components, resilience
Cognitive restructuring, self-reinforcement
Problem solving
Activity pacing
Goal-setting
Cognitive and behavioral skills training
Relaxation training
Exposure (e.g., behavioral experiments)
Management of flare-ups
Home practice
Relapse prevention

Third Wave

Third-wave behavior therapy is grounded in relational frame theory and functional contextualistic philosophy in which suffering is viewed as the result of futile attempts to control and fight against one's thoughts and feelings (Feliu Soler et al., 2018). Third wave approaches are also known as acceptance-based and mindfulness-based strategies, sometimes employed together with commitment and behavior change strategies, known cohesively as ACT (Hayes, 2004). Importantly, mindfulness-based stress reduction (MBSR) interventions exist as standalone treatments outside of ACT, and Dialectical Behavior Therapy (DBT) is also a third-wave behavior therapy. However, much of the literature on the effectiveness of third-wave approaches for chronic pain focus on ACT (Feliu Soler et al., 2018; McCracken & Vowles, 2006). As such, much of our discussion will center on ACT.

Psychological flexibility is a central tenet of ACT, and refers to the ability to act in accordance with one's own values, even in the midst of interfering or uncomfortable thoughts, feelings or bodily sensations (Hayes et al., 2006). This idea is a development from cognitive therapy (McCracken & Marin, 2014), but rather than being *an* important element as in CBT, it is viewed as *the* key to maximized functioning. Psychological flexibility is conceptualized as having six subcategories: (1) acceptance, (2) cognitive defusion, (3) flexible present-focused attention, (4) self-as-context, (5) values, and (6) committed action (Feliu Soler et al., 2018). Acceptance represents not only acknowledging that unwanted experiences (e.g., painful sensations, negative thoughts, negative feelings, painful memories) are inevitable parts of life, but also that these unwanted experiences may be necessary to the extent that they are connected to one's goals (e.g., to engage in a pleasurable activity such as hiking, you may experience pain). Cognitive defusion is the practice of differentiating between one's thoughts and experiences related to thoughts. While this is similar to cognitive restructuring within the CB perspective, the distinction is that in CBT, thoughts are analyzed for distortions and maladaptive patterns in which their validity and alternative interpretations are addressed, whereas the focus in cognitive defusion is solely to label thoughts as entities that may come and go, rather than actively engage with rational disputation of them. Flexible present-focused attention encourages a connection with the present and a tracking of moment-to-moment experience; this may mean recognizing painful sensations, but also noticing other experiences in the moment too, rather than exclusively focus on pain. This focusing on pain is contradictory to CBT where focusing on pain directly is seen as maladaptive and can exacerbate the experience.

Within ACT, self-as-context highlights a distinction between thoughts, feelings, and the person who observes them; while this idea also has ties to cognitive restructuring from CBT, the same distinction as above applies. The last two components of psychological flexibility, values and committed action, are concerned with the identification of and purposeful action towards one's idiographic values and goals (Feliu Soler et al., 2018; McCracken & Vowles, 2006) despite pain, which is viewed as largely uncontrollable so is simply accepted as a fact. Though the naming

conventions of these two components of psychological flexibility are different, they appear to share significant amount of overlap with goal-setting, self-efficacy, and positive activity planning seen in CBT.

With regard to pain, ACT conceptualizes pain interference as the result of people's constant search for immediate symptom relief, rather than learning to live with discomfort. Attempts to control pain and pain-related difficult experiences are conceptualized as the cause of suffering, rather than an effective remedy. As such, goals for chronic pain treatment within ACT focus on reducing the dominant role that pain plays in their life and helping patients act in accordance with their self-defined goals and values. Notably, ACT does not focus on symptom reduction, including pain intensity or emotional symptoms associated with pain. In fact, the labeling of difficult thoughts or behaviors as "symptoms" is viewed as problematic because it is the label that creates the internal struggle, rather than the experience itself. Treatment from an ACT perspective is considered successful when a person reports improved daily functioning, not necessarily a change in pain intensity or other emotions; that is, a person may continue to experience moderate pain and may continue to experience symptoms of anxiety associated with it, but no longer feel compelled to fight against them, and can instead recognize these sensations/feelings and still work toward their goals.

Specific intervention techniques within ACT share overlap with earlier waves of behavior therapy, though the implementation differs. For example, while exposure is an important treatment technique within ACT, practices such as measuring one's subjective units of distress or other active engagement with their thoughts or feelings are not included. Key concepts are frequently communicated through the use of metaphor and paradox. Other exercises and techniques within ACT are tied to the subcomponent of psychological flexibility they are aimed at enhancing. Similar to CBT, ACT can be delivered in various modalities, including individual, group, and technologically-aided formats (Feliu Soler et al., 2018; Hughes et al., 2017).

Evidence Base for Chronic Pain Treatment Across Waves of Behavior Therapy

In this section, we outline the evidence base for chronic pain treatment across the three waves of behavior therapy. We argue that at this time, the CBT and third waves have comparable levels of empirical support for their use in chronic pain treatment. Rather than seek to find the "best" approach, we highlight continuing limitations in the literature that are applicable across waves. We conclude with a call for researchers and practitioners to move towards building an evidence base for when and how to tailor each wave's approach to the unique needs of clients with chronic pain, and outline some possible circumstances in which second wave approaches may be preferable to others.

There have been few efforts to compare the efficacy and effectiveness of chronic pain treatment across the first-wave, behavioral treatments, and CBT. When they have been compared the results suggest that these two approaches appear to have different outcomes for patients with different pre-treatment characteristics. For example, Theime et al. (2007) found that at baseline fibromyalgia patients who responded to an operant behavioral treatment displayed higher levels of pain behaviors, physical impairment, physician visits, solicitous spouse behaviors, and level of catastrophizing; whereas responders to CBT had higher levels of affective distress, lower coping, less solicitous spouse behavior, and lower pain numbers of behaviors.

Across much of the research on clinical trials, CBT produces small effect sizes for pain intensity and disability, and moderate effect sizes for mood and catastrophic thinking across pain conditions when compared to controls (Williams et al., 2012). These effects are strongest immediately following treatment, and by 6–12 months post-treatment, most effects only remain for mood (Ehde et al., 2014; Williams et al., 2012); whereas conditioning based behavior therapy produced only small improvements in mood immediately after treatment when compared to control (Williams et al., 2012). Although the authors commented on CBT's strongest effects against treatment as usual/waiting list conditions, rather than active controls, they highlighted an absence of evidence for behavior therapy on most outcomes (Williams et al., 2012).

The evidence base developed for CBT is considerably longer than that of third-wave treatment, with over 30 years of RCTs testing its efficacy, though most trials focus on back pain, headache, or arthritis-related pain (Ehde et al., 2014). Direct comparisons between CBT and ACT are more plentiful than those between first wave behavioral treatments and CBT, but not particularly revelatory. As McCracken and Vowles (2006) point out, despite some differences in terminology and areas of emphasis, one of the problems inherent in comparing ACT to CBT is that ACT *is* CBT. The authors go on to note that in order to meaningfully demonstrate one approach's superiority over the other, given the significant overlap in methods used, studies would require very large sample sizes that are not currently available (McCracken & Vowles, 2006).

Both CBT and ACT have the classification of “well-established treatment” for chronic pain by the American Psychological Association (Feliu Soler et al., 2018). Recently the draft guideline for the National Institute of Clinical Excellence (NICE) in the United Kingdom recommends CBT and ACT for the treatment of patients with chronic pain (NICE, 2020). Although some have challenged the methodological shortcomings of the work supporting this classification for third-wave treatment (Öst, 2014), several systematic reviews and meta-analysis support the efficacy and effectiveness of both CBT and third-wave approaches (Ehde et al., 2014; Hann & McCracken, 2014; Hughes et al., 2017; Veehof et al., 2011, 2016; Williams et al., 2012). At this time, there is no strong, consistent evidence that either CBT or third-wave approaches are superior over the other, though some individual studies demonstrate better results for CBT relative to ACT (e.g., Hughes et al., 2017). Hughes et al. (2017) found that CBT produced larger improvements in quality of life, depression, and pain intensity than did ACT in their review of 11 RCTs; however,

they tempered these conclusions because all effect sizes were small, the sample sizes of the trials were also small, treatment fidelity was not assessed, and concerns about researchers' expressed "allegiance" to particular approaches were not addressed. A meta-analysis of 28 studies of mindfulness and acceptance-based interventions found no significant pattern of differences in treatment effect between ACT and CBT (Veehof et al., 2016). Interestingly, as Veehof and colleagues note, some of the mindfulness-based studies assessed incorporated elements traditionally associated with cognitive and behavioral approaches, highlighting the significant overlap present between waves.

Beyond overlapping in the specific techniques used in the studies comparing CBT and third-wave treatment for chronic pain, there is also evidence of conceptual overlap in the proposed mechanisms of action that produce effects on pain-related interference for both second and third wave approaches. For example, even though psychological flexibility is not explicitly named as a target of CBT, changes in pain-related outcomes in a CBT intervention were mediated by changes in pain acceptance (Åkerblom et al., 2015). In a follow-up study published this year, these researchers found that several ACT concepts, including psychological flexibility, acceptance, committed action, and values-based action mediated pain treatment outcomes in a traditional multicomponent CBT intervention (Åkerblom et al., 2020). This is not a unidirectional finding; indeed, Trompetter et al. (2015) demonstrated that although the hypothesized mechanism of action, changes in psychological inflexibility, mediated the relationship between an online ACT program and pain outcomes, so did catastrophizing, a critical element of second wave approaches not directly targeted in third-wave treatment; notably, reductions in catastrophic thinking remained a significant, independent mediator of pain-related improvement. Taken together, the current state of the literature suggests that non-specific commonalities across modalities may be more important than the specific details that distinguish between the second and third-waves of behavior therapy.

Challenges in Evaluating Efficacy and Effectiveness of Waves of Behavior Therapy for Chronic Pain

Despite a wealth of literature examining psychological interventions, especially those emanating from the waves of behavior therapy, on chronic pain, there are considerable limitations to the extant work. To date, one of the biggest challenges in evaluating the relative impact of various waves of behavior therapy is that most RCTs employ inactive, rather than active, controls. Although demonstrating an improvement against treatment as usual is a critical first step in establishing support for a novel approach, we believe that we are well beyond that phase, particularly given the over 30-year history of RCTs for CBT's impact on pain.

Studies inconsistently specify and assess theoretically-driven mechanisms of action in much of this literature (Ehde et al., 2014). Hypothesized drivers of change

in CBT, such as pain-related beliefs, catastrophic thinking, and fear avoidance are frequently assessed at baseline and demonstrate expected relationships with pain at the start of these interventions (Gatchel et al., 2007; Thieme et al., 2007), but are inconsistently measured as mediators during the course of treatment. Trials of third-wave approaches on chronic pain share a similar problem, but also have an added concern of an almost exclusive focus on psychological flexibility, to the near exclusion of other critical components of ACT. For example, while self-as-context is conceptualized as an active therapeutic process in ACT, there were no validated measures of the construct prior to 2016 (Yu et al., 2017). Unfortunately, this failure to adequately assess proposed mediators or the exclusion of them altogether makes it difficult to know when specific effects take hold or how mediators are temporally related to each other. This knowledge could help to not only distinguish between the waves of behavioral therapy, highlighting common and unique mechanisms of action, but could also help identify primary versus secondary mediators, or sufficient versus necessary targets of treatment.

We have highlighted how varied the specific techniques used across waves of behavior therapy are, and have noted the overlap present in their delivery. More detail about trials that assess the impact of these interventions on pain are needed in order to improve our knowledge base about how these therapies work. For example, explicit assessment of and inclusion in publication of treatment fidelity, information regarding clinicians' training and competence, assessment of client engagement, and clear delineation of the intervention techniques used would clarify important details about the effects of individual trials (Ehde et al., 2014). It is heartening to know that the quality and reporting of methods for trials focused on CBT have improved over time given the long history of this work (Williams et al., 2012). Hopefully, the same trajectory will hold for third-wave approaches given that Veehof et al. (2016) did not find evidence of improvement in the quality of studies between their initial meta-analysis (Veehof et al., 2011) and their subsequent one of acceptance and mindfulness-based interventions for chronic pain.

For Whom and Under Which Circumstances Are Second Wave Treatments Superior?

Interventions emanating from behavior therapy are efficacious for chronic pain management, with stronger evidence for second (i.e., CBT) and third (e.g., ACT) wave modalities than first (e.g. behavior therapy). However, both later waves would benefit from continued evaluation of the proposed and actual mechanisms of action (e.g., mediators) for change in pain-related outcomes. Despite head-to-head matchups, it appears that CBT and third-wave approaches are generally evenly matched when it comes to pain-related outcomes (e.g., Cherkin et al., 2016; Turner et al., 2016). Given this knowledge, we believe that it is a better use of time and resources for researchers to work to identify moderators of each wave of therapy's effects to

understand for whom and under which circumstances either approach may be most beneficial. For example, Wetherell et al. (2016) found that though there were no differences in credibility, attrition, satisfaction, or expectations of positive outcome across treatment groups, older adults randomly assigned to 8 weeks of group-based treatment responded more favorably to ACT than to CBT. Younger adults were more likely to respond to CBT. The authors speculated on the cause of this effect, but work aimed at clarifying these differences could help better target and calibrate treatment.

Importantly, third-wave approaches emphasize psychological functioning and de-emphasize psychological symptoms, while CBT focuses on both maximizing positive function and minimizing negative, especially in the context of chronic pain treatment. Given the high comorbidity between chronic pain and other mental health disorders (e.g., sleep disorders, anxiety, depression; Asmundson & Katz, 2009) and the effectiveness of CBT in treating those conditions too, it may be the case that second-wave approaches to pain management are preferable to third-wave ones when a patient has comorbid pain and psychological disorder (Ehde et al., 2014). This is not to say that third-wave approaches do not have an effect on these problems, rather it is not in its mission to reduce psychological symptoms, potentially making it a less attractive option.

An important caveat is that both CBT and ACT rely heavily on motivational approaches and a strong therapeutic alliance and supportive environment are essential. Regardless of the waves of behavioral treatments, it is important that patients are provided with a rationale that is understandable and makes sense, likely instilling positive outcome expectancy.

Future Directions

Subgroups There is growing interest in going beyond the “patient-uniformity myth” (Kissler, 1995) and general treatment benefits to identifying the subgroups of individuals with chronic pain who are most likely to benefit from treatments with different approaches (e.g., Rusu et al., 2012; Thieme et al., 2007; Thorn, 2020; Turk, 1990). Treatments could then be individualized and matched to important patient subgroup differences identified.

There is wide variability in individual responses to comparable levels of physical trauma and diseases. Thus, in addition to identifying treatment responders, it is important for research to identify subgroups based on their responses to such experiences. For example, are there particular predisposition factors that predict responses to trauma and disease (i.e., the diathesis-stress model, Turk, 2002)? If these can be identified, then it will be possible to target treatments to those most likely to need some form of behavioral intervention in order to prevent disability.

Utilization of Advanced Technologies Treating patients in a health care setting is not convenient for many patients who are employed, reside in rural areas, or who

have difficulty traveling. The availability of the internet and smart phone applications are providing increasing opportunities to make behavioral treatments, in general, more readily accessible. Although there have been some demonstration projects evaluating the potential value of these modalities (e.g., Macea et al., 2010) and there are many smart-phone applications that have not be systematically evaluated (e.g., Dario et al., 2017) the potential of these modalities for the delivery of behavioral pain treatments will continue to grow and systematic evaluation is warranted to not only identify the patients who benefit but also to identify the necessary and sufficient components for various subgroups, and how machine learning will permit customizing treatments based on information acquired during treatments.

Specificity of Treatment Components Research is needed to identify the specific versus nonspecific components of successful treatments. Given the overlap in the behavioral treatments described it is reasonable to raise the question of whether such nonspecific factors as motivation, therapeutic alliance, patient confidence in their ability to benefit might account for the greatest amount of the variance in successful treatment that any particular techniques used within the treatment (e.g., Thorn & Burns, 2011).

Conclusion

There is a substantial body of research published over the past 30 years to support the benefits of CBT in the treatment of patients with diverse chronic pain conditions. More recently there have been studies supporting the benefits of ACT. Although both these perspectives are recommended by different guidelines (e.g., APA, NICE), it is important to acknowledge that overall the results have been relatively modest (e.g., NICE, 2020; Williams et al., 2012). In this respect they are not that different from most of the more traditional pharmacological and medical treatments of chronic patients (Turk et al., 2011). Inspection of the perspectives and approaches of CBT and third-wave approaches reveal that the similarities among these may be greater than the differences. The CB perspective that superimposes CBT, similar to ACT, has always considered acceptance as an important component, that is accepting that a person who has a chronic pain condition may not be able to eliminate the physiological basis for the pain; however, from the CB perspective individuals with chronic pain do not have to accept they can do nothing, this leads to feelings of helplessness or hopelessness, a potential consequence and danger of the third-wave interventions. They may not be able to do anything to alter the neurophysiological causes of their pain, but they can self-manage their lives and the impact that pain has. In contrast to the first-wave focus on activity despite pain and third-wave emphasis on total acceptance and getting involved with more engaging objectives, CBT does provide some guidance as to things those with chronic pain can do “when they hurt.” Moreover, they may have the capacity to reduce the severity of the pain by pacing their activities to prevent exacerbation of their pain and engaging in

activities that can build up their strength, endurance, and flexibility. When they have flare ups they can modify activities as necessary and reinitiate activities when pain subsides. When they do experience pain, they can engage in distracting activities and practice relaxation and controlled breathing. They do not have to focus on the presence of pain as this can increase stress and accompanying physical changes that may contribute to the magnification of pain. To reiterate the key concepts of the Serenity Prayer, these individuals need to accept the things that cannot change [physical impairments associated with pain], the courage to change the things than can [self-manage pain severity itself and the impact on pain on their lives], and the wisdom to know the difference. Thus like the third-wave, CBT is designed to contribute to resilience in the face of chronic pain (Turk & Winter, 2020).

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