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Focus Article

Toward a Theoretical Model for Mindfulness-Based Pain Management

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Abstract: Mindfulness, as both a process and a practice, has received substantial research attention across a range of health conditions, including chronic pain. Previously proposed mechanisms underlying the potential health-related benefits of mindfulness and mindfulness-based interventions (MBIs) are based on a strong theoretical background. However, to date, an empirically grounded, integrated theoretical model of the mechanisms of MBIs within the context of chronic pain has yet to be proposed. This is a surprising gap in the literature given the exponential growth of studies reporting on the benefits of MBIs for heterogeneous chronic pain conditions. Moreover, given the importance of determining how, and for whom, psychological interventions for pain management are effective, it is imperative that this gap in the literature be addressed. The overarching aim of the current theoretical paper was to propose an initial integrated, theoretically driven, and empirically based model of the mechanisms of MBIs for chronic pain management. Theoretical and research implications of the model are discussed. The theoretical considerations proposed herein can be used to help organize and guide future research that will identify the mechanisms underlying the benefits of mindfulness-based treatments, and perhaps psychosocial treatments more broadly, for chronic pain management.

***Perspective:** This focus article presents an initial framework for an empirically based, theoretical model of the mechanisms of MBIs for chronic pain management. Implications of the framework for refining theory and for future research are addressed.*

***Key words:** Chronic pain, mindfulness, meditation, theory, theoretical model, mechanisms.*

The past 2 decades have witnessed an exponential growth of research on the benefits of mindfulness-based interventions (MBIs) for an array of health conditions. As of 1990, there were fewer than 80 published articles on mindfulness; by 2006 this had exploded to more than 600[15]; and at the time this article was completed (October 22, 2013), there existed more than 1,200 research articles in PubMed devoted to the topic. Mirroring the scholarly growth and interest in mindfulness is a concurrent, parallel increased interest in, and use of, mindfulness-based principles and interventions among clinicians.[4,9,10]

Given the rapidly increasing report and use of MBIs by both researchers and clinicians, it seems critical to appraise and refine the theory underlying the application of mindfulness within the context of specific conditions. Indeed, Brown and colleagues[15] described the biggest challenge in this area as the need to "develop empirically grounded, theoretical models examining the directional links between those conditions that support the unfolding and expression of mindfulness (eg, attitudes like acceptance), mindfulness itself, processes explaining its effects (eg, insight), and relevant outcomes of mindful states, traits, and interventions" (p. 231). Chronic pain is one condition that has received substantial empirical attention within the field of mindfulness

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research. However, a theoretical model integrating the current evidence with mindfulness-based theoretical precepts and extant pain-related theoretical models is yet to be developed.

To address this gap, the current paper had 5 aims. First, we present definitions of mindfulness to clarify the scope of this field. Second, we describe the various MBIs that have been developed and applied to chronic pain conditions and provide a brief overview of their efficacy. Third, we explore the prevailing theoretical models of pain, psychosocial pain treatment, mindfulness, and MBIs. Fourth, we propose an integration of the empirical evidence and theory to propose a theoretical model of MBIs for chronic pain management. Fifth, we discuss the implications of the model for refining theory and guiding future research. Our overarching goal was to provide an initial framework that can be used to organize MBI research within the context of chronic pain management.

A Definition of Mindfulness

Mindfulness as a Process and a Practice

Although mindfulness shares conceptual kinship with numerous philosophical and psychological traditions,[15] the concept of mindfulness is most systematically articulated and emphasized in Buddhist philosophy wherein mindfulness occupies a central role in an 8-fold spiritual system developed to alleviate human suffering.[51] In the majority of Buddhist traditions, mindfulness ("sati" in Pali, "smrti" in Sanskrit, and "tren-ba" in Tibetan) commonly denotes presence of mind. The most widely cited definition of mindfulness within empirical psychology is Kabat-Zinn's[59] description of mindfulness as "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience, moment by moment" (p. 145). Shapiro and Carlson[92] later offered a further definition that distinguished between mindful awareness and mindfulness meditation (MM) practice, where mindful awareness represents persistent attention to (and presence with) each moment and MM encapsulates the systematic training of the mind to intentionally attend in an open, accepting, and discerning way. Typically mindfulness is assessed in psychological research via proxy measures such as the Mindful Attention and Awareness Scale[14] or the Five Facet Mindfulness Questionnaire.[5] However, there continues to be debate about how best to operationalize, and thus assess, the mindfulness construct. The interested reader is directed to Carmody[20] and Brown et al[15] for a rich description of the issues surrounding this debate.

MBIs and Their Efficacy for Chronic Pain Management

MBIs

MM practices entail "open monitoring"[71] and aim to train the practitioner's mind to intentionally observe thoughts, emotions, and bodily sensations on a moment-to-moment basis with a nonjudgmental, open attitude, such that they are perceived as transient experiences with natural variation. MM is typically researched within an integrated treatment package such as mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT), which also includes yoga or "mindful movement" (as it is described in MBCT). Although both MBSR and MBCT have roots in Buddhism, these treatments are fundamentally secular.[34,59,89] Several other interventions that include mindfulness-based components have also been developed and are sometimes included under the umbrella of MBIs.[53,69,73] However, these interventions typically have not included formal MM practice within the treatment protocol.[42] Thus, we (along with others[26]) consider them to be distinct from MBIs and have excluded them from extensive discussion in this article. Henceforth in this article, unless otherwise specified, the term *MBIs* is used to refer to MBSR and MBCT.

Within both MBSR and MBCT protocols, a series of MM practices are taught, typically within a group setting consisting of 4 to 8 sessions (an extended meditation retreat period is also sometimes included). Generally, a body scan practice is the first formal meditation taught, followed by a series of seated meditations, mindful yoga/movement, and walking meditation. Participants are provided with guided MM audio files and are instructed to practice daily for 45 minutes. Furthermore, participants are encouraged to infuse mindful awareness into everyday tasks (such as when washing the dishes or brushing one's teeth) to cultivate mindfulness into everyday activities. In addition, MBCT integrates a brief, portable meditation practice (the "3-minute breathing space"), and participants are instructed to schedule 3 of these into their day as well as practice this technique in response to stressful events.

The primary distinguishing factor between MBSR and MBCT is what is integrated into the protocol to complement the MM practices taught. MBSR typically includes a didactic component that aims to teach participants about the psychology and physiology of stress reactivity and how to apply mindfulness as a method for responding adaptively to stress, pain, and challenges associated with pain. One of the great strengths of cognitive therapy (CT) is incorporated within our recently developed MBCT protocol for pain management[34] (primarily adapted from Segal et al[89]) in that it includes exercises that provide patients with a method for examining the links between cognitions, stress, emotions, physical sensations (including pain), and behavior. Kabat-Zinn[59] and Segal et al[89,90] provide more detailed overviews of MBSR and MBCT, respectively.

Effects of MBIs on Chronic Pain Management

Recent reviews of controlled studies of MBIs for a range of clinical populations (including, but not limited to, chronic pain patients) have reported significant and moderate effect size improvements on standardized