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Brian P. Meier *Editors*

Handbook of Mindfulness and Self-Regulation

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Introduction: The Science of Mindfulness and Self-Regulation

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Brian D. Ostafin, Michael D. Robinson, and Brian P. Meier

Introduction: The Science of Mindfulness and Self-Regulation

> The first and best victory is to conquer self.
>
> —Plato

> One who conquers himself is greater than another who conquers a thousand times a thousand on the battlefield.
>
> —Buddha

The human being is a conflicted animal. On the one hand, we have a multitude of desires as part of our genetic birthright. Desires for sex, food, safety, certainty, and self-esteem are among these. On the other hand, we are expected to forego our desires a good proportion of the time in the service of cultural values. Observers have long noted that this situation is rife with the potential for conflict. Plato's *Phaedrus* (trans. 2003) characterized a conflict of wills whereby the charioteer of reason must attempt to subdue the wild horse of appetite. Freud (1949) similarly described the manner in which a person's ego and superego must wrestle with the instinctual drives of the id. Conflicts between the short-term desires of our animal nature and the long-term goals derived from cultural values also figure prominently in modern theories of self-regulation (e.g., Vohs & Baumeister, 2011).

Despite our best intentions, reason often fails to control our appetites. Along these lines, St. Paul lamented "… the evil which I would not do, that I do" (Romans: 7:19) and Freud declared that "the ego is not master of its own house" (Freud, 1917, p. 143). Data support these insights. For example, one study examined the success of New Year's resolutions such as losing weight, working on relationships, and quitting smoking (Norcross, Ratzin, & Payne, 1989). The results revealed that a majority of people (80 %) maintained their resolutions for a week but only a minority of people (40 %) did so for 6 months. These and similar findings underscore the difficulties in regulating desires that seem part of the human condition. Further, such regulation difficulties can give rise to a wide range of problematic outcomes such as addiction, crime, domestic violence, educational underachievement, and obesity (Baumeister & Heatherton, 1996). Self-regulation failure additionally leads to decreases in well-being, in some cases contributing to clinical disorders such as depression (Pyszczynski &

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Greenberg, 1987). More broadly, a number of Western philosophical and spiritual traditions contend that self-control is a necessary foundation for inner peace, spiritual wisdom, and connecting with the divine (e.g., Galatians 5: 16–25; Hadot, 1995; 2002; Merton, 1969).

Given the crucial role that self-regulation plays in people's lives, we need to know how to facilitate it. Freud's (1917) analysis is a useful departure point in doing so. Freud metaphorically defined the unruly part of the mind as the id and the executive part of the mind as the ego. Consistent with the analysis above, the id and the ego often conflict with each other for control over behavior with the id favoring impulsive actions and the ego favoring more thoughtful actions (see Strack & Deutsch, 2004, for a related analysis). It is natural to characterize the resulting tensions in terms of a battle between the id and the ego, which in turn suggests particular ways of facilitating self-regulation. The id's forces must be defeated somehow, either by weakening the id or strengthening the ego and then engaging in combat. We note that there are fairly close parallels between this analysis and recommendations made in the self-control literature (e.g., Friese, Hofmann, & Wiers, 2011). Battles are costly, however, and they are grim. Freud (1917) anticipated this as well in his suggestion that a long-term solution to the self-regulation problem may depend on developing greater insight into how the mind works. Mindfulness similarly aims to increase the individual's freedom through insight.

What is mindfulness? It is a state of consciousness and a way of being that can be described as "… paying attention in a particular way; on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn, 1994, p. 4; also see Bishop et al., 2004). Although this definition originates in the Buddhist tradition (Chap. 18), similar ideas of attending to the moment with an accepting attitude can be found in Western traditions such as the Stoic practice of "delimiting the present" (Hadot, 1995). In both cases, the suggestion is that the untrained mind is poorly controlled, prone to problematic attachments and egoism, and ultimately not very conducive to harmonious living in the world. Meditation practices designed to improve capacities to sustain attention, to increase awareness of thoughts and feelings as they occur, and to develop a nonjudgmental acceptance of these thoughts and feelings are proposed to free the mind from its vices. In simpler terms, the mind has some bad habits that can either be lessened or worked with more functionally to the extent that one retains awareness of what is currently happening.

While the original purpose of mindfulness practice was to deconstruct ordinary experience for the sake of spiritual enlightenment (Rahula, 1959), Western psychologists have found that mindfulness is also conducive to a variety of practical forms of self-regulation. These include the regulation of negative emotions (Chap. 9; Hofmann, Sawyer, Witt, & Oh, 2010) and problematic behaviors of multiple types (Chap. 14; Zgierska et al., 2009). Mindfulness also appears to facilitate personal growth (Chap. 7) and its benefits have been touted for home (Kabat-Zinn & Kabat-Zinn, 1997), school (Rechtschaffen, 2014), and work (Carroll, 2007) settings. Independent of these potential benefits, mindfulness is a fascinating state of consciousness that has had a long attraction for Western psychology (James, 1902; Jung, 1964) and which warrants close study in its own right. The current volume provides this close study in the form of state-of-the-art reviews by international experts who review what is known about whether and how mindfulness works while making recommendations for future study. All chapters address the interface of mindfulness and self-regulation, with chapters covering a range from basic research to real-world applications in the clinic.

Overview of the Volume

As a general orientation, we should make two points. At its core, mindfulness involves paying attention to present-moment experiences in a nonjudgmental manner. Long-term meditation practice can help one achieve this state more reliably, but long-term meditation practice is not necessary to achieve it. Accordingly, the volume reviews research in which mindfulness (a)

naturally varies across people as an aspect of personality, (b) is temporarily induced among meditation-naïve participants as an experimental manipulation, (c) follows from clinical interventions, or (d) is the result of formal meditation training outside the context of a clinical intervention. These different ways of studying mindfulness often converge in their conclusions (e.g., Chap. 2), but we should be alert to possible divergences as well (Chap. 6).

The second point is that although the benefits of mindfulness are traditionally linked to insight (Rahula, 1959), there can be other mechanisms of action. For example, mindfulness stabilizes attention, which is conducive to purposeful behavior (Chap. 4). Many of our problems are caused by habits of the mind and mindfulness reduces the influence of such habits (Chap. 5). When mindful, one can become aware of negative thoughts and feelings sooner, which allows one to regulate them before they escalate (Chap. 13). And mindfulness allows one to identify an observer self that is not synonymous with the contents of the mind (Chap. 9). There are thus a number of different, though perhaps interconnected, ways in which mindfulness can support self-regulation, as will be highlighted in this volume. For organizational purposes, the chapters are organized into four sections.

Section 1: Neuroscience and Cognitive Perspectives

An emerging body of work, reviewed in this section, has revealed that mindfulness changes the way in which the brain works. Such changes in neural activity and cognition are likely to underlie some of the beneficial consequences of mindfulness. In addition, the section chapters cover topics such as emotion regulation, executive attention, and addictive behavior.

- Sayers, Creswell, and Taren (Chap. 2) review fMRI and EEG studies on the brain mechanisms through which mindfulness enhances the regulation of emotions. Among other findings, studies have linked mindfulness to reduced activity in the amygdala, a structure implicated in emergency-based reactions, and to increased activation in the dorsolateral prefrontal cortex, a structure implicated in emotion regulation and sustained attention. Mindfulness seems to support a more reflective, less reactive mode of brain functioning.
- Tang and Posner (Chap. 3) present a model in which executive attention—the ability to resolve mental conflicts in favor of goal-directed processing—underlies multiple forms of self-regulation. The authors present two categories of interventions that may benefit executive attention: practices that involve controlling mental content (e.g., working memory training) and mindfulness meditation, which does not involve changing the content of thoughts but rather involves a "state of restful alertness." The authors review several studies in which significant behavioral, structural, and functional changes occur as a function of mindfulness training.
- Morrison and Jha (Chap. 4) consider the overlap of mindfulness with contemporary brain-based models of information processing. Mindfulness may facilitate self-regulation by training executive attention, by changing working memory operations, or by increasing the monitoring of off-task thoughts. The authors present evidence for the benefits of mindfulness training in each of these areas and discuss ways in which mindfulness is distinct from other types of cognitive enhancement training.
- Ostafin (Chap. 5) notes that many self-regulation failures can be traced to automatic cognitive and behavioral responses. Accounts of mindfulness suggest that the individual can learn to observe such habits without necessarily acting on them. Support for this account has been found in several studies in which mindfulness—trait and manipulated—decouples the relationship between automatic processes and outcome variables such as rumination or alcohol consumption.

Section 2: Personality and Social Psychology Perspectives

People differ in mindfulness skills independent of meditation practice or experience. Research in personality and social psychology takes advantage of this fact, thus contributing to a basic understanding of how mindfulness functions. Among other topics, chapters in this section link mindfulness, both trait and interventions, to major theories of the self and psychological well-being.

- Goodman, Quaglia, and Brown (Chap. 6) review the major progress that has been made in assessing mindfulness as a dispositional quality—a key way in which people differ from each other. The chapter discusses issues related to how mindfulness should be defined and measured, including a discussion of how mindfulness differs from other measures of attention. The authors then present evidence for the validity of trait mindfulness measures such as an inverse relation with emotional reactivity in both neural and psychophysiological studies.
- Schultz and Ryan (Chap. 7) propose that mindfulness may be important to living one's life in a self-determined, health-promoting way. When people are mindful, they should be more fully aware of their deep-seated values and goals and therefore in a better position to act on them. Consistent with this framework, studies have linked mindfulness to less defensiveness, a greater focus on intrinsically motivated goals, and to higher levels of psychological well-being.
- MacKenzie and Baumeister (Chap. 8) present evidence for a strength model of self-control whereby self-control requires effort and is dependent on a limited pool of volitional resources. Support for this model has primarily come from studies in which resources are depleted, but there is also evidence that self-control resources can be strengthened over time. The authors suggest that mindfulness training may be a useful strategy to build such resources.
- Heppner, Adams, Vidrine, and Wetter (Chap. 9) consider the multiple ways in which mindfulness should support emotion regulation. These include the ability to identify problematic thoughts and feelings early on, the willingness to experience unpleasant states, and the insight that aversive experiences naturally fade over time without the need to do something about them. Consistent with these ideas, research has shown that mindful people are less reactive to negative events and less prone to addictive relapse in the context of cravings and stress.
- Neff and Dahm (Chap. 10) note that Buddhist practices seek to increase both mindfulness and self-compassion and that these are partially independent states of mind. Self-compassion is mindful, but also involves bringing an attitude of caring kindness toward oneself. Dispositional and intervention research converges on the idea that compassion toward the self increases well-being while decreasing symptoms of anxiety and depression.

Section 3: Clinical Perspectives

The benefits of mindfulness have perhaps been best documented in the clinical literature. Trait variations in mindfulness are inversely predictive of depressive symptoms, anxiety symptoms, and addictive disorders. Additionally, mindfulness-based treatment protocols have proven useful in treating a number of clinical disorders.

- Bach, Hayes, and Levin (Chap. 11) introduce the section by examining the broad questions of how to best define mindfulness and the reasons behind the growing popularity of mindfulness-based interventions. The authors note the potential pitfalls of tying mindfulness too closely to a particular technique (i.e., Eastern contemplative practices) and instead advocate an approach that is based on the process of paying attention in a particular way and the outcomes of doing so. The authors

suggest that the growing popularity of mindfulness is due not only to persuasive research evidence, but also to its curative properties in addressing the psychological imbalances caused by modern society.

- Eisenlohr-Moul, Peters, and Baer (Chap. 12) document the fact that mindfulness-based interventions have demonstrated their efficacy in a substantial number of studies. Accordingly, there is a growing need for research into the mechanisms through which mindfulness works. The authors provide a number of useful recommendations for conducting research of this type.
- Willett and Lau (Chap. 13) present an analysis of mindfulness-based cognitive therapy (MBCT) for depression. The chapter describes the MBCT intervention, presents evidence for its value in preventing depression relapse, and outlines newer applications such as treating bipolar disorder and acute depressive symptoms. The authors also discuss alternative delivery formats such as via phone or the Internet.
- Brewer, Van Dam, and Davis (Chap. 14) explain why mindfulness may be particularly useful in dealing with the dysregulated desires of addiction. As the authors document, there are striking parallels between Buddhist accounts of craving and modern accounts of the addictive process. The chapter summarizes existing research on mindfulness interventions for addiction and discusses the potential neurological mechanisms involved.
- Kristeller (Chap. 15) discusses mindfulness interventions as a means to improve the self-regulation of eating among eating-disordered clients. Among other processes, mindfulness may be helpful in this population by facilitating awareness of the factors that precipitate binge eating and of internal cues of satiety. An overview of a mindfulness-based intervention for dysregulated eating is presented next, followed by a review of research on the intervention.
- Davis-Siegel, Gottman, and Siegel (Chap. 16) propose that awareness and integration are general keys to health. As these activities are also central to mindfulness, mindfulness may play broad roles in health promotion. The authors use this framework to explain the problems endemic to certain disorders of personality and to impulsive forms of behavior.
- Carmody (Chap. 17) discusses the challenges and benefits of teaching mindfulness to Western psychotherapy clients. Although mindfulness and therapy both have the aim to reduce suffering and increase well-being, the idea and practice of mindfulness can seem somewhat foreign to Western clients. Carmody shows how such issues of translation can be circumvented through framing the goals of mindfulness in more familiar terms.

Section 4: Buddhist Perspectives

As this volume demonstrates, Western psychologists have generated a great deal of productive research on the topic of mindfulness. The roots of mindfulness, however, are Buddhist. The last section presents two commentaries on the relation between Buddhism and mindfulness as practiced and researched in the West.

- Dunne (Chap. 18) provides an informative account of the relation between contemporary Western mindfulness practices and two traditions in Buddhism that he terms "classical" and "nondual." These two strands of Buddhism hold different theories about the causes of suffering, giving rise to distinct meditation practices. By recognizing such distinctions and by taking advantage of centuries of knowledge accumulated by Buddhist practitioners, Western scientists and clinicians can further develop their mindfulness-based efforts.
- Rosch (Chap. 19) suggests that there are important differences between Western and Buddhist versions of mindfulness and that we should take a close look at these differences to better understand what our science has thus far documented. Among other issues, it will be important to know whether there is more to our interventions than relaxation (or social support)

and whether dispositional measures of mindfulness capture something beyond psychological mindedness or verbal abilities. Rosch's analysis encourages a number of directions for future research, including the need for dismantling studies on mindfulness interventions.

Conclusions

The mind seems to have a mind of its own. It can want things that are not good for us, it composes narratives about the self that may or may not be true, and it seems to have extraordinary deficits in staying on-task. As the opening quotes suggest, bringing such an unruly creature under control can be a challenge. The Buddhist tradition suggests that mindfulness can help to tame the mind and Western research has begun to provide support for this idea. When mindful, we can become aware without becoming attached and may be better able to act in accordance with health-promoting values and goals. As detailed in this volume, these ideas are not just interesting but also practical. Mindfulness changes how we process external and internal stimuli (section 1), allows us to better enact the goals of the self (section 2), and has demonstrated value in dealing with problematic symptoms and behaviors (section 3). Such gains may be increased through a deep study of Buddhist ideas and practices (section 4). Staying aware in the present moment, the chapters will suggest, benefits self-regulation in multiple ways.

References

Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological Inquiry, 7*, 1–15.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., . . . Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241.

Carroll, M. (2007). *The mindful leader: Awakening your natural management skills through mindfulness meditation*. Boston, MA: Trumpeter Books.

Freud, S. (1917). A difficulty in the path of psychoanalysis. In J. Strachey (Ed. and Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 17, pp. 135–144). London, England: Hogarth Press.

Freud, S. (1949). *The ego and the id*. London, England: Hogarth Press.

Friese, M., Hofmann, W., & Wiers, R. W. (2011). On taming horses and strengthening riders: Recent developments in research on interventions to improve self-control in health behaviors. *Self and Identity, 10*, 336–351.

Hadot, P. (1995). *Philosophy as a way of life: Spiritual exercises from Socrates to Foucault*. Oxford, England: Blackwell Publishing.

Hadot, P. (2002). *What is ancient philosophy?* Cambridge, MA: Harvard University Press.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169–183.

James, W. (1902). *The varieties of religious experience: A study in human nature*. London, England: Longman, Greens, and Company.

Jung, C. G. (1964). Forward. [Forward]. In D. T. Suzuki (Author), *An introduction to Zen Buddhism* (pp. ix–xxix). New York, NY: Grove Press.

Kabat-Zinn, J. (1994). *Wherever you go, there you are*. New York, NY: Hyperion.

Kabat-Zinn, M., & Kabat-Zinn, J. (1997). *Everyday blessings: The inner work of mindful parenting*. New York, NY: Hyperion.

Merton, T. (1969). *Contemplative prayer*. New York, NY: Random House.

Norcross, J. C., Ratzin, A. C., & Payne, D. (1989). Ringing in the new year: The change processes and reported outcomes of resolutions. *Addictive Behaviors, 14*, 205–212.

Pyszczynski, T., & Greenberg, J. (1987). Self-regulatory perseveration and the depressive self-focusing style: A self-awareness theory of reactive depression. *Psychological Bulletin, 102*, 122–138.

Rahula, R. (1959). *What the Buddha taught*. New York, NY: Grove.

Rechtschaffen, D. (2014). *The way of mindful education: Cultivating well-being in teachers and students*. New York, NY: W. W. Norton and Company.

Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review, 8*, 220–247.

Vohs, K. D., & Baumeister, R. F. (Eds.). (2011). *Handbook of self-regulation: Research, theory, and applications*. New York, NY: Guilford.

Zgierska, A., Rabago, D., Chawla, N., Kushner, K., Koehler, R., & Marlatt, A. (2009). Mindfulness meditation for substance use disorders: A systematic review. *Substance Abuse, 30*, 266–294.

Section 1

Neuroscience and Cognitive Perspectives

The Emerging Neurobiology of Mindfulness and Emotion Processing

2

W. Michael Sayers, J. David Creswell, and Adrienne Taren

Introduction

An emerging body of research suggests that mindfulness is associated with self-reported and clinically relevant changes in emotion processing. Self-report measures of dispositional mindfulness are associated with reduced negative affective states and positively associated with positive affective states and traits (Brown, Ryan, & Creswell, 2007). Moreover, mindfulness-based interventions reduce depressive symptomatology and depression relapse in at-risk patients (Hofmann, Sawyer, Witt, & Oh, 2010; Teasdale et al., 2000), anxiety symptoms (Hofmann et al., 2010; Kabat-Zinn et al., 1992; Roemer, Orsillo, & Salters-Pedneault, 2008), and affective disturbances in chronic pain patients (Grossman, Tiefenthaler-Gilmer, Raysz, & Kesper, 2007; Kabat-Zinn, 1982). This body of work suggests that mindfulness may be associated with changes in emotion processing, and in this chapter we consider the extant mindfulness fMRI and EEG research to better understand how the brain processes affective stimuli in relation to trait mindfulness, while adopting a mindful attentional stance, and after mindfulness training.

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Neurobiological Models of Mindfulness and Emotion Processing

Neurobiological models of emotion processing describe a ventral "core affective" system responsible for establishing the threat or reward value of a stimulus, and a more dorsal affect processing system responsible for appraisals and attributions of one's emotional state (Barrett, Mesquita, Ochsner, & Gross, 2007; Phillips, Drevets, Rauch, & Lane, 2003). While regions of affective processing systems overlap somewhat, the ventral system for core affect has been described as including temporal lobe structures (including the amygdala), insula, anterior cingulate cortex (ACC), orbitofrontal cortex (OFC), and ventromedial prefrontal cortex (VMPFC). It is thought that this neuroanatomically coupled ventral network communicates the value of affective stimuli quickly and efficiently to hypothalamus and brain stem areas for coordinating a behavioral response (Barrett et al., 2007). The dorsal affect processing system is thought to be responsible for generating attributions about the cause(s) of

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one's core affective state, and includes the medial prefrontal cortex (MPFC), dorsomedial PFC (DMPFC), and ACC (Barrett et al., 2007). Finally, neurobiological models of emotion have also described the important role of PFC regions in the regulation of emotional states (Arnsten, 2009; Ochsner & Gross, 2005). Specifically, these models indicate that explicit (e.g., cognitive reappraisal) and implicit (e.g., expectancies) emotion regulation strategies activate regions of dorsal and ventral PFC (including dorsal ACC), for modulating affect response regions (e.g., amygdala) (Ochsner & Gross, 2005; see Fig. 2.1).

This review considers the evidence for mindfulness and emotional responding in light of these neurobiological models of emotion. The current research base shows that mindful attention and mindfulness training are implicated in modulating each of these neurobiological systems for emotional responding. Specifically, emerging research indicates that mindfulness can alter ventral neural regions for generating core affective responses, dorsal regions implicated in one's attributions about the cause of one's affective state, and regions related to regulating one's affective responses.

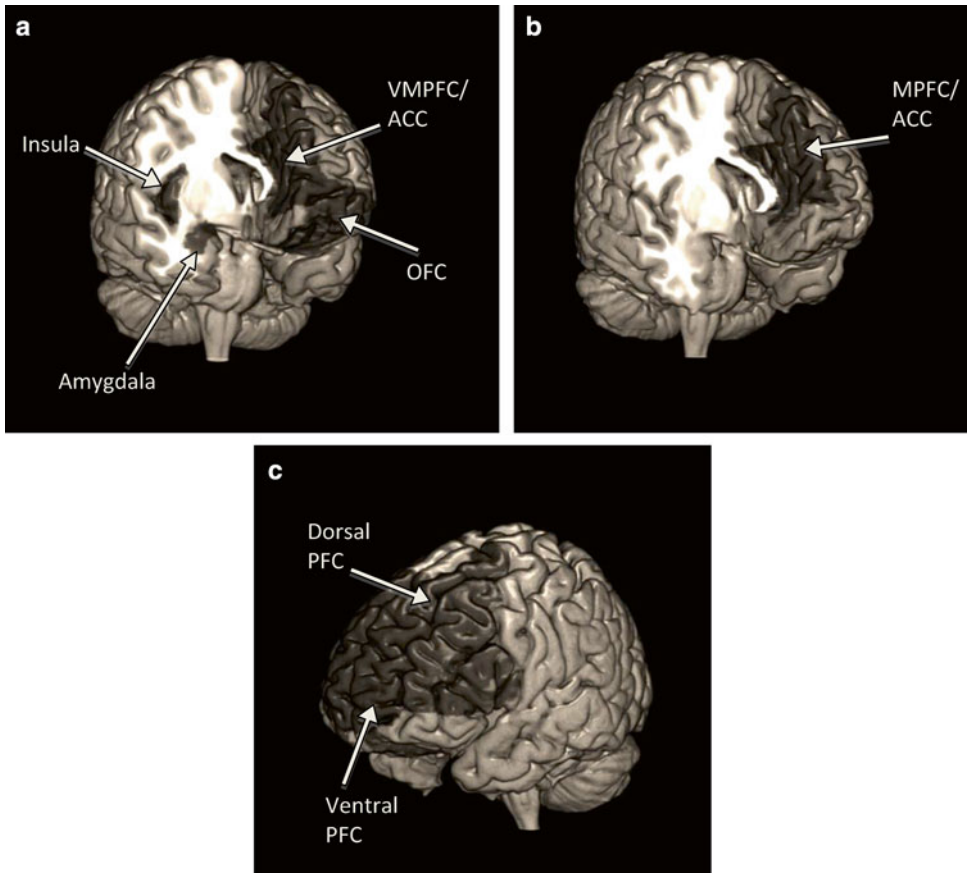

Fig. 2.1 Darker shaded regions depict the three affective processing systems: (**a**) the ventral core affect system includes the amygdala, insula, anterior cingulate cortex (ACC), orbitofrontal cortex (OFC), and ventromedial prefrontal cortex (VMPFC); (**b**) the dorsal, attributional affective system includes the medial prefrontal cortex (MPFC), dorsomedial PFC (DMPFC), and ACC; and (**c**) the regulatory affective processing system includes the dorsal and ventral PFC

Measuring and Manipulating Mindfulness

Mindfulness has been described as a process of paying attention "on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn, 1994). A great deal of research has focused on operationally defining and measuring mindfulness, with varying perspectives and conceptualizations (for a review, see Brown et al., 2007; Quaglia et al. 2015). The scientific study of mindfulness has viewed mindfulness as both a dispositional quality that all individuals possess to varying degrees and an attentional state which can be fostered through training (Brown & Ryan, 2003). Trait mindfulness has been measured by a variety of validated self-report questionnaires. In contrast to trait mindfulness, mindfulness training research entails training meditation-naïve participants to adopt a mindful attentional stance while completing emotion tasks, or examining how brief (4 days to 10 weeks) mindfulness meditation training impacts emotional responding. Finally, mindfulness training effects have been explored in studies that compare advanced meditators (with over 10 years of daily meditation practice, on average) to matched control participants. For a recent review of scientific measures and manipulations of mindfulness, see Quaglia et al. (2015).

For purposes of this chapter, we describe studies that include a measure or manipulation of mindfulness and a measure of brain activity while participants complete affective processing tasks. Accordingly, we first describe research relating dispositional (trait) mindfulness with neural measures of emotion processing. We then describe research exploring how a mindful attentional stance can impact neural markers of emotion processing. In the latter case, we order the sections by the amount of mindfulness training received: adopting a mindful attentional stance in meditation-naïve participants, brief mindfulness meditation training, and mindfulness meditation-trained experts.

Trait Mindfulness and Emotion Processing

Self-report measures of trait mindfulness have provided opportunities for investigators to relate self-reported individual differences in mindfulness to measures of brain activity during affective tasks. One recent study used electroencephalography (EEG) to assess the relationship between the late positive potential (LPP) and trait mindfulness in an undergraduate sample (Brown, Goodman, & Inzlicht, 2013). The LPP is a positive deflection of the event-related potential in the slow-wave latency range (~400–500 ms after stimulus onset), appearing most prominently in the posterior and central midline scalp regions. It is larger in response to more intense stimuli and correlates with subjective reports of arousal (Cuthbert, Schupp, Bradley, Birbaumer, & Lang, 2000). Because of these characteristics, some researchers consider it a sensitive marker of early emotional arousal (Hajcak, MacNamara, & Olvet, 2010). In this study of mindfulness and the LPP response, researchers found that trait mindfulness as assessed by two self-report measures [the Mindful Attention Awareness Scale (Brown & Ryan, 2003) and Five Facet Mindfulness Questionnaire (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006)] was associated with reduced LPP in response to high-arousal, unpleasant stimuli (e.g., images of corpses). Trait mindfulness was also associated with reduced LPP in response to motivationally salient pleasant stimuli (e.g., erotica). These findings suggest that trait mindfulness is associated with a tempered early response (~500 ms) to unpleasant and other motivationally salient stimuli that occurs before a subsequent response can arise and may indicate reduced emotional reactivity.

Another study assessed trait mindfulness with the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004) and asked participants to imagine personally experiencing emotional vignettes (Frewen et al., 2010). Using functional magnetic resonance imaging (fMRI),

the authors found that greater self-reported individual differences in observing (on the Mindful Observing subscale) were positively associated with activation of the amygdala and DMPFC while listening to scripts designed to elicit experiences of rejection or social praise. The positive association between observing and amygdala activation is opposite to research showing that dispositional mindfulness is associated with reduced amygdala activation (Creswell, Way, Eisenberger, & Lieberman, 2007; Modinos, Ormel, & Aleman, 2010) (discussed below). Importantly, these studies that found an association between dispositional mindfulness and downregulated amygdala activation used regulatory instructions to modify the response to affective stimuli, while the Frewen et al. study did not. Additionally, the observing subscale has been found to operate differently in meditating and non-meditating samples (Baer et al., 2008). In meditators, the observing subscale correlated with psychological adjustment and well-being. However, in non-meditators this subscale showed associations in the opposite direction. It may be that acceptance is an important moderating factor; that is, an amygdala response may be higher when observing internal and external experiences without an accepting or nonjudgmental stance. In addition, the reported DMPFC activation found in the Frewen et al. study (associated with observing) may implicate generating attributions about one's emotional state (Barrett et al., 2007) and may describe a potential neural underpinning of meta-cognitive awareness in mindful individuals (cf. Teasdale et al., 2002).

Two studies of trait mindfulness and emotion processing found mindfulness to be associated with increased PFC activity and reduced amygdala activity in response to affective stimuli (Creswell et al., 2007; Modinos et al., 2010). Both of these studies used regulatory experimental instructions while participants were viewing affective stimuli. Previous studies have shown that linguistically labeling affective images activates ventrolateral PFC (VLPFC), and deactivates the amygdala (Lieberman et al., 2007). This research suggests that labeling one's feelings may be a basic mechanism for regulating one's emotions, and interestingly, labeling and noting are commonly used during mindfulness meditation practices (e.g., noting the experience of anger in the body). Building on this, Creswell and colleagues (2007) showed that dispositional mindfulness [as measured by the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003)] moderated neural responses to an affect-labeling task. Specifically, dispositional mindfulness was associated with greater activation of PFC regulatory regions (including bilateral VLPFC) and greater deactivation of the amygdala, suggesting that mindful individuals may be better able to recruit PFC regulatory regions during affect labeling. A similar neural affect regulation effect was observed in mindful individuals when instructed to use a cognitive reappraisal regulatory strategy. Specifically, Modinos and colleagues (2010) asked participants to view negative images (e.g., burn victims, funeral scenes) and to reappraise, or reinterpret, their meaning so that they were no longer negative. The authors found that trait mindfulness during reappraisal (as measured by the KIMS) was associated with increases in DMPFC activity, and this activity was negatively correlated with amygdala activity.

Summary: Trait Mindfulness Research

Trait mindfulness research involving neural processing of affective stimuli suggests a relationship between trait mindfulness and reduced emotional reactivity. In studies using regulatory instructions, trait mindfulness is also associated with enhanced recruitment of emotion regulation regions. EEG research has linked dispositional mindfulness to reduced early cortical emotional reactivity (Brown et al., 2013). fMRI research using regulatory experimental instructions (e.g., affect labeling, cognitive reappraisal) has linked that trait mindfulness to increased PFC activation and reduced amygdala activation to affective images. Mindful traits were positively associated with increased activity in the PFC, and some functional connectivity findings (Creswell et al., 2007; Modinos et al., 2010) suggest that PFC is inversely associated

with amygdala activity. This work suggests that when participants are given instructions to explicitly regulate affective responses (labeling, cognitive reappraisal), individual differences in mindfulness may activate emotion regulation regions in the PFC, which may in turn inhibit core affective responses in regions such as the amygdala. These findings suggesting a link between trait mindfulness and reduced emotional reactivity are important because emotional reactivity is central to dysfunctional emotion regulation (Linehan, 1993), and dysfunction in emotion regulation is a core component in disorders of anxiety, mood, substance abuse, and eating (Berking & Wupperman, 2012).

State Mindfulness Research in Meditation-Naïve Participants

State mindfulness research can be categorized by participants' level of mindfulness training: meditation naïve, briefly trained, and expert. Studies of state mindfulness using meditation-naïve participants instruct participants with no previous mindfulness training to adopt a mindful attentional stance. They use various experimental instructions to ask participants to pay attention to present moment experience. Instructions may ask participants to pay attention to present emotional experience and bodily sensations (Herwig, Kaffenberger, Jäncke, & Brühl, 2010), or to actively monitor their responses to stimuli including thoughts, feelings, memories, and body sensations with an accepting attitude (Westbrook et al., 2013).

Taylor and colleagues (2011) instructed meditation-naïve participants to mindfully attend to images of differing emotional valences. These mindfulness instructions reduced self-reported emotional intensity experienced in response to the images across all valence categories (i.e., positive, negative, and neutral). In these participants, a mindful attentional stance deactivated the amygdala in response to positive and negative images. Similarly, another study contrasted a narrative, conceptual *think* condition ("think about yourself, reflect who you are, about your goals") with a mindfulness of present moment emotions and bodily sensations *feel* condition in meditation-naïve participants (Herwig et al., 2010). The *think* instructions increased activation in the amygdala, anterior cortical midline, and posterior cingulate cortex (PCC). The *feel* instructions deactivated the amygdala and resulted in a shift toward more posteriorly bilateral inferior frontal and premotor regions. The *feel* condition also activated the middle insula, which the authors interpreted as mindful attention increasing interoception (i.e., awareness of bodily states) (Critchley, Wiens, Rotshtein, Öhman, & Dolan, 2004).

One study examining mindfulness and cue-induced cigarette craving in meditation-naïve participants also found that a mindful attentional stance reduced neural activity in regions implicated in core affective reactivity (Westbrook et al., 2013). Most craving researchers categorize craving as an affective state for motivating behavior (see Skinner & Aubin, 2010). In this study on mindfulness and craving, mindfulness instructions led to reduced self-reported cigarette craving and reduced neural reactivity to smoking cues in nicotine-deprived smokers. The ACC, including its subgenual region (sgACC), plays a central role in the craving response of dependent smokers (Kühn & Gallinat, 2011). Mindfully attending to smoking cues not only reduced craving-related sgACC activation but also reduced its functional connectivity to other craving regions (e.g., ventral striatum). The area of deactivation around the sgACC extended to the ventromedial PFC (VMPFC), including Brodmann's area (BA) 10. BA 10 is thought to encode the subjective value of goods such as an appetitive snack (Hare, O'Doherty, Camerer, Schultz, & Rangel, 2008). Mindfulness-related reductions in this area may indicate a shift away from the subjective self-referential value of experience to a more objective, non-evaluative engagement with present moment experience.

In addition to reduction of emotional arousal, Farb and colleagues (2007) also showed a shift away from midline to lateral regions with engagement of a mindful attentional stance in meditation-naïve participants. This study contrasted states of

narrative focus and experiential focus while mildly positive (e.g., charming) and negative (e.g., greedy) characteristics were presented to meditation-naïve participants undergoing fMRI. (While we discuss results obtained prior to mindfulness training here, we note that this study and others that we review in this chapter included a mindfulness training component. We present neural results obtained after mindfulness training in our section on brief mindfulness training below.) Instructions for narrative focus entailed judging what is occurring, trying to figure out what that trait word means to the participant, whether it describes the participant, and allowing oneself to become caught up in a given train of thought. For experiential (mindfulness) focus, participants were to sense what is presently occurring in one's thoughts, feelings, and body state, without a purpose or goal. Compared to narrative focus, experiential focus resulted in deactivation of cortical midline structures (subgenual cingulate, PCC, and reduction in mPFC with lower threshold) and activation of a left-lateralized network (dorsolateral PFC, VLPFC, and posterior parietal areas). The authors interpreted their results to represent a shift away from the central default mode network (DMN) regions, the midline regions involved in narrative, self-referential processing. They interpreted reduced midline PFC activity as moving away from subjective, self-referential valuation of experience to more objective and non-evaluative engagement (Farb et al., 2007).

Summary: State Mindfulness Research with Meditation-Naïve Participants

State mindfulness research using meditation-naïve participants, as well as trait mindfulness findings, indicates a mindfulness-related decrease in core affective neural response and reported emotion reactivity (Farb et al., 2007; Herwig et al., 2010; Taylor et al., 2011; Westbrook et al., 2013). When engaging a mindful attentional stance, participants demonstrated deactivation of core affective, ventral regions and activation of dorsal and regulatory regions. As mentioned above, diminished emotional reactivity may allow for improved emotion regulation and thus discourage the development of psychopathology. Instructions to engage a mindful attentional stance reduce reactivity and may therefore be protective. There is also some evidence to support a mindfulness-related shift away from the DMN and medial PFC toward a left lateralized network when participants engage a mindful (experiential) attentional focus (Farb et al., 2007; Herwig et al., 2010). Although more research is needed to evaluate this claim, these neural findings are consistent with the idea that a mindful attentional stance shifts one from a subjective, self-referential valuation of experience to a more objective and non-evaluative perception of experience. This non-evaluative perception of experience may be a mechanism whereby a mindful attentional stance reduces emotional reactivity. With non-evaluative perception, a stimulus loses the self-referential valence required for strong reactivity.

State Mindfulness Research After Brief Mindfulness Meditation Training

In contrast to instructing meditation-naïve participants to adopt a mindful attentional stance, many studies offer participants a brief mindfulness meditation training program. A growing number of published studies randomly assign participants to brief mindfulness meditation training programs (or control programs) and compare changes in neural activation patterns to affective stimuli before and after this training. These training programs vary in length and intensity, ranging from 4 days of approximately 25 min of training per day (Zeidan et al., 2011) to 8 weeks of group and individual daily practice in variants of the Mindfulness-Based Stress Reduction (MBSR) program (Kabat-Zinn, 1994).

One recent study examined changes in neural processing of pain stimuli after a brief four-session 25-min mindfulness training program and compared this to an eyes-closed rest condition

(Zeidan et al., 2011). Participants were exposed to noxious heat stimuli while instructed to attend to the breath before and after mindfulness training. Attend to breath instructions did not reduce self-reported pain ratings before mindfulness training, but it did after training. Training also reduced activity in the somatosensory cortex while monitoring breathing and during the application of the heat stimulus. Participants who reported the greatest meditation-related reduction in pain intensity had the largest meditation-related activation of the anterior insula and ACC. With regard to pain, mindfulness training coupled with meditation instruction during application of pain stimuli resulted in reduced experienced pain. This reduction may be explained by the reduced activation of the primary somatosensory cortex and increased activation of the anterior insula and ACC. The authors suggested that these effects may describe a neural basis for how mindfulness meditation alters appraisals that impart significance to salient sensory (pain) events (Zeidan et al., 2011), which is consistent with early mindfulness research showing that chronic pain patients had decoupled their pain sensations from their cognitive-affective reactions after MBSR training (Kabat-Zinn, 1982).

In contrast to this new research using quite brief training manipulations, the MBSR program consists of 8 weekly 2-h group sessions, a 1-day silent retreat, and daily home meditation practice during the 8-week training program (Kabat-Zinn, 1994). This program is facilitated by an MBSR-trained instructor who maintains a daily mindfulness meditation practice. Mindfulness is taught through a progression of body-based mindfulness exercises (including guided meditations, mindful stretching and yoga, and didactic exercises and group discussions). Two published studies examined differences in neural activation patterns after MBSR training while participants were exposed to emotional stimuli without any specific experimental instruction to modify their affective response. Both studies found reduced activity in the DMN and language areas in response to affective stimuli after mindfulness training. In the first study, participants diagnosed with social anxiety disorder (SAD) were shown positive and negative social trait adjectives before and after MBSR training and asked to consider if these traits described them (Goldin, Ramel, & Gross, 2009). For positive traits, MBSR training resulted in reduced activity in self-referential DMN areas (medial PFC and DMPFC) and language processing (left inferior frontal gyrus) areas. MBSR training increased activation to negative traits in visual attention areas (left inferior parietal lobule and medial precuneus), possibly indicating reduced avoidance and increased ability to engage in negative social trait processing. Mindfulness training also resulted in decreased reported SAD symptoms (Goldin et al., 2009).

The second study exposed control and MBSR trained participants to sad film clips (Farb et al., 2010). Mindfulness training reduced neural activity in response to sad film clips compared to controls, particularly in the precuneus, PCC, left posterior superior temporal gyrus (Wernicke's area), and left frontal operculum (Broca's area). The precuneus and PCC are midline cortical structures that have been associated with autobiographical memory retrieval and self-referential processing (Cavanna & Trimble, 2006), and the PCC is a central node in the DMN. In addition to this shift away from DMN and language areas, MBSR participants showed more insula activity during sad clips than controls.

Another study that showed a mindfulness training-related reduction in DMN activity suggests that this reduction occurs with a decoupling of the DMN and insula (Farb et al., 2007). When experiential and narrative focus conditions were contrasted during the presentation of positive and negative traits in participants who have completed MBSR, experiential focus reduced activity along the anterior cortical midline (rostral dorsal and ventral mPFC) and activated right regulatory PFC regions, insula, and secondary somatosensory cortex. Functional connectivity analyses showed that the insula was strongly correlated with VMPFC in controls but not in MBSR participants. Instead, the insula was coupled to DLPFC activity during experiential focus following meditation training. The authors suggested that interoception may be strongly coupled with narrative focus in controls but not in participants

with mindfulness training. The overall pattern suggests that experiential (mindful) focus may reduce ventral core affective activity in the VMPFC and amygdala during the presentation of trait words, an effect that can be enhanced after mindfulness training. Moreover, mindfulness training increases the recruitment of right-lateralized PFC regulatory areas (right ventro- and dorsolateral PFC), providing suggestive evidence for mindfulness training effects on regulatory PFC regions (Cohen, Berkman, & Lieberman, 2013).

A recent study explored how MBSR training impacts neural responding in SAD patients. When these participants were instructed to shift attention to the breath while being exposed to negative self-beliefs, they exhibited a reduction in amygdala activity following MBSR training (Goldin & Gross, 2010). However, when participants were exposed to negative self-beliefs without instructions to direct attention to the breath, there was an initial increase or spike of amygdala activity that quickly dissipated. Because these participants reported reduced experienced negative emotion in response to negative self-beliefs, it may be that this initial spike in amygdala activity indicates that MBSR training increases initial affective orienting or emotional processing (Goldin & Gross, 2010). Compared to baseline reacting to negative self-beliefs, these SAD participants also showed a shift away from anterior midline cortical and other DMN regions with training and breath-focused attention. Similar to previous findings with SAD participants, they also demonstrated increased activation of visual attention that may indicate reduced avoidance of negative stimuli.

In addition to the fMRI studies of brief mindfulness training, there are several studies that used EEG to examine the effects of brief mindfulness training on prefrontal α-asymmetry. It is believed that anterior hemispheric asymmetry reflects motivational direction, with dominant left-hemispheric activity reflecting appetitive, approach responses and dominant right-hemispheric activity reflecting aversive, withdrawal responses (Davidson & Irwin, 1999). EEG measurement of asymmetry in the α-band (8–13 Hz) is used in this way to determine engagement of a positive, approach state or negative, withdrawal state. Studies that used this methodology have yielded mixed results. Two studies (one using MBSR and another using an abbreviated 5-week training) found that mindfulness training shifted α-asymmetry toward the left hemisphere, suggesting that there may be a shift toward more approach-related positive emotionality (Davidson et al., 2003; Moyer et al., 2011). However, one study showed no change with meditation training and a shift toward right dominant asymmetry in controls using an 8-week Mindfulness-Based Cognitive Therapy (MBCT) with participants with past suicidality (Barnhofer et al., 2007). Finally, in another study, the whole sample shifted toward right dominant α-asymmetry regardless of whether participants were controls or mindfulness trained using MBCT (Keune, Bostanov, Hautzinger, & Kotchoubey, 2011). One fMRI study not designed to assess α-asymmetry noted dominant left PFC activity during meditation in expert meditators, and the authors interpreted this as indicative of a positive emotional state (Wang et al., 2011).

Summary: State Mindfulness Research with Brief Mindfulness Meditation Training

State mindfulness research involving brief mindfulness training and emotion processing indicates that training results in reduced markers of negative affect, such as SAD symptoms, negative emotion, and pain intensity and unpleasantness to an applied thermal pain probe (Goldin et al., 2009; Goldin & Gross, 2010; Zeidan et al., 2011). These effects of brief mindfulness meditation training also co-occur with changes in specific neural activation patterns. Several studies indicate a mindfulness-related downregulation of DMN areas (particularly the VMPFC, DMPFC, and PCC) and language areas to a broad range of affective stimuli (Farb et al., 2007, 2010; Goldin et al., 2009; Goldin & Gross, 2010). This may indicate that brief mindfulness training shifts participants away from a self-referential, narrative

focus and subjective valuation of experience. In response to affective stimuli, two studies showed overall mindfulness-related amygdala deactivation (Farb et al., 2007; Goldin & Gross, 2010), and three studies found that mindfulness increased insula activation (Farb et al., 2007, 2010; Zeidan et al., 2011). It may be that this insula activation indicates changes in interoception and the appraisal of salient sensory events.

This body of work suggests that reduced negative affect as a result of mindfulness training may be driven by several underlying neural mechanisms: (1) deactivation of self-referential, evaluative, and narrative DMN regions; (2) deactivation of the amygdala likely indicating reduced reactivity; and (3) increased insula activation indicative of altered interoception and representation of sensory events. These patterns indicate decreased activation of core affect regions both with and without the recruitment of affect regulation regions found in subjects high in trait mindfulness performing regulation tasks. It may be that a more objective perspective that accompanies movement away from self-referential DMN processing as a result of mindfulness training diminishes core affect reactivity without engaging regulatory processes. However, improved functioning of regulatory regions likely also accompanies mindfulness training. There are likely diverse neural pathways whereby mindfulness training can reduce negative affect in response to affective stimuli, and reduction of negative affect is critical to diverse clinical outcomes. EEG evidence, although mixed, suggests that brief mindfulness training may shift anterior hemispheric dominance to the left or prevent increases in right anterior dominance, which has been interpreted as promoting a more positive and approach-oriented mental stance (Barnhofer et al., 2007; Davidson et al., 2003; Moyer et al., 2011).

State Mindfulness Research in Experienced Meditators

Another body of research has examined functional neural differences between mindfulness practitioners with significant meditation experience (i.e., several years of daily practice) and meditation-naïve controls matched on variables such as age, sex, education, and handedness (Brewer et al., 2011; Hölzel et al., 2007; Ives-Deliperi, Solms, & Meintjes, 2011; Taylor et al., 2011; Wang et al., 2011). One study compared neural processing of emotionally evocative images in meditation-naïve participants and meditators with over 1,000 h of zen meditation experience under mindful viewing instruction and no instruction conditions (Taylor et al., 2011). When looking at images without viewing instructions, the only difference between beginning and experienced meditators was that experts had decreased activity in the rostro-ventral ACC when viewing positive images. Under mindful viewing instructions, both beginning and experienced meditators reported reduced emotional intensity in response to the images with differing, group-specific neural correlates. Mindful instructions in beginners were associated with a deactivation of the amygdala during processing of positive and negative images. In experienced meditators, mindful viewing decreased activity in the medial PFC (BA 10) and PCC across all valence categories. In another study comparing experienced meditators to matched naïve controls while practicing different types of meditation, meditation in experienced meditators was associated with deactivation of the medial PFC and PCC (Brewer et al., 2011). Evidence therefore suggests that mindfulness in experienced meditators entails a shift away from the DMN, including altered activation in the medial PFC (also part of the dorsal affective system).

Our Emerging Understanding of Mindfulness and the Neurobiology of Emotion

The findings to date indicate that mindfulness affects neurobiological networks implicated in emotion, including the ventral core affective network, the dorsal emotion processing network, and PFC regions implicated in the regulation of emotion. In the ventral core affective network, trait mindfulness and mindfulness training alter

activation in the amygdala, VMPFC, ACC, and insula in response to a broad range of affective stimuli. Reductions of amygdala activation in response to affective stimuli have been found in trait and state mindfulness studies (Creswell et al., 2007; Farb et al., 2007; Herwig et al., 2010; Modinos et al., 2010; Taylor et al., 2011). Along with other ventral affect processing regions (i.e., VMPFC and ACC), the amygdala influences the visceromotor responses related to the value-based representations of an object (Barrett et al., 2007). Altered responses related to mindfulness in the VMPFC (Farb et al., 2007; Westbrook et al., 2013) and ACC (Farb et al., 2010; Taylor et al., 2011; Westbrook et al., 2013; Zeidan et al., 2011) have also been reported, further supporting the possibility of changes in visceromotor value-based responses associated with mindfulness.

These changes in this core affect response system coupled with a shift from midline DMN areas associated with self-referential valuation and narrative focus (i.e., VMPFC and PCC) toward more lateral and posterior regions (Farb et al., 2007, 2010; Goldin et al., 2009; Goldin & Gross, 2010) may indicate a shift away from subjective valuation and narrative elaboration toward a more experiential and objective awareness of present experience. Many theorists describe how mindfulness is characterized by a nonjudgmental awareness of one's moment-to-moment experience (Kabat-Zinn, 1994), and this may reduce the evaluation of affective stimuli in terms of whether it is good or bad for "me" and reduce the elaboration of thoughts related to that evaluation. The increase in insula activity with mindfulness (Farb et al., 2007, 2010; Herwig et al., 2010; Taylor et al., 2011), and its decoupling from the valuation-related VMPFC (Farb et al., 2007), may also underlie the movement from subjective evaluation to a bare awareness of present experience.

Mindfulness has also been linked with increases in neural regulatory PFC regions when participants are instructed to regulate affect responses. When modifying responses to affective stimuli using a regulatory strategy (i.e., reappraisal or labeling), trait mindfulness is associated with increased PFC activation and decreased amygdala response (Creswell et al., 2007; Modinos et al., 2010). This suggests that individuals high in trait mindfulness might be better able to recruit regulatory networks when using a regulatory strategy. Changes in activation of the DMPFC, part of the PFC included in the dorsal affect processing system, are also related to mindfulness. This region may support attributions about affective experience. Three studies of trait mindfulness found mindfulness-related increases in DMPFC activity (Creswell et al., 2007; Frewen et al., 2010; Modinos et al., 2010), and one state mindfulness study in MBSR trained participants found a related decrease (Goldin et al., 2009). It may be that the DMPFC serves as part of the prefrontal system associated with regulatory strategies in individuals high in trait mindfulness and is downregulated during state mindfulness in the shift away from midline DMN areas.

In addition to the DMPFC activation mentioned above, mindfulness has also been found to be associated with altered activation of the MPFC and ACC, which have been described as emotion processing regions in the dorsal affect network (Barrett et al., 2007). In response to affective stimuli, a mindful attentional stance is associated with reduced activation of the MPFC (Farb et al., 2007; Goldin et al., 2009; Taylor et al., 2011). While the functional properties of the MPFC have yet to be precisely defined (Amodio & Frith, 2006), it is thought that this region participates in attributions made about the cause(s) of core affect (Barrett et al., 2007). In contrast to the MPFC, the ACC has shown mindfulness-related activation in response to affective stimuli (Farb et al., 2010; Taylor et al., 2011; Zeidan et al., 2011), although craving-related activation of the sgACC in response to smoking cues is reduced with mindfulness (Westbrook et al., 2013). The ACC is thought to signal the need to represent mental contents in consciousness with the aim of reducing conflict, improving understanding, or exerting greater control over them (Barrett et al., 2007). The pattern of increased ACC and decreased MPFC associated with mindfulness may indicate increased understanding and control of mental contents while deemphasizing attributions about the affect itself.

Our review has focused on describing findings from self-report measures of mindfulness and mindfulness training interventions, and future research would benefit from comparing how these different types of measures and manipulations of mindfulness relate to activation patterns in response to the same affective stimuli (e.g., a sad film clip known to elicit robust sadness) (cf., Goldin & Gross, 2010; Taylor et al., 2011; Zeidan et al., 2011). When including state mindfulness, it would also be useful to ask participants how successful they felt they were in adopting a mindful attentional stance, and to include such reports in analyses. Instructions to engage mindful attention can be difficult to follow, and analyses using only subjects reporting success may further clarify mindful emotion processing patterns.

Promising Question for Future Research

How Do Mindfulness-Related Changes in Neural Emotion Processing Measures Relate to Changes in Clinical Symptoms?

Mindfulness-based interventions have been shown to reduce clinical symptoms of depression and anxiety (Hofmann et al., 2010; Roemer et al., 2008; Teasdale et al., 2000) as well as affective disturbances in chronic pain patients (Grossman et al., 2007; Kabat-Zinn, 1982; Kabat-Zinn et al., 1992). It seems likely that these clinical changes may be mediated by basic changes in neurobiological emotion processing systems, although very little work has attempted to explore neural mechanisms of these clinical symptom changes (Goldin et al., 2009; Goldin & Gross, 2010). We are aware of several groups who are exploring these brain-behavior links, so we hope to see advances in this area in the coming years. One challenge in advancing research on this question is the complexity of analytic models for testing brain-behavior relations, but advances in neuroimaging toolboxes for mediation analysis are now available (e.g., Wager et al., 2009).

How Do Mindfulness-Related Structural Brain Changes Inform Our Understanding of Mindfulness and Emotion Processing?

Several studies document mindfulness-associated changes in gray matter density and volume in neural regions implicated in emotion processing (i.e., amygdala, hippocampus, and OFC). One study reported that MBSR reduced perceived stress, and reductions in perceived stress co-varied with decreases in gray matter density of the right amygdala (Hölzel et al., 2010). Given that some previous studies indicate that mindfulness alters amygdala responses to affective stimuli (Creswell et al., 2007; Farb et al., 2007; Herwig et al., 2010; Modinos et al., 2010; Taylor et al., 2011), one promising future direction is to examine the relationship between structural and functional changes in amygdalar response (cf. Gianaros et al., 2008). Also, several studies indicate that mindfulness is associated with increases in gray matter density (Hölzel et al., 2011) and gray matter concentration (Hölzel et al., 2008; Luders, Toga, Lepore, & Gaser, 2009) in the hippocampus. The hippocampus sits adjacent to the amygdala and has been implicated as a core affective region. It is thought that the hippocampus facilitates fear extinction, emotion processing, and memory (Corcoran, Desmond, Frey, & Maren, 2005; Milad et al., 2007). Two studies indicate structural changes in orbitofrontal cortex (OFC) of experienced meditators (Hölzel et al., 2008; Luders et al., 2009). Gray matter density in the medial OFC was positively associated with hours of meditation practice in experienced meditators (Hölzel et al., 2008). Another study found increased gray matter volumes in the OFC of experienced meditators compared to non-meditators (Luders et al., 2009). The OFC, part of the ventral affective processing system, is thought to represent the affective value of an object in a flexible, experience- or context-dependent manner that the VMPFC uses to make choices and judgments based on this initial valuation (Barrett et al., 2007), suggesting that mindfulness training may increase processing capacity for considering contextual factors during emotion valuation.

How Does Mindful Awareness Impact Neural Affective Responses Over Time?

Affective experiences are not monotonic; instead, they are content-rich events that arise and pass away over time. Accordingly, mindfulness has the potential to alter early orienting and attention toward affective stimuli (Jha, Krompinger, & Baime, 2007; Vago & Nakamura, 2011), to modify early emotion processing as affective stimuli are initially perceived (Brown et al., 2013), and to change how these stimuli are processed and regulated over time (Goldin & Gross, 2010). We know very little about how mindful attention can alter these temporal parameters of emotion processing and its neural sequelae. For example, it is possible that mindful attention increases one's attention to threat-related cues early in the emotion generation process while also promoting a regulatory response during emotion processing. Indeed, an initial study suggests that this may be true (Vago & Nakamura, 2011), although the neurobiological mechanisms are unknown. One limitation with current fMRI approaches is their sluggish temporal resolution (collecting a whole brain volume can take 1–3 s), which makes it difficult to evaluate changes in emotion processing to discrete affective events. Currently, EEG (Brown et al., 2013) and MEG (Kerr et al., 2011) approaches offer the best temporal resolution for testing these unexplored areas, which are important areas for future research.

Conclusion

An exciting body of research is emerging that identifies how mindfulness changes the way the brain processes affective stimuli. The body of work we describe here represents our first steps in understanding the neurobiology of mindfulness and emotion processing. Collectively, this initial work indicates that trait mindfulness and mindfulness training can alter ventral core affective reactivity, dorsal emotion processing, and PFC regulatory neural affect regions. The coming years will no doubt bring new research that increases the specificity of our knowledge about the neurobiology of mindfulness and emotion processing.

References

Amodio, D. M., & Frith, C. D. (2006). Meeting of minds: The medial frontal cortex and social cognition. *Nature Reviews Neuroscience, 7*, 268–277.

Arnsten, A. F. T. (2009). Stress signalling pathways that impair prefrontal cortex structure and function. *Nature Reviews Neuroscience, 10*, 410–422.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45.

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., . . . Williams, J. M. G. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment, 15*, 329–342.

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report. *Assessment, 11*, 191–206.

Barnhofer, T., Duggan, D., Crane, C., Hepburn, S., Fennell, M. J., & Williams, J. M. (2007). Effects of meditation on frontal alpha-asymmetry in previously suicidal individuals. *Neuroreport, 18*, 709–712.

Barrett, L. F., Mesquita, B., Ochsner, K. N., & Gross, J. J. (2007). The experience of emotion. *Annual Review of Psychology, 58*, 373–403.

Berking, M., & Wupperman, P. (2012). Emotion regulation and mental health: Recent findings, current challenges, and future directions. *Current Opinion in Psychiatry, 25*, 128–134.

Brewer, J. A., Worhunsky, P. D., Gray, J. R., Tang, Y. Y., Weber, J., & Kober, H. (2011). Meditation experience is associated with differences in default mode network activity and connectivity. *Proceedings of the National Academy of Sciences, 108*, 20254–20259.

Brown, K. W., Goodman, R. J., & Inzlicht, M. (2013). Dispositional mindfulness and the attenuation of neural responses to emotional stimuli. *Social, Cognitive, and Affective Neuroscience, 8*(1), 93–99.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*, 211–237.

Cavanna, A. E., & Trimble, M. R. (2006). The precuneus: A review of its functional anatomy and behavioural correlates. *Brain, 129*, 564–583.

Cohen, J. R., Berkman, E. T., & Lieberman, M. D. (2013). Intentional and incidental self-control in ventrolateral

PFC. In D. T. Stuss & R. T. Knight (Eds.), *Principles of frontal lobe function* (2nd ed., pp. 417–440). New York: Oxford University Press.

Corcoran, K. A., Desmond, T. J., Frey, K. A., & Maren, S. (2005). Hippocampal inactivation disrupts the acquisition and contextual encoding of fear extinction. *The Journal of Neuroscience, 25*, 8978–8987.

Creswell, J. D., Way, B. M., Eisenberger, N. I., & Lieberman, M. D. (2007). Neural correlates of dispositional mindfulness during affect labeling. *Psychosomatic Medicine, 69*, 560–565.

Critchley, H. D., Wiens, S., Rotshtein, P., Öhman, A., & Dolan, R. J. (2004). Neural systems supporting interoceptive awareness. *Nature Neuroscience, 7*, 189–195.

Cuthbert, B. N., Schupp, H. T., Bradley, M. M., Birbaumer, N., & Lang, P. J. (2000). Brain potentials in affective picture processing: Covariation with autonomic arousal and affective report. *Biological Psychology, 52*, 95–111.

Davidson, R. J., & Irwin, W. (1999). The functional neuroanatomy of emotion and affective style. *Trends in Cognitive Sciences, 3*, 11–21.

Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F., . . . Sheridan, J. F. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine, 65*, 564–570.

Farb, N. A. S., Anderson, A. K., Mayberg, H., Bean, J., McKeon, D., & Segal, Z. V. (2010). Minding one's emotions: Mindfulness training alters the neural expression of sadness. *Emotion, 10*, 25–33.

Farb, N. A. S., Segal, Z. V., Mayberg, H., Bean, J., McKeon, D., Fatima, Z., & Anderson, A. K. (2007). Attending to the present: Mindfulness meditation reveals distinct neural modes of self-reference. *Social Cognitive and Affective Neuroscience, 2*, 313–322.

Frewen, P. A., Dozois, D. J. A., Neufeld, R. W. J., Lane, R. D., Densmore, M., Stevens, T. K., & Lanius, R. A. (2010). Individual differences in trait mindfulness predict dorsomedial prefrontal and amygdala response during emotional imagery: An fMRI study. *Personality and Individual Differences, 49*, 479–484.

Gianaros, P. J., Sheu, L. K., Matthews, K. A., Jennings, J. R., Manuck, S. B., & Hariri, A. R. (2008). Individual differences in stressor-evoked blood pressure reactivity vary with activation, volume, and functional connectivity of the amygdala. *The Journal of Neuroscience, 28*, 990–999.

Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*, 83–91.

Goldin, P., Ramel, W., & Gross, J. (2009). Mindfulness meditation training and self-referential processing in social anxiety disorder: Behavioral and neural effects. *Journal of Cognitive Psychotherapy, 23*, 242–257.

Grossman, P., Tiefenthaler-Gilmer, U., Raysz, A., & Kesper, U. (2007). Mindfulness training as an intervention for fibromyalgia: Evidence of postintervention and 3-year follow-up benefits in well-being. *Psychotherapy and Psychosomatics, 76*, 226–233.

Hajcak, G., MacNamara, A., & Olvet, D. M. (2010). Event-related potentials, emotion, and emotion regulation: An integrative review. *Developmental Neuropsychology, 35*, 129–155.

Hare, T. A., O'Doherty, J., Camerer, C. F., Schultz, W., & Rangel, A. (2008). Dissociating the role of the orbitofrontal cortex and the striatum in the computation of goal values and prediction errors. *The Journal of Neuroscience, 28*, 5623–5630.

Herwig, U., Kaffenberger, T., Jäncke, L., & Brühl, A. B. (2010). Self-related awareness and emotion regulation. *NeuroImage, 50*(2), 734–741. http://doi.org/10.1016/j.neuroimage.2009.12.089.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169–183.

Hölzel, B. K., Carmody, J., Evans, K. C., Hoge, E. A., Dusek, J. A., Morgan, L., . . . Lazar, S. W. (2010). Stress reduction correlates with structural changes in the amygdala. *Social Cognitive and Affective Neuroscience, 5*, 11–17.

Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S. W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research: Neuroimaging, 191*, 36–43.

Hölzel, B. K., Ott, U., Gard, T., Hempel, H., Weygandt, M., Morgen, K., & Vaitl, D. (2008). Investigation of mindfulness meditation practitioners with voxel-based morphometry. *Social Cognitive and Affective Neuroscience, 3*, 55–61.

Hölzel, B. K., Ott, U., Hempel, H., Hackl, A., Wolf, K., Stark, R., & Vaitl, D. (2007). Differential engagement of anterior cingulate and adjacent medial frontal cortex in adept meditators and non-meditators. *Neuroscience Letters, 421*, 16–21.

Ives-Deliperi, V. L., Solms, M., & Meintjes, E. M. (2011). The neural substrates of mindfulness: An fMRI investigation. *Social Neuroscience, 6*, 231–242.

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience, 7*, 109–119.

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*, 33–47.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. New York, NY: Hyperion Books.

Kabat-Zinn, J., Massion, A. O., Kristeller, J., Peterson, L. G., Fletcher, K. E., Pbert, L., . . . Santorelli, S. F. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *The American Journal of Psychiatry, 149*, 936–943.

Kerr, C. E., Jones, S. R., Wan, Q., Pritchett, D. L., Wasserman, R. H., Wexler, A., . . . Kaptchuk, T. J.

(2011). Effects of mindfulness meditation training on anticipatory alpha modulation in primary somatosensory cortex. *Brain Research Bulletin, 84,* 96–103.

Keune, P. M., Bostanov, V., Hautzinger, M., & Kotchoubey, B. (2011). Mindfulness-based cognitive therapy (MBCT), cognitive style, and the temporal dynamics of frontal EEG alpha asymmetry in recurrently depressed patients. *Biological Psychology, 88*, 243–253.

Kühn, S., & Gallinat, J. (2011). Common biology of craving across legal and illegal drugs–a quantitative meta-analysis of cue-reactivity brain response. *European Journal of Neuroscience, 33*(7), 1318–1326.

Lieberman, M. D., Eisenberger, N. I., Crockett, M. J., Tom, S. M., Pfeifer, J. H., & Way, B. M. (2007). Putting feelings into words affect labeling disrupts amygdala activity in response to affective stimuli. *Psychological Science, 18*, 421–428.

Linehan, M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: Guilford Press.

Luders, E., Toga, A. W., Lepore, N., & Gaser, C. (2009). The underlying anatomical correlates of long-term meditation: Larger hippocampal and frontal volumes of gray matter. *NeuroImage, 45*, 672–678.

Milad, M. R., Wright, C. I., Orr, S. P., Pitman, R. K., Quirk, G. J., & Rauch, S. L. (2007). Recall of fear extinction in humans activates the ventromedial prefrontal cortex and hippocampus in concert. *Biological Psychiatry, 62*, 446–454.

Modinos, G., Ormel, J., & Aleman, A. (2010). Individual differences in dispositional mindfulness and brain activity involved in reappraisal of emotion. *Social Cognitive and Affective Neuroscience, 5*, 369–377.

Moyer, C. A., Donnelly, M. P. W., Anderson, J. C., Valek, K. C., Huckaby, S. J., Wiederholt, D. A., . . . Rice, B. L. (2011). Frontal electroencephalographic asymmetry associated with positive emotion is produced by very brief meditation training. *Psychological Science, 22*, 1277–1279.

Ochsner, K. N., & Gross, J. J. (2005). The cognitive control of emotion. *Trends in Cognitive Sciences, 9*, 242–249.

Phillips, M. L., Drevets, W. C., Rauch, S. L., & Lane, R. (2003). Neurobiology of emotion perception I: The neural basis of normal emotion perception. *Biological Psychiatry, 54*, 504–514.

Quaglia, J.T., Brown, K.W., Lindsay, E.K., Creswell, J.D., & Goodman, R.J. (2015). Current conceptualizations and operationalizations of mindfulness. In K. W. Brown & R. R. Creswell (Eds.), *Handbook of Mindfulness: Theory, Research, and Practice*. New York, NY: Guilford Publications.

Roemer, L., Orsillo, S. M., & Salters-Pedneault, K. (2008). Efficacy of an acceptance-based behavior therapy for generalized anxiety disorder: Evaluation in a randomized controlled trial. *Journal of Consulting and Clinical Psychology, 76*, 1083–1089.

Skinner, M. D., & Aubin, H. J. (2010). Craving's place in addiction theory: Contributions of the major models. *Neuroscience and Biobehavioral Reviews, 34*, 606–623.

Taylor, V., Grant, J., Daneault, V., Scavone, G., Breton, E., Roffe-Vidal, S., . . . Beauregard, M. (2011). Impact of mindfulness on the neural responses to emotional pictures in experienced and beginner meditators. *Neuroimage, 57*, 1524–1533.

Teasdale, J. D., Moore, R. G., Hayhurst, H., Pope, M., Williams, S., & Segal, Z. V. (2002). Metacognitive awareness and prevention of relapse in depression: Empirical evidence. *Journal of Consulting and Clinical Psychology, 70*, 275–287.

Teasdale, J. D., Segal, Z. V., Williams, J. M. G., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68*, 615–623.

Vago, D. R., & Nakamura, Y. (2011). Selective attentional bias towards pain-related threat in fibromyalgia: Preliminary evidence for effects of mindfulness meditation training. *Cognitive Therapy and Research, 35*, 1–14.

Wager, T. D., van Ast, V. A., Hughes, B. L., Davidson, M. L., Lindquist, M. A., & Ochsner, K. N. (2009). Brain mediators of cardiovascular responses to social threat, part II: Prefrontal-subcortical pathways and relationship with anxiety. *NeuroImage, 47*, 836–851.

Wang, D. J. J., Rao, H., Korczykowski, M., Wintering, N., Pluta, J., Khalsa, D. S., & Newberg, A. B. (2011). Cerebral blood flow changes associated with different meditation practices and perceived depth of meditation. *Psychiatry Research: Neuroimaging, 191*, 60–67.

Westbrook, C., Creswell, J. D., Tabibnia, G., Julson, E., Kober, H., & Tindle, H. (2013). Mindful attention reduces neural and self-reported cue-induced craving in smokers. *Social, Cognitive, and Affective Neuroscience, 8*, 73–84.

Zeidan, F., Martucci, K. T., Kraft, R. A., Gordon, N. S., McHaffie, J. G., & Coghill, R. C. (2011). Brain mechanisms supporting the modulation of pain by mindfulness meditation. *The Journal of Neuroscience, 31*, 5540–5548.

Mindfulness and Training Attention

3

Yi-Yuan Tang and Michael I. Posner

Attention and Self-Regulation

Imaging the human brain by the use of functional magnetic resonance (fMRI) has revealed brain networks common to people when they perform tasks like reading, computing, or playing video games (Posner & Rothbart, 2007). One of the most common areas of study has been tasks that involve attention—maintaining an alert state, orienting to sensory stimuli, and/or resolving conflict among competing responses. Studies have revealed specific brain networks related to each of these attentional functions. The network involved in resolving conflict also serves as a means of self-regulation through control of brain networks involved in emotion, cognition, and behavior (Bush, Luu, & Posner, 2000; Posner, Rothbart, Sheese, & Tang, 2007).

Although everyone has these attentional networks, people can differ dramatically in the efficiency with which they are used. We will primarily, though not exclusively, concentrate on the executive attention network as this network has the greatest relevance to mindfulness and to self-regulation. In terms of this network, a behavioral criterion of efficiency refers to the speed with which conflict is resolved. Or, stated in other terms, a person is efficient to the extent that there is a smaller difference between correct responses when conflict is involved versus not. Behavioral efficiency, defined in this manner, has been shown to correlate with the strength of anterior cingulate cortex (ACC) activation in the executive network and with the degree of connectivity between nodes of this network (Fjell et al., 2012).

In more specific terms, the Attention Network Test (ANT) was devised as a means to measure network efficiency (Fan, McCandliss, Sommer, Raz, & Posner, 2002). The task, as illustrated in Fig. 3.1, requires the person to press one key if the central arrow points to the left and another if it points to the right. Conflict is introduced by having surrounding flankers either point in the same (congruent) or opposite (incongruent) direction of the central arrow. Cues presented prior to the target provide information on when or where the target will occur and these conditions are relevant to the alerting and orienting networks instead. By subtracting certain conditions from other conditions, with speed as the metric, three numbers can be assigned to the person that reflect the efficiency of the alerting, orienting, and executive networks.

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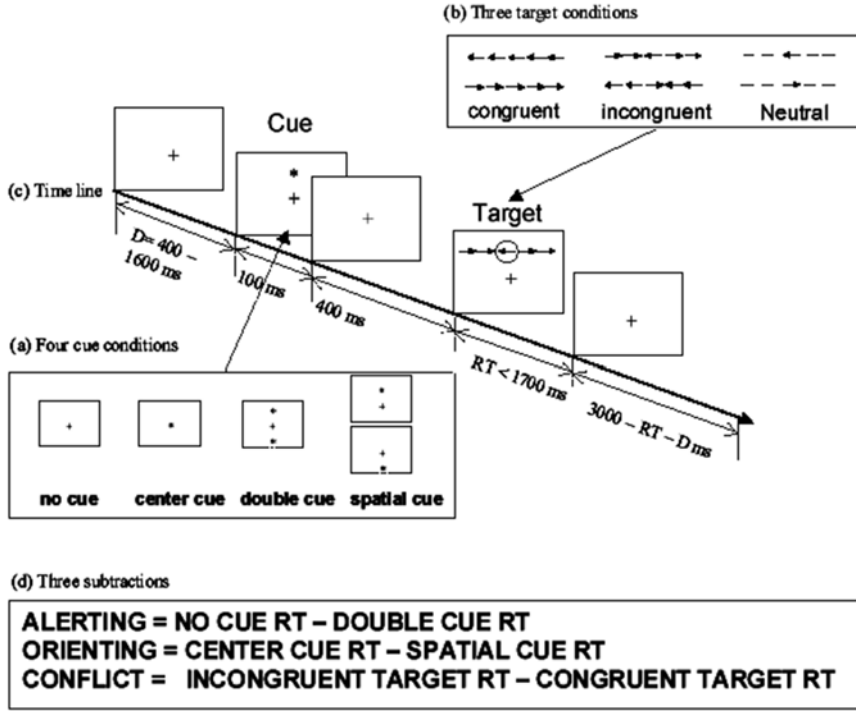

Fig. 3.1 Attention network test. (**a**) Indicates the four cueing conditions, (**b**) indicates the target conditions, (**c**) indicates the time line, (**d**) the three subtractions produce scores for alerting, orienting, and executive attention

Most MRI studies involve imaging the brain during tasks, but it has recently become common to study the brains of children and adults while they are resting without any task as well (resting-state MRI: Raichle, 2009). Resting state methods can be applied at any age because they do not require a task and the results of these studies are also informative concerning developmental processes. One of the brain networks active during rest is the executive network involved in resolving conflict and self-regulation (Dosenbach et al., 2007; Fair et al., 2009). During infancy and early childhood, most brain networks involve short connections between adjacent areas, such that the long connections that underlie complex forms of self-regulation develop slowly over childhood (Fair et al., 2009; Gao et al., 2009). Indeed, the brain network related to orienting to sensory events seems to provide the primary source of regulation prior to 2–3 years of age (Posner, Rothbart, Sheese, & Voelker, 2012; Rothbart, Sheese, Rueda, & Posner, 2011). Thereafter, an executive attention network develops and its locus involves the ACC and its connections to other brain areas.

Just as task and resting-state MRI are two fundamentally different methods of conducting MRI experiments related to self-regulation, there are also two very different methods that can be used to train self-regulation (Tang & Posner, 2009; Tang, Rothbart, & Posner, 2012b). We term one of these methods *network training* and the other *brain state training*. In network training, specific tasks are repeatedly administered to exercise the brain network to be trained, resulting in greater efficiency. This efficiency is thought to occur through two mechanisms—one that tunes the neurons in each node to fit the mental operations being performed and the other that strengthens the connection between nodes (Tang, Rothbart et al., 2012b). Conflict, working memory, and executive function tasks have all been used to improve self-regulation by network training.

Mindfulness meditation and aerobic exercise are two examples of efforts to improve attention through the training of brain state. In technical terms, brain states refer to reliable patterns of brain activity that involve the co-activation and/or connectivity of multiple large-scale brain networks (Tang, Rothbart et al., 2012b). Training brain states is thought to improve one's ability to switch between different states and/or to maintain a state when desirable. Mindfulness training is thought to work by facilitating the ability to enter and remain in a meditative state despite the brain's tendencies toward exiting this state (Tang, Rothbart et al., 2012b). The next two sections of the chapter describe these two training methods in greater depth.

Training Brain Networks

When a network involves a general function such as attention or working memory, increased efficiency should produce improvements in many different tasks that involve that network. Since working memory training may also target the manner in which attention works (Hofmann, Schmeichel, & Baddeley, 2012; Klingberg, 2011), the range of tasks that might be affected is further increased. In addition, such training may potentially extend beyond cognitive tasks to more social and emotional forms of self-regulation.

To examine the role of training on the executive attention network, we (Rueda, Rothbart, McCandliss, Saccamanno, & Posner, 2005) adapted a method that had been used by NASA to train monkeys for space travel. Children were randomly assigned to either an experimental group that was trained in executive attention or a control group that viewed child-appropriate videos for the same amount of time, a 5-day portion of the study. Children in the experimental group first learned to use a joystick to move a cat displayed on the monitor to a grass area while avoiding mud. As the child progressed, the task became more difficult because the grass area shrank and the mud area increased. The task is thought to require skills involving prediction, working memory, and conflict resolution. In addition, children in the experimental group performed a task requiring them to select the larger of two arrays of items and conflict trials manipulated digit number such that larger arrays were composed of smaller digits or vice versa. Before and after training, the children performed a child-based version of the ANT (Fan et al., 2002) while brain responses were measured by scalp electrodes (Rueda et al., 2005).

The effects of training were tested at ages (4–7 years) linked to major improvements in executive attention. After training, EEG data showed clear evidence of improvement in network efficiency in resolving conflict as the result of training. In particular, we focused on the N2 evoked response component whose neural generator is the ACC and whose occurrence is related to conflict resolution (Dehaene, Posner, & Tucker, 1994; van Veen & Carter, 2002). The N2 differences between congruent and incongruent trials of the ANT in trained 6-year-olds resembled differences found among adults, whereas this was not the case for the control group. The trained group also showed a greater improvement in intelligence compared to controls, as measured by the K-Bit test, a child-friendly test of IQ. The improvement was in overall IQ and in a matrix portion similar to the adult Raven's test. These results are important in that they reveal generalization to a measure of cognitive processing far removed from the training exercises.

A replication and extension of the Rueda et al. (2005) study was carried out for 5-year-olds in a Spanish preschool (Rueda, Checa, & Combita, 2012). Several additional exercises were added and 10 days of training occurred. The design also included a 2-month follow-up session. Unlike the control group, trained children showed improvement in intelligence scores, as measured by the matrices scale of the K-BIT intelligence test. The N2 findings of the earlier study were also conceptually replicated. In addition, executive attention training was shown to improve emotion regulation (e.g., in a child's delay of gratification when a reward was present). Finally, evidence for improved functioning was evident 2 months later despite no intervening practice.

Related results have been reviewed by Diamond and Lee (2011). Attention training has

occurred in the context of classroom activities (Diamond, Barnett, Thomas, & Munro, 2007; Stevens, Lauinger, & Neville, 2009) or individual computer training (Klingberg, 2011; Rueda et al., 2012), in the latter case typically using attention or working memory tasks. Usually the tasks increase in difficulty over time, pushing training-group participants to continually improve. As an example of this body of research, a yearlong curriculum-based program termed Tools of the Mind, which is designed to improve executive function, results in rather large gains in the ability to resolve conflict (Diamond & Lee, 2011).

Working memory training (WMT) includes procedures designed to improve executive attention. For this reason, a brief review of WMT studies is warranted. One paper reported that intensive adaptive WMT was associated with improved verbal memory span and complex arithmetic ability, though puzzlingly along with reduced regional gray matter volume in frontal-parietal brain regions (Takeuchi et al., 2011). This study also reported another puzzle in that WMT increased brain activity for some participants, but decreased it for others. It is possible that the latter inconsistencies relate to individual differences in learning strategies, motivation, or effort (Klingberg, 2011).

There are disputes as to whether WMT transfers to other tasks or to more general abilities. We do suggest, though, that there is some agreement concerning the regional activation patterns that are likely to follow from WMT. In a representative study, Olesen, Westerberg, and Klingberg (2004) found that areas of the frontal and parietal cortex were more strongly activated following the training than prior to it (also see Takeuchi et al., 2010). There also appears to be involvement of the caudate nucleus (Olesen et al., 2004). Whether increased brain activity reflects effort or is functional may be in some dispute, however. One study found that increased activity in a WMT condition correlated with improved performance (Olesen et al., 2004), but others have been critical of data of this type (e.g., Buschkuehl, Jaeggi, & Jonides, 2012).

In addition, we highlight some other issues that need to be resolved while concluding on a more optimistic note. Although we have suggested that executive attention training and WMT work on similar neural substrates, the activation appears to be more medial in the former case and lateral in the latter (Klingberg, 2011). Methodological issues may be involved, but such methodological issues have not been fully resolved. Turning to a different issue, scholars have noted that the skills taught in preschool training programs are often not retained for a lengthy period of time (Heckman, 2006). However, we suggest that are exceptions to this general pessimism, including in the realm of self-regulation achievements (Moffitt et al., 2011). Further, there is evidence that neural assessments of self-regulation converge with other assessments such as parental reports (Rothbart, 2011). Finally, we suggest that executive attention training affects functioning outside of the school context and that there is evidence that such skills can be retained for many years (Chatty et al., 2010; Moffitt et al., 2011).

Training Brain States

The approaches discussed above seek to obtain improvement in networks by exercising them. A rather different approach to training may be to develop a brain state conducive to self-regulation. One example is a form of mindfulness training called Integrative Body-Mind Training (IBMT). IBMT originates from ancient Eastern contemplative traditions including traditional Chinese medicine and Zen, but shares key components with other forms of mindfulness meditation. IBMT teaches people to engage in less or no effort to control their thoughts. Instead, people are coached toward a state of restful alertness that allows for a balanced (and high) degree of awareness of what is happening in the body, the mind, and the environment. IBMT uses a qualified trainer to ensure that naïve learners achieve the state without strong effort while working with trainer-group dynamics, harmony, and resonance (for a review of IBMT, see Tang, Yang, Leve, & Harold, 2012c).

The IBMT method leads to very rapid change and is therefore suited to experimental study. In

our studies, people are randomly assigned to IBMT or to a control group that receives relaxation training in accordance with standard cognitive behavioral treatments. Control group participants receive more than a placebo, then, and they also believe that they are learning important skills. In fact, we have found both conditions to be equally palatable to participants (e.g., Tang et al., 2010).

In one study (Tang et al., 2007), participants were randomly assigned to IBMT or to relaxation training, each involving 5 days of instruction and practice. A battery of tests was administered. This included the ANT, the Profile of Mood States (POMS), and a stress challenge of a mental arithmetic task, following which cortisol and secretory immunoglobulin A (sIgA, an index of immunoreactivity) were assessed. All measures were scored blind to group condition. The IBMT group showed significantly greater improvement than the relaxation group on the executive attention measure. In addition, the IBMT group had improved mood states and exhibited lesser cortisol and sIgA reactivity to the stressor task. The improvements appeared to involve a change in brain state in that there was increased brain activity in areas that control the parasympathetic portion of the autonomic nervous system, consistent with a quiet, but alert state of focused attention. IBMT also altered resting-state fMRI activity (Tang et al., 2009).

A subsequent study (Tang et al., 2010) revealed additional mechanisms of change. The protocol again involved 5 days of IBMT training versus relaxation training. Subsequently, neuroimaging was used to assay brain changes due to training. The IBMT group had greater ACC activity as well as greater functional connectivity between the ACC and striatum. Moreover, parasympathetic function had changed more in the IBMT group than in the relaxation control group. Diffusion tensor imaging (DTI) analyses were also performed. These measured the directionality of water molecules (fractional anisotropy or FA) due to white matter and found that several white matter tracts connecting the ACC to other brain areas had improved their efficiency (Tang et al., 2010). The tracts showing higher FA following meditation training included the anterior corona radiata, which has previously been linked to operations of the executive attention network (Niogi, Mukherjee, Ghajar, & McCandliss, 2009).

There are at last two ways in which white matter tracts might be changed in efficiency by training. One involves increases in the density of the axons that make up the connections between brain areas and the other involves myelination increases between these same brain areas. The measure of FA is composed of both radial changes most closely related to myelination and axial changes most closely related to axon density. Based on further considerations, Tang, Lu, Fan, Yang, and Posner (2012a) concluded that both sets of changes occurred as the result of IBMT. This is interesting because attention network training effects have primarily been ascribed to changes in myelination alone. In development, though, both changes in axon density and myelination occur. Accordingly, IBMT-induced changes in white matter function are unlike changes due to training specific brain networks and more similar to what is found in brain maturation due to development. Among other implications, it may be possible to use state training by meditation to explore the behavioral consequences of increases in axon density and myelination independent of developmental confounds.

Mindfulness training can also be carried out with children. In one study (Tang, Yang et al., 2012c), we tested the efficacy of IBMT in 60 Chinese preschool children between the ages of 4 and 5. We modified the IBMT intervention by using cartoons and stories to create an environment to help the children enter a meditative state. Results of this randomized controlled trial were consistent with the IBMT studies with adolescents and adults: About 10 h of IBMT significantly increased self-regulation as indicated by parent ratings of their children on the Child Behavior Questionnaire (Rothbart, 2011). We also found that IBMT improved the ability of children to resolve conflict on two (Stroop and go/no go) executive processing tasks in compari-

son with an active control group (Tang, Yang et al., 2012c). All told, findings involving IBMT reveal that the brain systems related to self-regulation can be modified in their activation and in their connectivity. These results have several implications and applications, some of which are considered later in this chapter (also see Tang, Rothbart et al., 2012b).

Does Training Last?

As mentioned earlier, studies conducted on the role of preschool training such as Headstart have often concluded that effects on schooling can be found at first, but over a few years they are reduced or eliminated (Heckman, 2006). This may be in part because those not exposed to the preschool program nevertheless receive extensive elementary education and school outcomes have been emphasized. Outside of the context of schoolwork, though, long-term improvements in life outcomes can occur as a result of preschool training (Ludwig & Phillips, 2008).

Further, there is ample evidence that self-regulation skills, if they can be imparted early, matter in determining life trajectories. For example, one study of middle school children showed that a parent report measure of self-regulation correlated with grades more strongly than other, often emphasized measures such as IQ (Moffitt et al., 2011). In this same study of 1,000 children followed for 30 years, self-regulation abilities among children were positively related to income, health, and reduced criminality in adulthood. Although this was not a training study, those children who, for whatever reason, showed greater improvements in self-regulation during childhood most definitely benefited later on in life. Such results, as well as more direct ones involving training (Ludwig & Phillips, 2008), advocate in favor of attempts to improve the self-regulation abilities of children. As described above, meditation training for preschool children provides another means of improving self-regulation, particularly if the meditation skills are continually practiced and reinforced.

Pathologies of Attention

The ability to image the human brain has provided new perspectives for neuropsychologists in their efforts to understand, diagnose, and treat damage to the human brain that might occur as the result of stroke, tumor, traumatic injury, degenerative disease, or errors in development. In fact, there is convergence among neurological and psychiatric perspectives of disorder, a convergence that makes sense in that both sets of disorders involve dysfunctions in the efficacy of brain networks.

In more specific terms, attentional problems are a very frequent symptom of different forms of life difficulties, whether those involving learning disabilities or psychopathology. Before there was a real understanding of the neural substrates of attention, there was not a sufficient corpus of knowledge to remedy attentional problems. This is no longer the case. Viewing attention as an organ system and investigating the underlying neural networks provides a means of classifying disorders that differs from the usual internalizing (e.g., depression) versus externalizing (e.g., conduct disorder) classification applied to such disorders. In the section below, we consider the relationship between attention networks and some common disorders. In general, we do not know whether the attention deficits cause or result from the disorders, but an attention-related analysis can illuminate the symptoms involved as well as suggest methods of prevention and/or remediation. A number of disorders seem to primarily involve the executive attention network and these include addiction, psychopathy, borderline personality, and schizophrenia.

Substance Abuse

A recent test of long-term adolescent marijuana abusers using conflict tasks and fMRI showed that in comparison to controls, abusers showed a deficit in the ability to resolve conflict caused by an inefficient executive network (Abdullaev,

Posner, Nunnally, & Dishion, 2010). This result could either be the cause of the abuse or the result of using the drug. In either case, methods that might strengthen the activation and connectivity of the ACC could be useful in treatment of the disorder.

Many other forms of addiction such as to cocaine, tobacco, and alcohol involve deficits of self-regulation and it is noteworthy that studies have linked these addictions to operations of the ACC or to related areas of the midfrontal cortex and other parts of the executive attention network (Goldstein & Volkow, 2011; Volkow & Fowler, 2000). These are the brain areas that have been found to be improved by the use of IBMT (Tang et al., 2009; Tang, Lu et al., 2012a), suggesting that IBMT or other forms of mindfulness training may be an effective intervention for substance abusers.

Psychopathy

Psychopathy involves a failure of empathy for the pain of others when taking actions that favor the self. Many believe that the initial impetus for empathy lies in the mirror neuron system that allows the pain of others to be reflected in the neuronal discharges of the self. However, studies suggest that psychopathic behavior may also be linked to the degree of attention paid to environmental cues. According to Newman's work, psychopaths who are in prison for their behavior differ from non-psychopathic prisoners in the degree to which the emotional cues of others will influence their behavior, but only if the situation brings those cues to attention. When cues are not deliberately attended, psychopaths seem to behave similarly to non-psychopaths, but psychopaths do not seem to monitor the environment for those cues if they are not already in the focus of attention (Zeier, Maxwell, & Newman, 2009).

It is as though the pain of others is not a salient enough cue for psychopaths. Consistent with this analysis, imaging studies have found that the ventral ACC is less active among psychopaths when viewing frightening faces than among normals (for a review, see Blair, 2010), suggesting that emotional controls are less active in this population, as psychopaths may themselves report. In this regard, psychopathy seems to have something in common with borderline personality disorder (see below) in terms of a difficulty in handling emotion. However, the origin of borderline personality disorder appears to be quite early in life whereas this may be less true of psychopathy.

Borderline Personality

Borderline personality disorder is characterized by a great lability of affect and difficulties in interpersonal relations. In some cases, patients are suicidal or carry out self-mutilation. Because this diagnosis has been studied largely by psychoanalysts and has a very complex definition, it might at first be thought of as a poor candidate for a specific pathophysiology involving attentional networks. However, by focusing on the temperamentally based core symptoms of negative emotionality and difficulty in self-regulation, patients can be characterized as very high in temperamental negative affect and relatively low in effortful control (Posner et al., 2002). Even when matched on these two temperament-related dimensions, however, we have found that people meeting the diagnosis for borderline personality disorder display executive attention deficits on the ANT relative to those who are not diagnosable with a personality disorder (Posner, 2012).

Imaging results further suggest overgeneralization of responding to negative stimuli in the amygdala among borderline patients along with reduced responding in the ACC and related midline frontal areas involved in self-regulation (Silbersweig et al., 2007). In the Silbersweig et al. (2007) study, it was also found that lower levels of effortful control and high ANT conflict scores predicted poorer responses to therapy, another feature of borderline pathology. Overall, we emphasize the scientific benefits that are likely to accrue when methods focus on the core deficits of patients, match patients to controls on the basis of temperament scores, and use attention performance as a guide to conducting informative imaging studies.

Schizophrenia

A number of years ago, never-medicated schizophrenic patients were tested with a cued detection task similar to the orienting part of the ANT and were studied using positron emission tomography (PET). These patients showed a deficit in orienting similar to what had been found for patients with left parietal lobe damage (Posner, Early, Reiman, Pardo, & Dhawan, 1988). At rest, these schizophrenic subjects also showed a focal decrease in cerebral blood flow in the left globus pallidus (Posner et al., 1988), a part of the basal ganglia with close ties to the anterior cingulate. When their visual attention was engaged, they had difficulty in shifting attention to the right visual field and they also showed deficits in conflict tasks, particularly when they had to rely on a language cue. It was concluded that differences found in comparison to a control group were consistent with difficulties in the executive attention system with signs of mostly left hemisphere deficits.

The deficit in orienting rightward has been replicated in first-break schizophrenics, but it does not seem to be characteristic of later stages of the disorder (Maruff, Hay, Malone, & Currie, 1995), nor does the pattern appear to be part of the genetic predisposition for schizophrenia (Pardo et al., 2000). As schizophrenia progresses, the cognitive deficits become more severe and more general. Yet, there have been many reports of ACC and basal ganglia deficits in patients with schizophrenia (Benes, 1999). In more particular terms, schizophrenic patients coming to autopsy showed deficits in outflow from the ACC to a number of other frontal and temporal structures that have also been implicated in functional analyses of the disorder (Benes, 1999).

A study using the ANT casts some light on these results (Wang et al., 2005). In this study, the chronic schizophrenic patients had a much greater difficulty resolving conflict than did the similarly aged normal controls. The deficit in patients was also much larger than that found for borderline personality patients. However, there was still a great deal of overlap between the patients and normal subjects, indicating that the deficit is not suitable for making a differential diagnosis. The data also showed a much smaller orienting deficit of the type that had been reported previously in first-break patients. What we emphasize is that there is a strong executive deficit in chronic schizophrenia (consistent with the analysis of Benes, 1999), but that it remains to be determined whether this deficit exists prior to the initial symptoms or develops with the disorder.

Conclusions and Future Research

Brain networks underlie aspects of attention and self-regulation. In recent years, two fundamentally different approaches have been reported to improve attention and self-regulation. One practices the network through the execution of specific tasks. Another involves the use of meditation as a means of developing a brain state that serves to improve self-regulation and reduce stress. Both directions of training can be advocated and there is evidence that early self-regulation ability is related to more favorable later life outcomes.

This new knowledge could lead to important improvements in treatment. To do this, we need to investigate how to combine methods of improving self-regulation that fit well with the educational system. Methods involving training of specific attention networks and those that involve changing brain states may work at different rates and on different aspects of network improvement. Imaging the brain may give us clues as to how best to develop a combination of training strategies that may be particularly efficacious. Moreover, individual differences in temperament (Rothbart, 2011) could make one method more useful than others for particular children. Studies of self-regulation may also lead to more refined methods of training and instruction. These could provide unusual opportunities for educators, psychologists, and neuroscientists to work together for the common goal of improving children's lives.

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References

Abdullaev, Y., Posner, M. I., Nunnally, R., & Dishion, T. (2010). Functional MRI evidence for inefficient attentional control in adolescent chronic cannabis abusers. *Behavioral Brain Research, 215*, 45–57.

Benes, F. M. (1999). Alterations of neural circuitry within layer II of anterior cingulate cortex in schizophrenia. *Journal of Psychiatric Research, 33*, 511–512.

Blair, R. J. R. (2010). Psychopathy, frustration, and reactive aggression: The role of ventromedial prefrontal cortex. *British Journal of Psychology, 101*, 383–399.

Buschkuehl, M., Jaeggi, S. M., & Jonides, J. (2012). Neuronal effects following working memory training. *Developmental Cognitive Neuroscience, 2*(Suppl 1), S167–S179.

Bush, G., Luu, P., & Posner, M. I. (2000). Cognitive and emotional influences in the anterior cingulate cortex. *Trends in Cognitive Science, 4*, 215–222.

Chatty, R., Friedman, J. N., Hilger, N., Saez, E., Schanzenbach, D., & Yagan, D. (2010). *How does your kindergarten performance affect your earnings: Evidence from project STAR*. On line http://obs.rc.fas.harvard.edu/chetty/STAR_slides.pdf

Dehaene, S., Posner, M. I., & Tucker, D. M. (1994). Localization of a neural system for error detection and compensation. *Psychological Science, 5*, 303–305.

Diamond, A., Barnett, S., Thomas, J., & Munro, S. (2007). Preschool improves cognitive control. *Science, 30*, 1387–1388.

Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science, 333*, 959–964.

Dosenbach, N. U. F., Fair, D. A., Miezin, F. M., Cohen, A. L., Wenger, K. K., Dosenbach, R. A. T., et al. (2007). Distinct brain networks for adaptive and stable task control in humans. *Proceedings of the National Academy of Sciences USA, 104*, 11073–11078.

Fair, D., Cohen, A. L., Power, J. D., Dosenbach, N. U. F., Church, J. A., Meizin, F. M., et al. (2009). Functional brain networks develop from a local to distributed organization. *Public Library of Science, 5*, 1–13.

Fan, J., McCandliss, B. D., Sommer, T., Raz, M., & Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. *Journal of Cognitive Neuroscience, 3*, 340–347.

Fjell, A. M., Walhovd, K. B., Brown, T. T., Kuperman, J. M., Chung, Y., Hagler, D. J., Jr., et al. (2012). Multimodal imaging of the self-regulating developing brain. *Proceedings of the National Academy of Sciences USA, 109*, 19620–19625.

Gao, W., Zhu, H., Giovanello, K. S., Smith, J. K., Shen, D., Gilmore, J. H., et al. (2009). Evidence on the emergence of the brain's default network from 2-week-old to 2-year-old healthy pediatric subjects. *Proceedings of the National Academy of Sciences of the USA, 106*, 6790–6795.

Goldstein, R. Z., & Volkow, N. D. (2011). Dysfunction of the prefrontal cortex in addiction: Neuroimaging findings and clinical implications. *Nature Reviews Neuroscience, 12*, 652–669.

Heckman, J. J. (2006). Skill formation and the economics of investing in disadvantaged children. *Science, 312*, 1900–1902.

Hofmann, W., Schmeichel, B. J., & Baddeley, A. D. (2012). Executive functions and self-regulation. *Trends in Cognitive Sciences, 16*, 174–180.

Klingberg, T. (2011). Training working memory and attention. In M. I. Posner (Ed.), *Cognitive neuroscience of attention* (pp. 45–60). New York, NY: Guilford.

Ludwig, J. C., & Phillips, D. A. (2008). The long-term effects of head start on low-income children. *Annals of the New York Academy of Sciences, 40*, 1–12.

Maruff, P., Hay, D., Malone, V., & Currie, J. (1995). Asymmetries in the covert orienting of visual spatial attention in schizophrenia. *Neuropsychologia, 33*, 1205–1223.

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., et al. (2011). A gradient of childhood self control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences of the USA, 108*, 2693–2698.

Niogi, S., Mukherjee, P., Ghajar, J., & McCandliss, B. B. (2009). Individual differences in distinct components of attention are linked to anatomical variations in distinct white matter tracts. *Frontiers in Neuroanatomy, 4*, 2.

Olesen, P. J., Westerberg, H., & Klingberg, T. (2004). Increased prefrontal and parietal activity after training of working memory. *Nature Neuroscience, 7*, 75–79.

Pardo, P. J., Knesevich, M. A., Vogler, J. V., Towne, B., Cloninger, C. R., & Posner, M. I. (2000). Genetic and state variables of neurocognitive dysfunction in schizophrenia: A twin study. *Schizophrenia Bulletin, 26*, 459–477.

Posner, M. I. (2012). *Attention in a social world*. New York, NY: Oxford University Press.

Posner, M. I., Early, T. S., Reiman, E., Pardo, P. J., & Dhawan, M. (1988). Asymmetries in hemispheric control of attention in schizophrenia. *Archives of General Psychiatry, 45*, 814–821.

Posner, M. I., & Rothbart, M. K. (2007). *Educating the human brain*. Washington, DC: APA Books.

Posner, M. I., Rothbart, M. K., Sheese, B. E., & Tang, Y. Y. (2007). The anterior cingulate gyrus and the mechanisms of self-regulation. *Cognitive, Affective, & Behavioral Neuroscience, 7*, 391–395.

Posner, M. I., Rothbart, M. K., Sheese, B. E., & Voelker, P. (2012). Control networks and neuromodulators of early development. *Developmental Psychology, 48*, 827–835.

Posner, M. I., Rothbart, M. K., Vizueta, N., Levy, K. N., Evans, D. E., Thomas, K. M., et al. (2002). Attentional mechanisms of the borderline personality disorder. *Proceedings of the National Academy of Sciences of the USA, 99*, 16366–16370.

Raichle, M. E. (2009). A paradigm shift in functional imaging. *Journal of Neuroscience, 29*, 12729–12734.

Rothbart, M. K. (2011). *Becoming who we are*. New York, NY: Guilford.

Rothbart, M. K., Sheese, B. E., Rueda, M. R., & Posner, M. I. (2011). Developing mechanisms of self-regulation in early life. *Emotion Review, 3*, 207–213.

Rueda, M. R., Checa, P., & Combita, L. M. (2012). Enhanced efficiency of the executive attention network after training in preschool children: Immediate and after two month effects. *Developmental Cognitive Neuroscience, 2*(Suppl 1), S192–S204.

Rueda, M. R., Rothbart, M. K., McCandliss, B. D., Saccamanno, L., & Posner, M. I. (2005). Training, maturation and genetic influences on the development of executive attention. *Proceedings of National Academy of Sciences of the USA, 102*, 14931–14936.

Silbersweig, D., Clarkin, J. F., Goldstein, M., Kernberg, O. F., Tuescher, O., Levy, K. N., et al. (2007). Failure of frontolimbic inhibitory function in the context of negative emotion in borderline personality disorder. *The American Journal of Psychiatry, 164*, 1832–1841.

Stevens, C., Lauinger, B., & Neville, H. J. (2009). Differences in neural mechanisms of selective attention in children from different socioeconomic backgrounds: An event-related brain potential study. *Developmental Science, 12*, 643–646.

Takeuchi, H., Sekiguchi, A., Taki, Y., Yokoyama, S., Yomogida, Y., Komuro, N., et al. (2010). Training of working memory impacts structural connectivity. *The Journal of Neuroscience, 30*, 3297–3303.

Takeuchi, H., Taki, Y., Sassa, Y., Hashizume, H., Sekiguchi, A., Fukushima, A., & Kawashima, R. (2011). Working memory training using mental calculation impacts regional gray matter of the frontal and parietal regions. *PLoS One, 6,* e23175.

Tang, Y. Y., Lu, Q., Fan, M., Yang, Y., & Posner, M. I. (2012). Mechanisms of white matter changes induced by meditation. *Proceedings of National Academy of Sciences in the USA, 109*, 10570–10574.

Tang, Y. Y., Lu, Q., Geng, X., Stein, E. A., Yang, Y., & Posner, M. I. (2010). Short term mental training induces white-matter changes in the anterior cingulate. *Proceedings of National Academy of Sciences of the USA, 107*, 16649–16652.

Tang, Y. Y., Ma, Y., Fan, Y., Feng, H., Wang, J., Feng, S., et al. (2009). Central and autonomic nervous system interaction is altered by short-term meditation. *Proceedings of National Academy of Sciences of the USA, 106*, 8865–8870.

Tang, Y. Y., Ma, Y., Wang, J., Fan, Y., Feng, S., & Lu, Q., et al. (2007). Short term meditation training improves attention and self-regulation. *Proceedings of National Academy of Sciences of the USA, 104*, 17152–17156

Tang, Y. Y., & Posner, M. I. (2009). Attention training and attention state training. *Trends in Cognitive Sciences, 13*, 222–227.

Tang, Y. Y., Rothbart, M. K., & Posner, M. I. (2012). Neural correlates of establishing, maintaining and switching brain states. *Trends in Cognitive Sciences, 16*, 330–337.

Tang, Y. Y., Yang, L., Leve, L., & Harold, G. (2012). Improving executive function and its neurobiological mechanisms through a mindfulness-based intervention: Advances within the field of developmental neuroscience. *Child Development Perspectives, 6*, 361–366.

van Veen, V., & Carter, C. S. (2002). The timing of action-monitoring processes in the anterior cingulate cortex. *Journal of Cognitive Neuroscience, 14*, 593–602.

Volkow, N. D., & Fowler, J. S. (2000). Addiction, a disease of compulsion and drive: Involvement of the orbitofrontal cortex. *Cerebral Cortex, 10*, 318–325.

Wang, K., Fan, J., Dong, Y., Wang, C., Lee, T. M. C., & Posner, M. I. (2005). Selective impairment of attentional networks of orienting and executive control in schizophrenia. *Schizophrenia Research, 78*, 235–241.

Zeier, J. D., Maxwell, J. S., & Newman, J. P. (2009). Attention moderates the processing of inhibitory information in primary psychopathy. *Journal of Abnormal Psychology, 118*, 554–563.

Mindfulness, Attention, and Working Memory

4

Alexandra B. Morrison and Amishi P. Jha

Mindfulness is often described as attention to the present moment in a manner that is free from embellishment or reactivity. Mindfulness can be cultivated through a number of well-established practices (e.g., Kabat-Zinn, 1994; Wallace, 1999), and a central feature of these practices involves awareness and control of basic cognitive processes such as attention and working memory. Accordingly, a sound understanding of mindfulness requires introduction to the cognitive processes that support sustained attention to the present moment.

The broad aims of this chapter are as follows. First, we discuss the cognitive processes—specifically, attention and working memory—that guide our ability to select and maintain information in a given moment. Then, we discuss the hypothesis that engaging in mindfulness exercises (both within a session and over longer periods of time) strengthens specific aspects of attention and working memory. Further, we explore the proposal that because of bolstered attention and working memory, mindfulness training may protect against the mind's pervasive tendencies to wander away from the present moment to task-unrelated thoughts and feelings. Last, we introduce a broader set of hypothesized tools for cognitive enhancement and discuss the uniqueness of mindfulness training among other types of cognitive training.

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Attention and Working Memory

At any given moment, our minds are offered a large and varied array of information and several potential trains of thought. Yet, the brain lacks sufficient computational resources to fully process all that is happening. As such, cognitive processes to select a subset of information for further analyses are necessary to guide our moment-to-moment experiences. Attention is the workhorse for selection, and only attended information will enter conscious awareness and assist in commitment to a particular task. Failures of attention prompt mistakes like not noticing a stop sign while driving or missing a point someone else is making in a discussion while engaged in one's own thoughts. Moreover, in many of our professional lives, attention is crucial. In the context of military personnel, for example, the need to maintain attentive focus on all events transpiring around one's current position (referred to as "situational awareness") is critical to personal safety and mission completion (Stanley & Jha, 2009).

Attention, as described in cognitive neuroscience, may be divided into two largely separable streams, the dorsal and the ventral. The dorsal

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stream (localized bilaterally in dorsal frontoparietal brain regions) is responsible for the top-down voluntary control of attention and, thus, responds to environmental cues in a deliberate manner (Corbetta & Shulman, 2002). Meanwhile, the ventral stream (localized in right-lateralized ventral frontoparietal brain regions) is responsible for bottom-up stimulus-driven attention and, thus, is cued by less frequent and less expected events than dorsal attention (Corbetta & Shulman, 2002). For example, while conversing with a friend over a cup of coffee, listening to his or her voice would draw dorsal attention while someone creating a commotion by spilling coffee behind you would draw ventral attention.

In a theoretical model of the structure of attention, Posner and Petersen (1990) further divide dorsal (voluntary) attention into the orienting and conflict monitoring subsystems, while ventral (stimulus driven) attention is encompassed by an alerting subsystem. Specifically, orienting is the control of attention towards only certain inputs, while conflict monitoring suggests selection between inputs that are competing in nature. Lastly, alerting is a state of preparedness that is onset by an external cue.

As a core component of human cognition, attention relates to and intersects with other cognitive constructs like working memory (see Jha, 2002). Evidence from functional magnetic resonance imaging (fMRI) and event-related potential (ERP) studies suggests that working memory is akin to dorsal attention over time (Corbetta, Kincade, & Shulman, 2002; Jha, 2002). A quintessential illustration of working memory describes it as the mind's workspace, where information is stored and processed towards any activity the mind is engaged in at present. According to one theoretical account, working memory is dependent upon two separable cognitive processes, a controlled search through attended information and the retrieval of task-related items from longer term memory stores (Unsworth & Engle, 2007).

It is well established that the capacity of working memory is limited. In a seminal paper, Miller (1956) proposed a limit of seven plus or minus two items. More recent evidence suggests a stricter working memory capacity of four plus or minus one item (see Cowan, 2001). In a demonstration of the upper bound of this system, Luck and Vogel (1997) presented participants with arrays of colored squares ranging from 1 to 12 squares. Following a short delay, participants were shown another array and asked whether this array was the same or different than the first. While arrays of one to three squares produced near-perfect accuracy, there was a decline in performance for arrays of four squares, and an even larger decrement for arrays of five or more squares. This discontinuity in performance for arrays exceeding four squares is interpreted as a marker of a roughly four-item capacity limit. Very similar conclusions were made using the same procedure and more complex stimuli (e.g., configurations of colored bars), and examinations of verbal items also suggest a capacity limit of around four items (Cowan, 2001).

The size of working memory capacity differs between individuals and is predictive of prowess in measures of intelligence, reading comprehension, language acquisition, etc. (e.g., Baddeley, 2003; Daneman & Carpenter, 1980; Kane et al., 2004). Working memory is required during complex mental operations involving selection, integration, and updating of information, and a low working memory capacity corresponds to difficulty in complex and important situations in our daily lives from an academic exam, to a job interview, to an interpersonal altercation.

In addition to differences between individuals, core cognitive capacities have been shown to differ within an individual across situations (see Ilkowska & Engle, 2010). A series of experiments by Schmeichel (2007) tested the prediction that executive control resources (like attention and working memory) are depletable and hindered by repeated use. Participants completed either a high-attention task (viewing a video of an interview while ignoring text on a screen) or a low-attention task (viewing the video with no instruction to ignore or remember the words on the screen). After viewing, all participants completed one of the two measures of working memory capacity (operation span or sentence span) (Conway et al., 2005; Unsworth, Heitz, Schrock,

& Engle, 2005). Performance on both working memory measures was worse following the high-attention task than the low-attention task. Following exploration of factors such as mood and working speed, the authors attributed the disruption of working memory in the second task to the use of attentional resources in the first task. Although this decline in performance is temporary, the length and timing of the experiment suggest that this deficit can persist for at least a few minutes.

Working memory may also be degraded by conditions of stress and negative emotional experiences (see Ilkowska & Engle, 2010). Schmeichel (2007) showed participants video clips of an eye surgery and of children describing upsetting problems at home. One group was instructed to exaggerate their negative emotions while the other group was instructed to simply watch the clips. After viewing, all participants completed the operation span task. Individuals asked to exaggerate their emotional responses performed worse on the subsequent measure of working memory capacity than did the group asked only to watch the clip. Notably, while those asked to exaggerate showed more outward emotion and reported greater task difficulty than the other group, the groups did not differ in reported emotional state. It follows that working memory performance was impaired not by emotional state per se, but by task instructions that required more cognitive engagement relative to watching and naturally responding to emotionally evocative material. In sum, repeated cognitive demand—in both emotionally neutral and evocative scenarios—is detrimental to future performance on tasks demanding attention and working memory.

Mind Wandering

In addition to their depletable and fragile nature, attention and working memory are susceptible to hijacking by competing environmental stimuli and internally generated distractions. Accordingly, the mind wanders off task quite frequently. In one large-scale study, 2,250 individuals were contacted via phone at unpredictable intervals throughout the day. In order to gage the frequency of mind wandering, participants were asked: "Are you thinking about something other than what you are currently doing?" (Killingsworth & Gilbert, 2010); 46.9 % of the time, participants reported that their minds were wandering, in response to this question. In addition, individuals were less happy when they experienced mind wandering episodes than at other times, and even mind wandering in the context of pleasant thoughts was not accompanied by higher happiness ratings than when the mind was not wandering.

In addition to a decrease in mood, mind wandering also results in poor task performance (e.g., Franklin, Smallwood, & Schooler, 2011; Kane et al., 2007). Schooler et al. (2011) highlight two separate aspects of attentional fluctuations that accompany mind wandering. First, mind wandering is characterized as a decoupling between perceptual input (or information from one's immediate environment) and the contents of attention (on something other than one's immediate environment). Second, mind wandering is accompanied by fluctuations in the awareness of the contents of the mind (i.e., meta-awareness), and mind wandering can occur with and without the knowledge that the mind has wandered. One study of self-reported mind wandering while reading a Sherlock Holmes novella found that some participants were only intermittently aware of whether their mind was on or off task. When mind wandering was divided into incidents with and without awareness, only mind wandering without awareness was predictive of poorer reading comprehension (Smallwood, McSpadden, & Schooler, 2008). In sum, mind wandering is characterized by a failure to attend to task-relevant perceptual input and, sometimes, a lack of attention to whether the mind is on or off task.

In addition to a relationship between mind wandering and attention, a growing amount of empirical evidence suggests a relationship between one's working memory capacity and the occurrence of mind wandering. During attentionally demanding tasks, those with higher working memory capacity report less mind wandering than lower capacity individuals, and this may be tied to the ability to keep task goals and

task-related information in mind (Kane et al., 2007; McVay & Kane, 2009; McVay, Kane, & Kwapil, 2009). Even so, it has recently been hypothesized that those with higher working memory capacity do not *always* wander less than those with lower working memory capacity (Levinson, Smallwood, & Davidson, 2012). Instead, those with a high amount of working memory resources may be able to either inhibit wandering during a demanding task or allow for mind wandering in a less demanding one. This hypothesis is supported by evidence that in a simple visual search task, where one is asked to press a key when he or she sees an X, those with higher working memory capacity wandered more than those with less capacity (rather than mind wandering less, as they typically do in tasks highly demanding of attention). Accordingly, rather than considering mind wandering a failure of controlled attention, it may be a process that is either restricted or permitted according to the demands of the moment.

Mindfulness Training

Our reliance on attention and working memory to complete daily tasks and the limitations of these mental abilities evoke the following question: Can we optimize the use or expand the size of attention and working memory capacity? A quickly developing literature tests whether training produces measurable benefits to cognitive performance, and while some studies demonstrate gains on multiple measures (e.g., Green & Bavelier, 2003; Jaeggi et al., 2010; Klingberg et al., 2005; Tang et al., 2007), others show changes in performance that are very limited in scope (e.g., Chooi & Thompson, 2012; Ericsson & Chase, 1982; Lee et al., 2012; Redick et al., 2013). This mixed literature provokes extended discourse over whether cognitive abilities like attention and working memory are immutable or plastic (see Boot, Blakely, & Simons, 2011, and Shipstead, Hicks, & Engle, 2012, and associated commentaries). Here, we detail research investigating mindfulness training as a hypothesized tool for training attention and working memory.

An example of a prototypical mindfulness activity is the direction of attention to the breath. In a mindful breathing exercise, individuals are instructed to sit in a comfortable upright posture, select a particular sensation associated with breathing, and then maintain that selected focus for the duration of the practice. Instructors note that attention will likely wander to other trains of thought or to external stimuli like nearby noises, but upon acknowledgement of these exercise-unrelated thoughts, attention should be returned to the breath. Thus, this and many other exercises that emphasize concentrative focus require selection and maintenance of information and monitoring of mind wandering throughout the period of practice. As such, we would expect that engaging in these practices in an ongoing fashion would not only engage attention, working memory, and monitoring of mind wandering (as they are defined in the cognitive neuroscience literature), but may also strengthen these processes. If so, time spent cultivating mindfulness may be considered time spent honing attention, working memory, and monitoring of task-unrelated thoughts.

Mindfulness training can be understood through the specific neural and cognitive processes mindfulness practices engage, and researchers interested in the human mind can gain knowledge of the extent to which essential cognitive processes can be targeted and altered through deliberate practice. At present, the ability of cognitive neuroscientists to quantify mindfulness practice in cognitive and neuroscientific terms is quite limited. Key issues remain, including investigating the specific processes that are engaged or strengthened during mindfulness exercises, and the specific neural and behavioral indices responsive to mindfulness training. Below, we examine mindfulness training as a vehicle for the study of attention, working memory, and mind wandering.

Attention

There are marked parallels between mindfulness texts illustrating mental modes and cognitive neuroscience texts examining attention. The mindfulness literature suggests that mindfulness

exercises target concentrative attention, where attention is narrowed to a specific target like the breath, and receptive attention (also referred to as open monitoring, Lutz et al., 2008), where attention more broadly encompasses the present moment, tracing the contents of what arises and passes in consciousness without targeted selection of any particular aspect it (Brown, 1977; Delmonte, 1987; Valentine & Sweet, 1999). In a merging of parallel viewpoints (one based on the mindfulness training literature and contemplative practice and another based on the cognitive neuroscience literature on the topic of attention), it has been hypothesized that the dorsal (or voluntary) attention system is targeted in concentrative attention, while the ventral (or stimulus driven) system is targeted in receptive attention (Jha, Krompinger, & Baime, 2007).

Many traditions propose a hierarchy where prowess in concentrative attention should be established prior to honing of receptive attention. One account of this hierarchy explains that receptive attention requires that consciousness remain anchored in the present moment. In novice practitioners or those without strong concentrative attention, the mind will likely wander away from the present moment towards unrelated thoughts, emotions, or images, making instructions to keep attention in a receptive open state hard to follow. However, if and when one can hold attention in the present, one can then practice receptivity to aspects of experience such as the sound of footsteps or the emotional state that accompanies noticing this sound.

The compatibility of definitions in the mindfulness and attention literatures suggests that mindfulness training should target the control of attention, and self-reported and introspective measures of attention do suggest gains in attention through mindfulness practice (see Grossman, Niemann, Schmidt, & Walach, 2004). However, the following empirical question remains: Do the attentional constructs identified by cognitive researchers and mindfulness scholars indeed overlap and, if so, how completely do they overlap?

Jha and others (2007) examined attentional abilities in individuals without prior mindfulness experience and in experienced mindfulness practitioners (Table 4.1). Attentional performance was assessed prior to and following the training using the attentional network task, which indexes orienting, conflict monitoring, and alerting (Fan, McCandliss, Sommer, Raz, & Posner, 2002). Novices in this study engaged in an 8-week mindfulness training course emphasizing concentrative attention and following a prescription similar to that described by Kabat-Zinn (1994). The course included a weekly 3-hour session composed of meditation, group discussion, and interactive mindfulness activity, and included 30 min of daily sitting practice assigned as homework. Experienced practitioners in the study self-selected to attend a 1-month residential retreat. This retreat included sitting and walking meditations, one-on-one interviews with instructors, and 10–12 h of daily formal mindfulness meditation, and the cultivation of receptive attention was also emphasized. Both mindfulness groups were compared to a group of participants with no mindfulness experience and no training.

According to the predictions above, improvements in dorsal attention in those engaging in mindfulness training should precede strengthening of involuntary attention. In line with the first half of this prediction, at the initial cognitive

Table 4.1 Summary of Jha et al.'s (2007) study of subsystems of attention and mindfulness training

System of attention	Neural correlates	Training emphasis (population)	Results from Jha et al., 2007
Alerting	Ventral frontoparietal network	Receptive attention (experienced practitioners)	After training: experienced > controls and novice
Orienting	Dorsal frontoparietal network	Concentrative attention (novice practitioners)	After training: novice > controls and experienced
Conflict monitoring	Dorsal frontoparietal network	Concentrative attention (novice practitioners)	Before training: Experienced > controls and novice

assessment, the retreat group of experienced practitioners showed higher conflict monitoring performance than the groups without mindfulness experience. This finding is consistent with Van den Hurk and others' (2010) demonstration that experienced mindfulness meditation practitioners exhibited better executive attention performance when compared to those without mindfulness experience.

Examination of performance after the training period revealed that participants in the novice group showed stronger orienting performance after training when compared to the retreat group and control group, but there was no difference in conflict monitoring. Therefore, in the case of the dorsal subsystems, experienced practitioners entered the study with greater conflict monitoring, and orienting was stronger following training among novice mindfulness practitioners than the other two groups. Turning towards the involuntary (ventral) attention system, following the retreat, alerting performance was greater in the retreat group (or experienced practitioners) than the other two groups. These findings provide initial support for the hypothesis that engagement in mindfulness training is accompanied by enhanced performance on measures of attention. Moreover, they advance the specific hypothesis that input level dorsal attention is targeted in early mindfulness training while ventral attention requires higher levels of practice.

It should be noted that while a growing list of studies demonstrate the attentional benefits of mindfulness training (see Lutz, Slagter, Dunne, & Davidson, 2008; for a review, see Hölzel et al., 2011), the literature contains failure to find measurable attentional benefits of mindfulness training as well (e.g., Anderson, Lau, Segal, & Bishop, 2007). Such null findings may suggest that mindfulness training does not produce measurable attention enhancement as operationalized in the cognitive neuroscience literature. Alternatively, null results may indicate that the relevant mindfulness training programs were not optimal to elicit attentional improvements or that the experience and characteristics of the individuals were not well matched to the training administered. As a last possibility, null findings may reflect real gains in attention that are fragile and not easily documented by the tasks experimenters chose to administer before and after training.

Current findings showing gains in measures of attention (e.g., Lutz et al., 2008) promote a level of optimism regarding mindfulness training as an intervention for attention. Yet, consideration of multiple studies highlights the need for continued research into the precise mechanism of mindfulness training, the most optimal construction of mindfulness training, and the appropriateness of mindfulness training for different populations.

Working Memory

As working memory is a set of processes that support attention over time, one might expect some commonality between working memory and the mental mode of mindfulness. When one engages in a mindful breathing exercise, for example, working memory processes should support attention on the breath over time and buffer against unrelated thoughts or external stimuli. Additionally, should task goals be lost from conscious awareness, the retrieval component of working memory could allow for a refreshing of task goals and a return of attention to the sensations of the breath.

Over time, a mindfulness practice might strengthen performance under high working memory load. This strengthening of working memory processes could occur in at least two distinct ways. First, mindfulness training might limit elaboration or reactivity to information in working memory, allowing for more task-relevant information to be sustained instead. Put differently, mindfulness might allow one to use working memory more efficiently by limiting irrelevant information in working memory. Alternatively, mindfulness training might expand working memory capacity by allowing for accommodation of a larger amount of information. A small number of studies examine working memory capacity as an outcome variable of mindfulness training studies. Chambers, Lo, and Allen (2008) tested novice practitioners before and after a 10-day mindfulness retreat and found

improvements in a measure of working memory (backward digit span) that were larger than improvements in those who did not participate in the training. Van Vugt and Jha (2011) found that following mindfulness training, participants' reaction times were faster and less variable when compared to controls. Mathematical modeling tied training-related gains to factors like a decrease in encoding noise and a reduction of response conservativeness. Also, Mrazek, Franklin, Philips, Baird, and Schooler (2013) found an increase in an operation span task that was significantly larger in those completing mindfulness training than those completing nutrition training.

In a multifaceted study, Jha, Stanley, Kiyonaga, Wong, and Gelfand (2010) examined a group of US Marines and the impact of deployment preparation on their working memory capacity and emotional state. The study asked two questions about mindfulness training. 1) Does mindfulness training protect against stress-related degradation in cognitive performance, and, 2) does protection of cognitive resources correspond with changes in affective experience? The study was conducted over a pre-deployment interval—i.e., the months prior to deployment where military service members undergo intense physical training and training in mission-critical skills. In addition to formal training, such individuals must prepare to leave their loved ones and enter a situation that is unpredictable, stressful, and potentially dangerous. While preparations during the pre-deployment interval are meant to increase mission readiness, the pre-deployment interval can be marked by decreases in cognitive functioning and increases in emotional disturbance (Bolton, Litz, Britt, Adler, & Roemer, 2001; Maguen et al., 2008).

In order to determine the utility of mindfulness training as a tool to protect against cognitive and emotional degradation, a group of marines completed a mindfulness course named Mindfulness-Based Mind Fitness Training, which was designed and instructed by a former US Army officer with mindfulness expertise. Training was 8 weeks in duration, emphasized mindfulness skills and their military application, and matched several features of a Mindfulness-Based Stress Reduction course (Kabat-Zinn, 1994). The mindfulness training group was compared to pre-deployment military control and civilian control groups.

The operation span task was administered to all groups before and after the training interim. While civilian controls showed stable performance over time, military controls showed degradation in their performance. This decrement in performance supports claims that stress is accompanied by degraded cognitive capacity. The training group was split in half into those who reported higher levels of practice during the intervention (an average of 634 min) and those who reported lower levels of practice (an average of 151 min). While the low-practice group showed degradation in the operation span task (like the military controls), the high-practice group showed modest improvements that trended towards significance. Moreover, within the mindfulness training group, there was a positive correlation between amount of mindfulness practice and operation span performance. Participants also completed a self-report mood measure—the Positive and Negative Affect Scales (Watson, Clark, & Tellegen, 1988)—both prior to and following the training period. Results revealed that there was a direct relationship between practice time and positive affect but that levels of negative affect depended on working memory performance. In sum, this paper suggests protective effects of mindfulness training on working memory capacity in a high-stress group of participants and affective benefits as well.

Together, results from the studies above (Chambers et al., 2008; Jha et al., 2010; Mrazek et al., 2013; Van Vugt & Jha, 2011) posit a salutary relationship between working memory and mindfulness practice. These findings may be attributed to the size of working memory capacity or the efficiency with which working memory capacity is used (see Van Vugt & Jha, 2011). While these possibilities are difficult to disentangle, future work should consider whether training impacts the total amount of information in working memory, the ratio of relevant to irrelevant information, or both. Studies have begun to gain traction on this question by administering

tasks that measure capacity for task-relevant information but also ask participants about task-unrelated thoughts (i.e., mind wandering) (Mrazek et al., 2013).

Mind Wandering

It has been suggested that mind wandering (inattention to the task at hand) and mindfulness (attention to the present moment) are opposing states of mind (Mrazek, Smallwood, & Schooler, 2012). In support of this point, a negative correlation has been shown between trait mindfulness (measured through the Mindful Awareness Attention Scale) and four separate measures of mind wandering (including both self-report metrics and objective measures of performance in the Sustained Attention to Response Task (SART): Mrazek et al., 2012). Additionally, an 8-min mindful breathing exercise was shown to reduce indices of mind wandering (errors and reaction time variability in the SART) when compared to passive relaxation and reading a newspaper.

More extensive mindfulness practice has also been related to the occurrence of mind wandering. In a relevant study (Mrazek et al., 2013), participants engaged in a 2-week mindfulness course and were compared to participants in a nutrition course. Each course met for four 45-min sessions per week, and the mindfulness course emphasized focused-attention meditation with both physical and mental components. Before and after training, participants completed a measure of standardized test performance (subsets of the verbal Graduate Record Exam: GRE) and a measure of working memory capacity (the operation span task). During the GRE, mind wandering was measured by asking participants at unpredictable intervals whether their thoughts were on or off task and also by asking participants to report if they noticed their mind wandering. During the operation span task, mind wandering was measured through a retrospective report collected after completion of the working memory task. Results revealed that mindfulness training led to larger performance gains in the cognitive measures and larger reductions in mind wandering than in the nutrition training group. This pattern was consistent for performance in both cognitive tasks and in all three mind wandering metrics, and it provides strong evidence that mindfulness training is of value to cognitive performance, even when compared to an active control group taught by an expert in that field.

Fluctuations in Cognitive Processes During Mindfulness Practice

The work described above suggests both an interdependence of attention, working memory, and mind wandering and a relationship between these processes and mindfulness training. Building upon the establishment of these initial relationships, one can describe mindfulness training as resulting in a shift in cognitive processes in order to sustain or regain attention to the present moment. A recent model describes mindfulness practice as a series of such brief cognitive states (Hasenkamp, Wilson-Mendenhall, Duncan, & Barsalou, 2012). For example, during a mindful breathing exercise, attention is focused on the breath (focus), the mind begins to wander (mind wandering), one becomes aware of the off task thoughts (awareness), attention shifts back towards the breath (shifting), and attention is again sustained on the breath. This cycling of cognitive states is thought to occur frequently as one engages and disengages from a mindful state of attention to the breath. Further, these cognitive states are hypothesized to be accompanied by distinct patterns of brain activation.

According to the neural predictions of this model, focus, shifting, and awareness are accompanied by activity in regions associated with attention to a task, including the lateral prefrontal cortex, premotor cortex, lateral parietal regions, occipital regions, anterior cingulate cortex, and insula (Fox et al., 2005; Fransson, 2005). In contrast, episodes of mind wandering should be associated with activity in the default mode network, a group of brain regions that reveal higher signal during periods of rest than periods of task performance (Raichle et al., 2001). The default mode network includes regions of the dorsal and

ventral medial prefrontal cortex, posterior cingulate cortex, posterior inferior parietal regions, lateral temporal regions, and parahippocampus (Buckner, Andrews-Hanna, & Schacter, 2008). Activities in the attentional network and default mode network are shown to fluctuate in opposite fashion (Fox et al., 2005; Fransson, 2005).

In order to test the predictions of this model of mindfulness, experienced mindfulness practitioners engaged in a 20-min mindful breathing exercise during an fMRI scan (Hasenkamp et al., 2012). Participants were instructed to note if their minds wandered from attention to the breath, indicate this wandering by a button press, and then return attention back to the breath. The authors constructed a hypothesized timeline of the cycling of cognitive states surrounding the button press. Awareness was defined as the 3 s surrounding the button press (specifically, 2 s prior to the button press and one after), mind wandering was defined as the 3 s prior to awareness, shifting attention was defined as the 3 s after awareness, and focusing of attention was defined as a 3-s period after shifting.

Broadly, comparisons targeting each of these four cognitive states revealed that while the awareness, shifting attention, and focusing attention phases were accompanied by activity in task-positive attentional networks, the mind wandering phase was accompanied by activity in the default mode network. More specifically, the shifting attention and focusing attention phases were associated with subsystems of the larger attentional network. When compared to the mind wandering period, awareness was associated with robust activity in networks associated with salience (e.g., anterior insula and dorsal anterior cingulate cortex), shifting was associated with areas implicated in executive attention (e.g., dorsolateral prefrontal cortex and lateral inferior parietal cortex), and focus was accompanied by activity in regions associated with working memory and maintenance of information over time (e.g., the dorsolateral prefrontal cortex).

Together, Hasenkamp and others' (2012) findings provide a neural and cognitive framework for the cycling of mental processes that occurs during a mindfulness practice. The authors are optimistic but cautious in their conclusions due to uncertainty around the precise timing of fluctuations between cognitive states and uncertainty over whether there are distinctly serial (rather than temporally overlapping) processes. Yet, this work creates an intriguing stepping stone for the description of mindfulness practice as a set of putative cognitive and neural processes. Further mindfulness research should continue to characterize the neural and cognitive processes that support mindfulness practice and how these processes differ between individuals and change over time.

Mindfulness Training as a Unique Tool Targeting Cognitive Enhancement

The notion of cognitive enhancement garners enthusiasm in both the popular press (Hurley, 2012) and scientific literature (Morrison & Chein, 2011; Slagter, Davidson, & Lutz, 2011). This enthusiasm originates from a desire to overcome the inherent limitations of the human mind, the detrimental impact of a variety factors (e.g., affect, stress, age, disease) on cognition, and the failures of some techniques to increase intellectual abilities. The literature contains several approaches to cognitive enhancement including skills training (Lee, Lu, & Ko, 2007), videogame training (Green & Bavelier, 2003), and neurofeedback training (Keizer, Verment, & Hommel, 2010), among others. In this final section, we briefly detail how lessons from other training efforts can be applied to the development of mindfulness training and discuss what makes mindfulness training a distinct form of training.

One type of cognitive training that attracts attention and discourse is computerized working memory training (see Klingberg, 2010; Shipstead, Redick, & Engle, 2012). Here, training requires extensive practice with computerized tasks that tax working memory capacity. It is hypothesized that this manner of targeted training may expand working memory capacity and thereby benefit related cognitive constructs like cognitive control and general fluid intelligence. There are now

several studies in which computerized working memory training benefitted performance on untrained measures of attention and working memory (e.g., Morrison & Chein, 2011; Klingberg et al., 2005; Schmiedek, Lövdén, & Lindenberger, 2010). In addition, some studies have shown generalized benefits to measures of fluid intelligence (Jaeggi et al., 2010; Jaeggi, Buschkuehl, Jonides, & Perrig, 2008; Klingberg et al., 2005). In contrast, there are instances where training begets large improvements in the practiced task but does not lead to improvements on other tasks that are not part of the training battery (Chooi & Thompson, 2012; Redick et al., 2013).

There have been critiques regarding the methodology and conclusions of cognitive training studies (Morrison & Chein, 2011; Shipstead, Hicks & Engle, 2012; Shipstead, Redick & Engle, 2012), and these critiques can be leveraged to inform mindfulness training endeavors. One particularly nuanced notion is that improvement on a singular cognitive task is not sufficient to claim (and should not be confounded with) broad enhancement of a cognitive construct. True enhancement of a cognitive ability should be accompanied by improved performance in a range of untrained measures taxing this ability. Moreover, it is crucial to adjudicate between performance changes that stem from changes in capacity and changes attributed to strategy use, motivation, or effects of repeated testing. Currently, the gold standard methodology for studying cognitive training is the use of an active control group tightly matched on many variables (e.g., motivation, repeated testing), but whose training is composed of an activity not expected to produce generalized gains. Put simply, demonstration of true cognitive enhancement is no easy task and several levels of inquiry may be required for bold conclusions that training A expands ability B for reason C.

If several types of training are available, then one might ask what makes mindfulness training distinct. First, it should be restated that mindfulness training is accompanied by centuries of knowledge, tradition, and a growing community of practitioners and instructors (see Wallace, 2006). From the standpoint of a practitioner, this creates a rich, meaningful, and motivating experience and it is also true that mindfulness training has a well-established relationship with aspects of well-being like mood, perceived stress, social support, and treating of disorder symptomatology (see Kabat-Zinn, 1994; Shapiro, Oman, Thoresen, Plante, & Flinders, 2008). In this chapter, we asked whether mindfulness training leads to measurable improvements in attention and working memory and find that it often does. From a standpoint of science, though, it is important to determine whether increases in performance on cognitive assessments stem from the development of the intended cognitive skills, from enhanced well-being, or from some combination of cognitive and affective elements. While all types of cognitive training (e.g., computerized training, videogame training) may promote some level of increase in motivation and perhaps social support (e.g., from the experimenter), these types of benefits are especially relevant to mindfulness training due to the presence of instructors and co-participants in the training program.

In one recent paper, Slagter et al. (2011) outline particular aspects of mindfulness training that can lead to process-specific learning (or training gains that generalize outside of the context of training). One of these factors is stimulus and task variability in that mindfulness practice can have considerable variability from day to day due to the ever-changing state of the mind and environment. Therefore, each day one practices, the present moment will be characterized by different moods, sounds, and temperatures, and this type of variability may promote transfer to novel contexts. Another aspect of mindfulness training highlighted by Slagter and others is arousal. Specifically, they suggest that mindfulness training exercises require awareness of one's level of arousal or drowsiness, and a mindfulness practice may promote regulation of attention and emotion in an effort to maintain a balance between too great or too little arousal.

Lastly, we suggest the importance of the quality of awareness of the contents of the mind to mindfulness training. While completion of difficult cognitive tasks may produce some awareness of task difficulty and on or off task thinking,

awareness of cognitive states is not a central component of such tasks. In contrast, a key aspect of mindfulness training is meta-awareness, or awareness of the present content of consciousness (see Schooler et al., 2011). The building of meta-awareness is one hypothesized mechanism for how mindfulness practice might improve cognitive performance outside of practice. For example, during mindfulness practice, awareness is crucial to holding attention in the present and to returning to a mindful state following off task thoughts. This quality of awareness seems likely to generalize beyond mindfulness practice to other daily responsibilities and activities.

In sum, a growing body of work suggests relationships between attention, working memory, and mind wandering, and between these cognitive processes and those involved with mindfulness training. Recent studies demonstrate enhancement (Jha et al., 2007; Mrazek et al., 2013) or protection (Jha et al., 2010) of performance in measures of cognition following mindfulness training. It is advised to note that the bar for suggesting stable increases in core cognitive constructs is set quite high, and the literature is continually growing with regard to both the measurement and cultivation of mindfulness. Accordingly, the study of mindfulness presents a rich set of challenges and potentials to practitioners and researchers alike and simultaneously informs current knowledge about core cognitive processes.

References

Anderson, N. D., Lau, M. A., Segal, Z. V., & Bishop, S. R. (2007). Mindfulness-based stress reduction and attentional control. *Clinical Psychology & Psychotherapy, 14*(6), 449–463.

Baddeley, A. (2003). Working memory and language: An overview. *Journal of Communication Disorders, 36*, 189–208.

Bolton, E., Litz, B., Britt, T., Adler, A., & Roemer, L. (2001). Reports of prior exposure to potentially traumatic events and PTSD in troops poised for deployment. *Journal of Traumatic Stress, 14*, 249–256.

Boot, W. R., Blakely, D. P., & Simons, D. J. (2011). Do action video games improve perception and cognition? *Frontiers in Psychology, 2*, 1–6.

Brown, D. P. (1977). A model for the levels of concentrative meditation. *International Journal of Clinical & Experimental Hypnosis, 25*, 236–273.

Buckner, R. L., Andrews-Hanna, J. R.,., & Schacter, D. L. (2008). The brain's default network. *Annals of the New York Academy of Sciences, 1124*, 1–38.

Chambers, R., Lo, B. C. Y., & Allen, N. (2008). The impact of intensive mindfulness training on attentional control, cognitive style, and affect. *Cognitive Therapy and Research, 32*, 303–322.

Chooi, W. T., & Thompson, L. A. (2012). Working memory training does not improve intelligence in healthy young adults. *Intelligence, 40*, 531–542.

Conway, A. R., Kane, M. J., Bunting, M. F., Hambrick, D. Z., Wilhelm, O., & Engle, R. W. (2005). Working memory span tasks: A methodological review and user's guide. *Psychonomic Bulletin & Review, 12*, 769–786.

Corbetta, M., Kincade, J. M., & Shulman, G. L. (2002). Neural systems for visual orienting and their relationships to spatial working memory. *Journal of Cognitive Neuroscience, 14*, 508–523.

Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature Reviews Neuroscience, 3*, 215–229.

Cowan, N. (2001). The magical number 4 in short-term memory: A reconsideration of mental storage capacity. *Behavioral and Brain Sciences, 24*, 87–114. discussion 114-185.

Daneman, M., & Carpenter, P. A. (1980). Individual differences in working memory and reading. *Journal of Verbal Learning & Verbal Behavior, 19*, 450–466.

Delmonte, M. (1987). Meditation: Contemporary theoretical approaches. In M. A. West (Ed.), *The psychology of meditation* (pp. 39–58). New York, NY: Oxford University Press.

Ericsson, K. A., & Chase, W. G. (1982). Exceptional memory. *American Scientist, 70*, 607–615.

Fan, J., McCandliss, B. D., Sommer, T., Raz, M., & Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. *Journal of Cognitive Neuroscience, 14*, 340–347.

Fox, M. D., Snyder, A. Z., Vincent, J. L., Corbetta, M., Van Essen, D. C., & Raichle, M. E. (2005). The human brain is intrinsically organized into dynamic, anticorrelated functional networks. *Proceedings of the National Academy of Sciences of the United States of America, 102*, 9673–9678.

Franklin, M. S., Smallwood, J., & Schooler, J. W. (2011). Catching the mind in flight: Using behavioral indices to detect mindless reading in real time. *Psychonomic Bulletin & Review, 18*, 992–997.

Fransson, P. (2005). Spontaneous low-frequency BOLD signal fluctuations: An fMRI investigation of the resting-state default mode of brain function hypothesis. *Human Brain Mapping, 26*, 15–29.

Green, C. S., & Bavelier, D. (2003). Action video games modify visual selective attention. *Nature, 423*, 534–537.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*, 35–43.

Hasenkamp, W., Wilson-Mendenhall, C., Duncan, E., & Barsalou, L. (2012). Mind wandering and attention

during focused meditation: A fine-grained temporal analysis of fluctuating cognitive states. *NeuroImage, 59*, 750–760.

Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science, 6*, 537–559.

Hurley, D. (2012, April 18). Can you make yourself smarter? *New York Times Magazine*, http://www.nytimes.com/2012/04/22/magazine/can-you-make-yourself-smarter.html.

Ilkowska, M., & Engle, R. W. (2010). *Trait and state differences in working memory capacity. In A. Gruszka, G. Matthews, & B. Szymura (Eds.), Handbook of Individual Differences in Cognition. Attention, Memory, and Executive Control (pp. 295-320)*. New York, NY: Springer.

Jaeggi, S. M., Buschkuehl, M., Jonides, J., & Perrig, W. J. (2008). Improving fluid intelligence with training on working memory. *Proceedings of the National Academy of Sciences, 105*, 6829–6833.

Jaeggi, S. M., Studer, B., Buschkuehl, M., Su, Y.-F., Jonides, J., & Perrig, W. J. (2010). On the relationship between n-back performance and matrix reasoning—implications for training and transfer. *Intelligence, 38*, 625–635.

Jha, A. P. (2002). Tracking the time-course of attentional involvement in spatial working memory: An event-related potential investigation. *Cognitive Brain Research, 15*, 61–69.

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive Affective and Behavioral Neuroscience, 7*, 109–119.

Jha, A. P., Stanley, E. A., Kiyonaga, A., Wong, L., & Gelfand, L. (2010). Examining the protective effects of mindfulness training on working memory capacity and affective experience. *Emotion, 10*, 54–64.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. New York, NY: Hyperion.

Kane, M. J., Brown, L. H., McVay, J. C., Silvia, P. J., Myin-Germeys, I., & Kwapil, T. R. (2007). For whom the mind wanders, and when: An experience-sampling study of working memory and executive control in daily life. *Psychological Science, 18*, 614–621.

Kane, M. J., Hambrick, D. Z., Tuholski, S. W., Wilhelm, O., Payne, T. W., & Engle, R. W. (2004). The generality of working memory capacity: A latent variable approach to verbal and visuospatial memory span and reasoning. *Journal of Experimental Psychology: General, 133*, 189–217.

Keizer, A. W., Verment, R. S., & Hommel, B. (2010). Enhancing cognitive control through neurofeedback: A role of gamma-band activity in managing episodic retrieval. *NeuroImage, 49*, 3404–3413.

Killingsworth, M. A., & Gilbert, D. T. (2010). A wandering mind is an unhappy mind. *Science, 330*, 932.

Klingberg, T. (2010). Training and plasticity of working memory. *Trends in Cognitive Sciences, 14*, 317–324.

Klingberg, T., Fernell, E., Olesen, P. J., Johnson, M., Gustafsson, P., Dahlström, K., et al. (2005). Computerized training of working memory in children with ADHD—A randomized, controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry, 44*, 177–186.

Lee, H., Boot, W., Basak, C., Voss, M., Prakash, R., Neider, M., … & Kramer, A.F. (2012). Performance gains from directed training do not transfer to untrained tasks. *Acta Psychologica, 139,* 146–158.

Lee, Y. S., Lu, M. J., & Ko, H. P. (2007). Effects of skill training on working memory capacity. *Learning and Instruction, 17*, 336–344.

Levinson, D. B., Smallwood, J., & Davidson, R. J. (2012). The persistence of thought evidence for a role of working memory in the maintenance of task-unrelated thinking. *Psychological Science, 23*, 375–380.

Luck, S. J., & Vogel, E. K. (1997). The capacity of visual working memory for features and conjunctions. *Nature, 390*, 279–281.

Lutz, A., Slagter, H. A., Dunne, J. D., & Davidson, R. J. (2008). Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences, 12*, 163–169.

Maguen, S., Turcotte, D. M., Peterson, A. L., Dremsa, T. L., Garb, H. N., McNally, R. J., & Litz, B. T. (2008). Description of risk and resilience factors among military medical personnel before deployment to Iraq. *Military Medicine, 173,* 1–9.

McVay, J. C., & Kane, M. J. (2009). Conducting the train of thought: Working memory capacity, goal neglect, and mind wandering in an executive-control task. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 35*, 196.

McVay, J. C., Kane, M. J., & Kwapil, T. R. (2009). Tracking the train of thought from the laboratory into everyday life: An experience-sampling study of mind wandering across controlled and ecological contexts. *Psychonomic Bulletin & Review, 16*, 857–863.

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63*, 81–97.

Morrison, A., & Chein, J. (2011). Does working memory training work? The promise and challenges of enhancing cognition by training working memory. *Psychonomic Bulletin & Review, 18*, 46–60.

Mrazek, M. D., Franklin, M. S., Phillips, D. T., Baird, B., & Schooler, J. W. (2013). Mindfulness training improves working memory capacity and GRE performance while reducing mind wandering. *Psychological Science, 24*, 776–781.

Mrazek, M. D., Smallwood, J., & Schooler, J. W. (2012). Mindfulness and mind wandering: Finding convergence through opposing constructs. *Emotion, 12*, 442.

Posner, M. I., & Petersen, S. E. (1990). The attention system of the human brain. *Annual Review of Neuroscience, 13*, 25–42.

Raichle, M. E., MacLeod, A. M., Snyder, A. Z., Powers, W. J., Gusnard, D. A., & Shulman, G. L. (2001). A default mode of brain function. *Proceedings of the National Academy of Sciences, 98*, 676–682.

Redick, T. S., Shipstead, Z., Harrison, T. L., Hicks, K. L., Fried, D. E., Hambrick, D. Z., ... & Engle, R. W. (2013). No evidence of intelligence improvement after working memory training: A randomized, placebo-controlled study. *Journal of Experimental Psychology: General, 142*(2), 359.

Schmeichel, B. J. (2007). Attentional control, memory updating, and emotion regulation temporarily reduce the capacity for executive control. *Journal of Experimental Psychology: General, 136*, 241–255.

Schmiedek, F., Lövdén, M., & Lindenberger, U. (2010). Hundred days of cognitive training enhance broad cognitive abilities in adulthood: Findings from the COGITO study. *Frontiers in Aging Neuroscience, 2*, 1–10.

Schooler, J. W., Smallwood, J., Christoff, K., Handy, T. C., Reichle, E. D., & Sayette, M. A. (2011). Meta-awareness, perceptual decoupling and the wandering mind. *Trends in Cognitive Sciences, 15*, 319–326.

Shapiro, S. L., Oman, D., Thoresen, C. E., Plante, T. G., & Flinders, T. (2008). Cultivating mindfulness: Effects on well-being. *Journal of Clinical Psychology, 64*, 840–862.

Shipstead, Z., Hicks, K. L., & Engle, R. W. (2012). Cogmed working memory training: Does the evidence support the claims? *Journal of Applied Research in Memory and Cognition, 1*, 185–193.

Shipstead, Z., Redick, T. S., & Engle, R. W. (2012). Is working memory training effective? *Psychological Bulletin, 138*, 628–654.

Slagter, H. A., Davidson, R. J., & Lutz, A. (2011). Mental training as a tool in the neuroscientific study of brain and cognitive plasticity. *Frontiers in Human Neuroscience, 5*, 1–12.

Smallwood, J., McSpadden, M., & Schooler, J. W. (2008). When attention matters: The curious incident of the wandering mind. *Memory & Cognition, 36*, 1144–1150.

Stanley, E. A., & Jha, A. P. (2009). Mind fitness: Improving operational effectiveness and building warrior resilience. *Joint Force Quarterly, 55*, 144–151.

Tang, Y. Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q., … & Posner, M. I. (2007). Short-term meditation training improves attention and self-regulation. *Proceedings of the National Academy of Sciences, 104,* 17152–17156.

Unsworth, N., & Engle, R. W. (2007). The nature of individual differences in working memory capacity: Active maintenance in primary memory and controlled search from secondary memory. *Psychological Review, 114*, 104–132.

Unsworth, N., Heitz, R. P., Schrock, J. C., & Engle, R. W. (2005). An automated version of the operation span task. *Behavior Research Methods, 37*, 498–505.

Valentine, E. R., & Sweet, P. L. G. (1999). Meditation and attention: A comparison of the effects of concentrative and mindfulness meditation on sustained attention. *Mental Health, Religion, & Culture, 2*, 59–70.

Van den Hurk, P. A., Giommi, F., Gielen, S. C., Speckens, A. E., & Barendregt, H. P. (2010). Greater efficiency in attentional processing related to mindfulness meditation. *The Quarterly Journal of Experimental Psychology, 63*, 1168–1180.

Van Vugt, M., & Jha, A. P. (2011). Investigating the impact of mindfulness meditation training on working memory: A mathematical modeling approach. *Cognitive, Affective, and Behavioral Neuroscience, 11*, 344–353.

Wallace, B. A. (1999). The Buddhist tradition of Samatha: Methods for refining and examining consciousness. *Journal of Consciousness Studies, 6*, 175–187.

Wallace, B. A. (2006). *The attention revolution: Unlocking the power of the focused mind*. Boston, MA: Wisdom.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063–1070.

Taming the Wild Elephant: Mindfulness and Its Role in Overcoming Automatic Mental Processes

5

Brian D. Ostafin

Wild elephants are formidable creatures that can wreak havoc on human communities. A recent account from Vietnam demonstrates the difficulty of controlling these animals, as bonfire barricades and loud gongs failed to dissuade them from destroying a village's orchards and vegetable fields ("Wild elephants raid fields", 2013). For anyone who has tried to change a behavior such as overeating, smoking, or procrastination, the habits of the mind can feel as powerful and obstinately uncooperative as wild elephants. A wild elephant metaphor of the mind is found in early Buddhist accounts (MN 125.23)[1]:

> Just as…the elephant tamer plants a large post in the earth and binds the forest elephant to it…in order to subdue his forest habits…and to inculcate in him habits congenial to human beings, so these four foundations of mindfulness are the bindings for the mind of the noble disciple in order to subdue his habits.

This chapter uses a cognitive science perspective to review what is known about the mind's unruly habits and how mindfulness may help to counter them.

The Frame Problem and the Problem of Framing

Why does the human mind feel like an untamed elephant? The approach taken here includes the assumptions that reducing the informational complexity of the world is a prerequisite to goal pursuit and that a side effect of this reduction is inflexible responding to the environment[2].

To begin, the goal-oriented nature of humans can be understood as part of the strategy that we use to obtain the necessities of life, such as food and shelter (Klinger, 1998). Unlike plants, which rely on the environment to deliver what they need to survive, animals, including humans, must seek out the goods of life. These goods are represented as goals that are pursued by humans as well as lower animals (Tolman, 1948).

An important obstacle to successful goal pursuit is the vast complexity of the world (Simon, 1972). This obstacle is demonstrated in the *frame problem* from artificial intelligence, which consists of the difficulty of designing robots that can both determine what information is *relevant* (*salient*) for a task and ignore information that is *irrelevant* (*nonsalient*) for the task. Dennett (1984) illustrates the frame problem by describing the difficulties of designing a robot to use a wagon so

[1] MN is the standard abbreviation for the canonical Majjhima Nikāya ("Middle-length discourses") text.

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[2] I follow Vervaeke's (2011) argument regarding the necessity of frames and their costs.

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that it can move a battery from one room to another, in which the battery can be connected to the robot. In addition to representing the intended consequences of its behavior (the battery will come along when the wagon is pulled), the robot must also be able to (a) discriminate between the few relevant unintended consequences of its action (e.g., pulling the wagon is a bad idea because there is also a time-bomb on it) from the infinite number of irrelevant unintended consequences (e.g., the influence of pulling the wagon on air currents that contribute to weather patterns in South America) and (b) ignore the irrelevant information so that it can act instead of being perpetually frozen in a state of computational processing. Relatively complex goal pursuits such as playing a game of chess have similar problems with immense quantities of information, as the number of possible chess games has been estimated to be 10^{120} (Shannon, 1950). Given our limited information processing capacity (Miller, 1956), we are unable to fully consider all possible behavioral alternatives and their consequences. Thus, we cannot play the perfect game of chess or flawlessly pursue more complex goals involved in relationships, childrearing, and one's career. Although it may be impossible to solve the frame problem in artificial intelligence (Dennett, 1984), it is clear that frames, which demarcate the relevant from the irrelevant, are necessary for goal pursuit.

Fortunately, there are a number of adaptations that help to establish relevance. For example, innate parameters in our sensory systems constrain what is perceived and acted upon (von Uexküll, 1957). Importantly, frames are also derived from learning experiences (Rieskamp & Otto, 2006). Such learning creates mental shortcuts in determining what is relevant, thus allowing decisions to be made without an exhaustive search of information related to an action. For example, previous learning means that a desire for a midnight snack does not elicit haphazard foraging through the house but instead prompts a direct path toward the refrigerator. Another example is that chess players who can successfully plan three moves ahead need not demonstrate super-human information processing in order to select advantageous moves. Instead, they use heuristics such as devoting attention to moves that allow the opponent fewer options and to squares that can be influenced by many pieces (Reynolds, 1982; Simon & Simon, 1962). Shortcuts such as walking to the fridge at midnight or attending to chess moves that constrain an opponent become habitual because they facilitate the acquisition of something good or the elimination of something bad (Wood & Neal, 2007). These experience-related frames confer great adaptive advantage due to their speed and efficient use of limited cognitive resources, both of which may contribute to the finding that habitual behavior is associated with less stress than nonhabitual behavior (Wood, Quinn, & Kashy, 2002).

It is an unfortunate fact that everything costs something. The cost of learning-based frames becomes apparent when the environment changes. This is because frames tend to be conservative and are most beneficial if the environment remains constant. For example, the salience of a midnight snack in the fridge may become problematic when the context changes from "eat when hungry" to "going on a diet" (Carels et al., 2001). Frames also impede goal pursuit by blocking the consideration of alternative options, some of which may be more efficient. For example, research has shown that experienced chess players will select a familiar solution to achieve checkmate when a shorter but unfamiliar solution is available (Bilalić, McLeod, & Gobet, 2008). These participants were only able to find the shorter solution when the board was set up so that the familiar solution was no longer an option, indicating that the well-known solution impeded access to the arguably better solution. Further, even though participants stated that they looked for shorter solutions after finding the familiar one, eye-tracking data showed that they continued to primarily look at the squares relevant to the familiar solution.

These examples show that despite intentions to the contrary, frames have a centripetal force that can capture thinking and behavior. Unfortunately, the consequences are often more serious than a poorly played game of chess. The

problem of frames becomes apparent when considering the difficulty of changing self-destructive behaviors:

> Even though in the morning, you say, "I'm not going to drink", then you seem to hit like a blind spot in your brain, where you go on automatic and you're going to have that drink…you're not thinking anymore, "What about the kids? What about the marriage"…You just hit this blank spot and you go to the refrigerator, you open it, and you pull out that bottle of wine (Moyers, 1998).

Treatment outcome research supports the idea that alcohol and drug behavior is hard to change, with relapse rates of 60 % within 4 months post-treatment (Foster, Marshall, & Peters, 2000) and 70 % within the first year (Hunt, Barnett, & Branch, 1971). Similarly bleak results are demonstrated by individuals making New Year's resolutions, with approximately 60 % failing to maintain their resolutions 3 months later (Norcross, Ratzin, & Payne, 1989). These findings illustrate that habits of the mind can indeed act like unruly elephants.

Self-Regulation and Dual-System Models of the Mind

Dual-system (process) models of the mind have helped to provide insight into the role of habits in self-regulation. Although there are a number of variants of dual-system models (Epstein, 1994; Fazio, 1990; Posner & Snyder, 1975; Strack & Deutsch, 2004), they overlap to a considerable extent in the characteristics ascribed to each system. Using the terminology of Stanovich and West (2000), *System 1* is the system of habits and involves information represented in associative links, automatic responses that occur quickly (with the corollary that System 1 is the default system for thinking and behavior), and little demand on executive control resources. In contrast, *System 2* is the system of conscious reflection and involves information represented as propositions (that are operated on with logic), volition, slow response characteristics, and the use of executive (attentional) control. (For a critique of such dual-system models, see Keren & Schul, 2009.)

The Habit System

System 1 (the habit system) is proposed to represent information in an associative network. This network is the storage place for learning-based relevance (frames). From this perspective, the perception of a stimulus automatically activates nodes in an associational network. The nodes can represent a number of things such as concepts (*ice cream—cold*), and affect (*ice cream—hedonic pleasure*). Additionally, the network includes behavioral schemata that encompass the contextual cues of the behavior, the behavior, and consequences related to the behavior (*dessert tray—order and eat dessert—hedonic pleasure*; Strack & Deutsch, 2004). Although some associations in System 1 are part of our genetic makeup, such as loud noises eliciting an orienting response (Sokolov, 1963) or palatable foods eliciting appetitive behavior (Mennella & Beauchamp, 1996), experience is proposed to play a central role in the development of associative networks. Early behaviorist research demonstrated that learning experiences create associations between cues, behaviors, and responses as measured in post-learning actions (Skinner, 1948; Watson & Rayner, 1920). For example, over the course of learning to read, verbal stimuli come to automatically elicit reading behavior such that it becomes more difficult to ignore a word in order to categorize the color in which it is printed (Stanovich, Cunningham, & West, 1981). More recent studies have found that conditioning strengthens mental associations as measured with a reaction time task (Olson & Fazio, 2001).

Stronger associations between nodes are reflected in the automaticity with which one node activates another (Strack & Deutsch, 2004). Research on automaticity (and related functional properties such as speed and efficiency) was advanced with the development of a number of *implicit* (indirect) measures of association, such as the sequential priming task. This task consists of the sequential presentation of two stimuli to examine the influence of the first (prime) on responses to the second (target). Early research demonstrated automaticity with a priming task by first creating an explicit expectancy that a

prime (e.g., the word *body*) would be followed by an unrelated target (e.g., building-related words, such as *door*). Participants were instructed to intentionally shift their attention away from expecting a body-related target and toward expecting a building-related target when they saw a body-related prime. The results showed that when the interval between the prime and target was relatively long (>500 ms), the body prime facilitated recognition of the expected building-related target as a word and inhibited recognition of a target that was related to the prime but unexpected (e.g., *heart*). However, when the interval between prime and target was brief (<500 ms), the body prime no longer facilitated recognition of the expected building-related targets but now facilitated responses to unexpected body-related targets (Neely, 1977). These results show that strong stimulus–stimulus associations are activated automatically, quickly, and that they are difficult to control. Similar findings have been shown with evaluative priming task variants in which attitudes are assessed by examining the influence of primes on target evaluations (Degner, 2009; Fazio, Sanbonmatsu, Powell, & Kardes, 1986).

An important benefit of using implicit measures relates to the concept of transfer-appropriate processing, which is the idea that the greater the overlap between the processes that contribute to a measure and the processes that contribute to real-life behavior, the better the measure will be in predicting the behavior (De Houwer, 2006; Roediger, 1990). The extent to which implicit measures assess automaticity should thus make them valuable in understanding self-regulation failures, as such failures are thought to involve automatic processes (Hofmann, Friese, & Strack, 2009). Along these lines, implicit measures assessing stimulus-affect associations have been shown to predict behaviors that people often have a hard time controlling, including alcohol consumption among heavy drinkers (Ostafin, Marlatt, & Greenwald, 2008) and nonverbal expressions of negative attitudes during innocuous cross-racial interactions (Hofmann, Gschwendner, Castelli, & Schmitt, 2008).

The Reflective System

Although the quick and dirty responses in System 1 can provide effective guidance in goal pursuit, the conservative nature of System 1 means that it is poorly equipped to respond to a dynamically changing environment. The dynamic aspect of the world shows itself in a variety of ways, such as novelty (e.g., an unfamiliar chessboard configuration or symptom presentation) or changes in goals (e.g., deciding to go on a weight-loss diet). System 2 (the reflective system) provides greater flexibility under such circumstances.

The flexibility of System 2 results, in part, from the way that it represents information. In this system, information is represented as propositions with a truth value (Strack & Deutsch, 2004). The representation of propositions allows reasoning to be applied, such as evaluating the proposition "Drinking alcohol tonight is a good idea" against a standard (e.g., consideration of the costs and benefits of one's habit of drinking on Wednesday evenings in light of a job interview the next day). Such reasoning may result in the conclusion that "Drinking alcohol tonight is *not* a good idea," leading to a decision/intention to not drink, which in turn activates appropriate behavioral schemata (e.g., declining a beer; Strack & Deutsch, 2004).

The activity of System 2 is dependent on *executive (attentional) control*, which is the ability to maintain attention on a goal and its object while inhibiting (internal or external) distractions (Barrett, Tugade, & Engle, 2004; Engle, 2002). Executive control must actively represent information so that logical operations can be applied. For example, the behavioral option of drinking alcohol, the standard of doing well on the job interview, and the likely consequences of drinking must all be represented in order for even simple reasoning to occur (e.g., "If I drink my usual six beers, I will feel mentally sluggish at the interview and this will negatively impact my evaluation"). Reasoning will be enhanced to the degree that goal-irrelevant information (e.g., how good it feels to get an alcohol buzz) is inhibited. After making a decision (e.g., "I will have just

one beer and then go home early"), executive control must then represent the intention over the course of the relevant time period (the short stay at the bar) in the face of obstacles to goal completion (e.g., the desire to consume a second beer).

A Dual-System Perspective on Self-Regulation

The classic self-regulation dilemma between temptation and restraint can be understood as conflict between System 1 and System 2, with the outcome being determined by the relative strength of the two systems (Hofmann et al., 2009). Stronger appetitive associations in System 1 will increase the likelihood of yielding to temptation. For example, the automaticity of alcohol-approach associations predicts difficulty controlling drinking behavior (Palfai & Ostafin, 2003). In addition, the ability of System 2 to moderate the influence of automatic responses on subsequent behavior is dependent on at least two factors (Fazio, 1990; Strack & Deutsch, 2004). The first involves the motivation to engage in effortful deliberation. When this motivation is low, behavior consistent with System 1 is more likely. Support for this idea has been found in the literature on automatic associations and prejudicial behavior (Olson & Fazio, 2004). Even when motivation to engage in effortful deliberation is high, deliberation cannot occur without sufficient resources (such as time or executive control). Consistent with this idea, relations between implicit associations and behavior are stronger when the person chronically lacks such resources (Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008), when attention is occupied by another task (Gibson, 2008), and when such resources were recently used and thus in a depleted state (Ostafin et al., 2008).

Self-regulation interventions can be designed to either weaken the operations of System 1 or strengthen the operations of System 2. Regarding System 1, there is evidence that aversive conditioning designed to combat appetitive associations can be effective in reducing the consumption of tempting stimuli such as high-fat foods, alcohol, and cigarettes (Diehl et al., 2010; Erickson, Tiffany, Martin, & Baker, 1983; Hollands, Prestwich, & Marteau, 2011). Further, some research has found that aversive conditioning is mediated by changes in associative networks (Hollands et al., 2011; though see Mitchell, De Houwer, & Lovibond, 2009). A recent extension of the conditioning method involves pairing an incentive with avoidance behavior. For example, instructions to respond to alcohol pictures with an avoidance behavior (pushing a joystick away from the body with a concomitant zoom-out effect) have been found to result in reduced alcohol use (Wiers, Eberl, Rinck, Becker, & Lindenmeyer, 2011) and this effect is partially mediated by increased alcohol-avoidance associations (Eberl et al., 2013).

Other System 1 interventions are designed to prevent the initial activation of appetitive associations. One example consists of attention training. Such interventions are based on the logic that attention toward a stimulus results in the activation of appetitive responses and, therefore, that training attention away from that stimulus should facilitate self-regulation outcomes (Field & Cox, 2008; MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002). For example, people might be trained to attend to the area of space occupied by neutral rather than alcohol-related pictures in a visual probe task of attention. Although some studies have demonstrated benefits to such attention-retraining manipulations (Schoenmakers et al., 2010), they may fail to generalize to new appetitive stimuli (Schoenmakers, Wiers, Jones, Bruce, & Jansen, 2007).

Other interventions have instead focused on strengthening System 2 processes. There is evidence that executive control can be enhanced through training (Klingberg, 2010), for example, and an initial study found that such training reduced alcohol use among heavy drinkers (Houben, Wiers, & Jansen, 2011). Also, interventions that include elements designed to reduce errors in reasoning have been shown to improve the self-regulation of a number of behaviors such as alcohol use, binge eating, and gambling (Darkes & Goldman, 1993; Grilo, Masheb, & Wilson, 2005; Ladouceur et al., 2001). Such

cognitive restructuring interventions have also been shown to alter emotional responding (Shurick et al., 2012).

Thus, there are several approaches that appear to work, at least somewhat, in allowing the individual to better resolve self-control dilemmas. Nonetheless, each has important limitations. For example, although extinction procedures may create new associations in System 1, the previously problematic associations remain intact (Bouton, 2004). This state of affairs leaves the individual vulnerable when re-exposed to tempting cues (O'Brien, Childress, Ehrman, & Robbins, 1998) or when stress occurs (Sinha, Shaham, & Heilig, 2011). Stress additionally limits the ability of System 2 to guide behavior, as stressors impair executive control (Qin, Hermans, van Marle, Luo, & Fernández, 2009) and mitigate the effects of cognitive restructuring on emotional response (Raio, Orederu, Palazzolo, Shurick, & Phelps, 2013).

Given such limitations, other approaches to preventing self-regulation failure are desirable. One promising class of strategies aims not to alter the contents of the mind, but rather the individual's relationship to such mental contents (Hayes, 2004). The construct of mindfulness falls into this category.

Mindfulness and Overcoming Automatic Processes: Theory

Defining Mindfulness

A popular definition of mindfulness is that it consists of an *awareness* of immediate experience, and a *nonjudgmental*, *accepting attitude* toward that experience such that experiences are allowed to be as they are independent of an agenda to control them (Kabat-Zinn, 1994). Scholars have suggested that although this definition is related to the original understanding of mindfulness in Buddhism, it obscures other aspects of that understanding (e.g., the positive role of concepts, evaluations and judgments in mindfulness practice; Bodhi, 2011; Gethin, 2011). The nonjudgmental awareness definition will be used in this chapter both because of its relation to early Buddhism (Bodhi, 2011; Gethin, 2011) and because of its widespread usage among researchers (Bishop et al., 2004) and contemporary Buddhist teachers (Gunaratana, 2002), thus aiding communication among different scholarly traditions.

Mindfulness and Habit in the Buddhist Model of Suffering and Freedom[3]

The central concern of Buddhism is the general unsatisfactoriness of life, ranging from minor (but pervasive) irritations, boredom, and unfulfilled expectations to acute and intense forms of suffering such as the death of a loved one. An important cause of suffering is thought to be craving and grasping (the latter of which is a more involved form of craving). From this perspective, the perception of external and internal stimuli is typically accompanied by positive or negative (or neutral) feelings, which in turn trigger craving and grasping. Craving and grasping result in thoughts, impulses, and behaviors that aim to obtain and maintain positive feeling states or reduce and remove negative feeling states. People can become trapped in a positive feedback loop such that thoughts, impulses, and behaviors elicit additional feeling states, subsequent craving and grasping, and so on.

Craving and grasping are thought to lead to dissatisfaction in a variety of ways. Consistently wanting things to be different than they are involves a chronic evaluation of the current state as negative and a concomitant feeling of discontent. Further, the difficulty of controlling the world (both external and internal) means that attempts to obtain the pleasant and remove the unpleasant are likely to lead to persistent frustration. Even when the desired goal is obtained, the fleeting nature of positive experiences means that the interlude of satisfaction will be brief. Finally,

[3] This sketch is abstracted from more comprehensive accounts (Bodhi, 1984; Carrithers, 1983; Goldstein, 1993; Rahula, 1959).

craving and grasping extend the natural life of a negative state through thoughts (e.g., rumination and worry) and behaviors (e.g., acting in anger elicits more conflict).

The trajectory from the perception of stimuli and concomitant feeling state to craving and grasping is understood to be habitual (and would thus involve System 1). The most usual case is that individuals are unconscious of the process. That is, the cognitions and behaviors aiming to increase the pleasant and decrease the unpleasant are not carried out as the result of volitional intention, but instead just automatically happen. A consequence of the repeated acting out of the impulses of craving and grasping is that these responses become reinforced and are even more tightly linked to perception and feeling.

Although the link between feeling and subsequent craving and grasping is habitual, it is not necessary. Mindfulness is proposed to lead to freedom from suffering by cutting this link. One way that mindfulness practice is understood to do so is by focusing awareness on the direct experience of feeling states. As this awareness is intentional, at least in the early phases of practice, it would involve System 2. For example, the meditator may direct attention to body sensations involved in breathing, walking, or sitting for extended periods of time. This sort of "bare attention" includes a nonjudgmental element, in that the sensations are to be observed in their most basic phenomenological form (including whether they are pleasant, unpleasant or neutral) rather than as states that are evaluated as good or bad and therefore things to be sought or avoided. Mindfulness practice also involves a concentration element in which awareness is aimed at either a specific object (e.g., the breath) or ongoing experience (sometimes called "choiceless awareness"). In both cases, instructions are to disengage attention from distractors whenever the mind has wandered.

Mindfulness of feeling states may lessen the likelihood of craving-related behaviors from "just happening" to the degree that that unconsciousness plays a role in their expression. However, the more central mechanism through which the feeling–craving link is broken consists of continued mindfulness of feeling states leading to the insight that they are short-lived. In contrast to intellectual insight, the insight derived from mindfulness practice is understood to be an experiential one that alters the way that stimuli are perceived. With extended practice, such changes in perception may become automatic, thus shifting the action of mindfulness to System 1. Further, such insight eliminates the imperative to do something about the feeling states; that is, the insight is that feeling states resolve themselves without having to do anything about them. As a consequence, the meaning of feeling states is changed in a qualitative manner. This qualitative change has been described as "…all of these changing phenomena as objects of our desire leave us feeling unfulfilled, while as objects of mindfulness they become the very vehicle of awakening" (Goldstein, 2002, p. 32).

As evidence for the benefits of mindfulness has grown, several reviews have examined the mechanisms of mindfulness from the perspective of psychological science (Brown, Ryan, & Creswell, 2007; Hölzel et al., 2011; Lutz, Slagter, Dunne, & Davidson, 2008; Shapiro, Carlson, Astin, & Freedman, 2006; Vago & Silbersweig, 2012). In one recent paper, important mechanisms were proposed to include (1) *what* the mind processes and (2) *how* the mind processes this information (Teasdale & Chaskalson, 2011). These mechanisms of mindfulness may improve self-control outcomes through effects in both System 1 and 2.

Mindfulness Mechanism 1: Executive (Attentional) Control Lessens Problematic Content

As mentioned, mindfulness practice often includes a concentration element (especially early on) and thus can be thought of as a function of System 2 processes. Repeated practice with focusing awareness should lead to an improved ability to resist distraction and sustain attention on intended objects (Lutz et al., 2008). Indeed, there is accumulating evidence that mindfulness training produces this benefit (Jha, Krompinger,

& Baime, 2007; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). Attentional control should, in turn, facilitate self-regulation (Teasdale & Chaskalson, 2011). For example, each instance of directing one's attention to neutral objects (e.g., the sensations of breathing or walking) is also an instance during which one is not processing problematic stimuli (e.g., cues of food for a dieter). And, as already stated, less attention to problematic (e.g., tempting) stimuli means that automatically triggered associations to such stimuli are less likely to occur (Field & Cox, 2008). It should thus be easier to control one's behavior in the absence of these System 1 thoughts and urges.

The ability to control attention is important, but this mechanism is not unique to mindfulness. Other interventions have been shown to improve self-regulation by strengthening general attentional control abilities (Houben et al., 2011) and attentional control related to specific cues of temptation (Schoenmakers et al., 2010). The novel element of mindfulness is represented in its focus on changing the relation with mental content rather than changing the content itself (Hayes, 2004), as will be covered below.

Mindfulness Mechanism 2: Acceptance Breaks Maladaptive Frames

A second mechanism of mindfulness involves changing the way that the content of experience is processed (Teasdale & Chaskalson, 2011). This is done through an accepting attitude, one that can eventually change the framing of experience in a manner conducive to self-regulation. Similar to learning to drive a car or other types of skill acquisition, an accepting attitude may initially require volition (System 2) but then become automatized (System 1). Two processes through which acceptance may improve self-regulation include giving up a goal to regulate emotional states and the creation of experiential distance from temptation.

The relinquishment of an emotion regulation agenda. As a function of learning, we acquire frames and thus expertise in efficient goal pursuit. However, goals also produce frames that influence what we see and how we interpret what we see. A striking example can be found in the inattentional blindness study of Simons and Chabris (1999). Among participants who had the goal of counting the number of passes among a group of individuals playing catch, approximately 50 % did not perceive the unexpected event of a person in a gorilla suit walking through the middle of this scene. Similarly, research using virtual reality methods has shown that participants who are looking directly at an object in their hand are oblivious to changes of the object's size unless object size is relevant for their goal-directed action (i.e., where to place the object; Triesch, Ballard, Hayhoe, & Sullivan, 2003).

In addition to influencing what we see, goals alter our interpretation of perceived stimuli. For example, a group of small children playing on the sidewalk may elicit a smile if one is out for a Sunday stroll but a curse if they are blocking the quickest route to work when in a rush. That is, goal pursuit figures prominently in whether stimuli are perceived positively, negatively, or as irrelevant (Carver & Scheier, 1990; Frijda, 1988; Löw, Lang, Smith, & Bradley, 2008).

Given the importance of goals to what we feel, changing one's goal from "emotion regulation" to "acceptance" may represent an important route to changing experience and behavior. First, an accepting attitude may result in a stimulus no longer eliciting strong automatic affective responses (i.e., craving and grasping from the Buddhist perspective). As the goal to improve one's state weakens, stimuli may be less likely to be perceived as "something that can improve affect state," thereby losing their motivational imperative. Second, an accepting attitude may delink the relation between automatic affective responses and behavior. For example, an alcoholic drink (for a problem drinker) might still be seen as something that could improve one's affect state but relinquishing the idea that one needs to be as happy as possible means that the stimulus is less likely to be acted upon. Thus the impulse can be allowed to arise and fall on its own accord. In this context, Marlatt (1994) has described the utility of mindfulness as "urge surfing," a metaphor

that contrasts with one of getting swept away by an impulse.

Creation of a decentered perspective. Our normal mode of experience is often characterized by an immersed, first-person perspective (see Nigro & Neisser, 1983). This means that when experiencing temptation, the individual may be absorbed in mental content related to acquiring the tempting stimulus, such as the stimulus itself (e.g., thoughts about how good a cold beer would taste), behavior that would facilitate acquisition of the stimulus (e.g., walking to the fridge), etc. In this way, our perception of the world is overshadowed by our mental content. Such a state can be described as looking *from* our thoughts, much like we look at the world though eyeglasses (Hayes, Strosahl, & Wilson, 1999). Mindfulness helps individuals to disentangle themselves from their mental content by directing attention toward the phenomenology of the present-moment experience. For example, nonjudgmental observation would be directed toward physical sensations involved in an appetitive state, including their location in the body and their qualia (intensity, whether they are sharp, dull, throbbing, etc.). This observation includes noting the dynamic nature of experience, such as how the location and qualia of sensations change over time or how a stimulus-related thought emerges, lingers for a period of time, and then fades. This type of attention in which experience is treated as an object of awareness has been variously described as *decentering* (Teasdale et al., 2002), *re-perceiving* (Shapiro et al., 2006), or *cognitive defusion* (Hayes et al., 1999). The experiential distance involved in decentering represents a shift from identification with (and immersion in) mental content (e.g., believing that one needs to eat a dessert or consume alcohol) to dis-identification, in which the content is experienced as "passing thoughts and feelings that may or may not have some truth in them" (Teasdale et al., 2002, p. 276).

A potential consequence of a decentered perspective is that the relation between automatic appetitive responses and behavior is weakened. For example, with mindfulness practice, the idea that "I need that chocolate cake" (alcohol, etc.) may shift from an immersed perspective in which it is experienced as *a reality that must be made manifest* to a decentered perspective in which it is experienced as *another element of mental content that comes and goes on its own accord*. This shift should subsequently make it less important to act on the impulse. In addition, continued mindfulness practice may result in a decentered *observation* of appetitive mental content replacing *consummatory behavior* as the habitual response to temptation (Breslin, Zack, & McMain, 2002).

Mindfulness and Overcoming Automatic Processes: Evidence

As the discussion in the previous section suggests, there are a number of paths through which mindfulness may allow the individual to rise above the influence of System 1 habit. Recent research supports the idea that mindfulness can indeed help to overcome habit.

Mindfulness and Creativity

The solution to many of life's problems depends upon the prior learning of logical steps designed to reach a goal state (e.g., solving an algebra problem, building a house). However, the automatic cognitive and behavioral reactions (System 1) derived from such learning can impede the solving of problems that require a nonhabitual response (Gilhooly & Murphy, 2005; Knoblich, Ohlsson, Haider, & Rhenius, 1999; Luchins, 1942). Because mindfulness involves a "bare attention"—observing "everything as if it was occurring for the first time" (Gunaratana, 2002, p. 134)—it may facilitate the novel responses required by creativity problems.

Several recent studies have demonstrated a beneficial effect of mindfulness on creativity in a variety of domains. For example, the Einstellung effect occurs when previous experience in solving similar types of problems triggers an initial idea of how to solve a current problem and this idea prevents the consideration of alternatives, even when they are more optimal (Luchins, 1942).

Mindfulness meditation training has been shown to reduce the Einstellung effect, both when comparing meditators and nonmeditators and following participation in an 8-week mindfulness course relative to a control group (Greenberg, Reiner, & Meiran, 2012).

Another index of creativity is divergent thinking, which is the ability to come up with novel ideas (e.g., listing novel uses of a common object; Guilford, 1950). Previous research has shown that compared to control conditions (such as 20 min of resting or completing general knowledge questions), mindfulness training led participants to generate more novel exemplars of categories (e.g., kitchen utensils) when asked to do so (Wenk-Sormaz, 2005). Using a within-subject design, a recent study similarly found that compared to a brief (35 min) focused-attention training (i.e., maintaining attention on parts of the body), a mindfulness intervention increased the ability to generate novel uses of common objects but did not influence performance on a measure of logical thinking (Colzato, Ozturk, & Hommel, 2012). Another recent study found that compared to a brief (20 min) relaxation period, practitioners who completed a meditation intervention demonstrated greater ability to generate higher-order categories that link groups of disparate stimuli (Strick, van Noorden, Ritskes, de Ruiter, & Dijksterhuis, 2012). Strick et al. further noted that the meditation group responded more quickly, which may suggest greater access to the correct answers generated by nonconscious processes.

A third measure of creativity is represented by insight problems. These are problems in which previous experience biases the representation of a problem so that it is difficult to solve. This difficulty results in an impasse, after which the problem may be restructured, allowing an insight into the solution (Knoblich et al., 1999). For example, the difficulty of solving the classic 9-dot problem may be partly due to habitual focus on dots rather than blank spaces as "places to pivot" (Kershaw & Ohlsson, 2001). A recent pair of studies found that (a) trait mindfulness predicts insight but not noninsight problem solving, (b) compared to a control condition, a brief (10 min) mindfulness intervention increased insight but not noninsight problem solving, and (c) such training effects were partly mediated by increased state mindfulness (Ostafin & Kassman, 2012). These results have been extended with the finding that mindfulness training outperforms a relaxation control condition in insight problem solving (Walsh & Greaney, 2014).

Mindfulness and Attentional Flexibility

A second category of studies has examined the relation between mindfulness training and the ability to overcome the extent to which salient stimuli capture attention. The rapid serial visual presentation (RSVP or "attentional blink") task represents one approach to assessing the extent to which stimuli capture attention (Raymond, Shapiro, & Arnell, 1992). The dual-target RSVP consists of presenting a rapid stream of stimuli with instructions to identify two targets (e.g., numbers) among a series of distractors (e.g., letters). Raymond et al. found that the second target is more difficult to identify when it is presented approximately < 500 ms after the first, indicating the time it takes to shift from automatic (System 1) to volitional (System 2) processing. Performance on the RSVP has been shown to improve in a group after an intensive 3-month meditation retreat (Slagter et al., 2007). The results further showed that a neural indicator of attention allocation (the P3b event-related potential) was reduced in the intensive meditation group and that this change was correlated with improved RSVP performance.

Other research has shown that target detection can be impaired when participants are instructed to identify only a single target. For example, distractors that have negative emotional content have been shown to impair detection of targets that are presented <500 ms after the distractor (Most, Chun, Widders, & Zald, 2005). Brief mindfulness training has been shown to reduce the attentional capture of negative stimuli in the single-target RSVP paradigm (Ostafin, Verwoerd, & Wessel, 2014). Specifically, the results showed

that that distractors consisting of aversive pictures created less impairment in target detection for participants receiving two 10-min sessions of mindfulness training compared to a control condition.

Mindfulness and Automatic Responses

A third category of studies has examined the relation between mindfulness and the ability to overcome automatic (System 1) responses elicited by salient stimuli. A thought-provoking example consists of a case study that examined the startle reflex, an innate and involuntary response to sudden loud noises, in a practitioner with over 40 years of meditation practice (Levenson, Ekman, & Ricard, 2012). The results showed that indices of the startle response, including facial expression and physiological measures, were greatly reduced in the subject in a mindfulness meditation period compared to a distraction period.

Other research has shown that mindfulness training can help to overcome automatic responses that have developed through previous learning. For example, learning experiences can lead to automatic approach responses to appetitive food cues (Van Gucht, Vansteenwegen, Van, & Beckers, 2008). A recent series of three studies examined the influence of mindfulness training on approach-related processes of this type (Papies, Barsalou, & Custers, 2012). This research used a variant of the affective Simon task, in which participants are instructed to categorize stimuli based on a nonaffective feature (e.g., frame color) while ignoring stimulus affect (see De Houwer, Crombez, Baeyens, & Hermans, 2001). Previous research has shown that stimulus affect influences such approach-avoidance responses despite the irrelevance of this feature to the instructions (De Houwer et al., 2001). Papies et al. (2012) found that training participants to allow and observe thoughts and impulses related to attractive food reduced automatic food-approach responses.

The influence of learning on automatic responses has also been demonstrated in the color-word Stroop task (Stroop, 1935). The common finding in the Stroop task is that it takes longer to name the ink color of color words when these dimensions are incongruent rather than congruent. Because word reading has become automatic through practice, a smaller Stroop effect is consistent with the ability to overcome (versus get stuck in) the habitual response of reading (De Houwer, 2003a). It is therefore of interest that experienced meditators demonstrate less Stroop interference than nonmeditators (Moore & Malinowski, 2009). Similar findings have been shown with an intervention design. In this research, participants receiving three 20-min sessions of mindfulness training showed less Stroop interference compared to two different control conditions (Wenk-Sormaz, 2005). Although one subsequent study did not replicate these findings (Anderson, Lau, Segal, & Bishop, 2007), it included modified Stroop tasks, which prevent direct comparison to the standard Stroop task (Algom, Chajut, & Lev, 2004; De Houwer, 2003b).

Several studies have also shown that mindfulness moderates the relation between automatic affective responses and variables related to behavior or conscious thought. These studies have assessed automatic associations with the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The IAT consists of categorizing stimuli from two target categories (the category of interest such as *alcohol* and a comparison category such as *water*) and two attribute categories (such as *positive* and *negative*) by pressing one of two response keys. The logic of the IAT is that the stronger the association between two categories (e.g., *alcohol* and *positive*), the faster they can be classified when paired with the same response key. That is, the irrelevant (affective) feature of a target (e.g., the positive valence of alcohol stimuli) may automatically activate affective responses, leading to faster response times when the irrelevant feature matches the extrinsic valence of the response key (De Houwer, 2003b). Evidence for the IAT as a measure of automatic processes includes the IAT placing low demand on executive control resources, as a cognitive load does not eliminate

IAT effects (Cunningham, Preacher, & Banaji, 2001), and the difficulty of controlling the IAT effect, as faking instructions have less success with the IAT compared to explicit (paper and pencil) measures (Steffens, 2004).

Mindfulness has been found to moderate relations between alcohol IATs and drinking-related outcomes in several studies. For example, the relation between automatic alcohol-approach associations and problem drinking behavior was shown to be considerably weaker at higher levels of trait mindfulness (Ostafin & Marlatt, 2008). Parallel findings have been shown with a mindfulness intervention (Ostafin, Bauer, & Myxter, 2012). Participants in this study completed an alcohol-approach IAT, three sessions of mindfulness training (versus a control condition), and then a follow-up session in which they reported their drinking over the previous week. The results showed that the baseline IAT predicted drinking at follow-up in the control condition, but not in the mindfulness condition. Furthermore, mindfulness has been shown to moderate the relation between an alcohol IAT and preoccupation with alcohol-related thoughts (Ostafin, Kassman, & Wessel, 2013). The results showed that the IAT predicted preoccupation with alcohol-related thoughts in participants with low but not high trait mindfulness. The study also found that trait mindfulness was related to executive control but that the moderating role of mindfulness still existed when controlling for individual differences in executive control. The latter results suggest that the role of mindfulness in decoupling impulse from behavior is not simply due to stronger inhibitory control.

Mindfulness training may help to decouple automatic affective responses from behavior in other domains. One recent study examined the influence of mindfulness on the relation between automatic race attitudes and race behavior (Ostafin & Friese, 2014). Participants in this study completed a race IAT to assess White-favoring (Black-disfavoring) attitudes, were randomly assigned to a 10-min mindfulness intervention or a control condition, and then completed a modified "cyberball" task (Williams, Cheung, & Choi, 2000). Participants were told that the ball-tossing task was web-based and that they would see the pictures of two other online players. One of the other "players" was depicted to be Black and the other to be White. Relative ball tosses to the two targets served as the dependent measure. The results showed that the IAT predicted a greater likelihood of tossing the ball to the White player in the control condition but not in the mindfulness condition. In sum, the alcohol and race behavior studies suggest that mindfulness may play a general role in freeing individuals from automatic responses.

Conclusions

Without the ability to determine relevance from irrelevance, humans could float in endless thought about behavioral options. Fortunately, past learning allows us to automatically know what to think and what to do in many situations. Unfortunately, the automaticity of our thoughts and behaviors means that they have a gravitational force that can be difficult to escape when the context requires a novel response. To illustrate, craving responses to food are essential to survival but become problematic for obese individuals trying to lose weight. Mindfulness meditation was developed to counteract habitual desire for the present to be different than it is (Rahula, 1959). The whole of the practice has been described as transforming such habitual desire that contributes to suffering to a more wholesome desire for well-being (Sucitto, 2010). Evidence for the ability of mindfulness to overcome habit is represented by the studies reviewed in this chapter showing mindfulness to influence automatic attentional and behavioral responses related to self-regulation outcome.

Although promising, the studies reviewed here represent a first step that should be furthered with research designed to examine several pressing questions. One question is whether mindfulness reduces the strength of automatic responses or reduces the relation between these responses and downstream phenomena such as overt behavior (or both). Evidence for the former includes results showing that mindfulness training reduces

automatic responses (Papies et al., 2012; Wenk-Sormaz, 2005) and attentional biases (Ostafin et al., 2014; Slagter et al., 2007). Evidence for the latter includes findings that mindfulness training weakens the relation between automatic affective responses and overt approach behavior (Ostafin et al., 2012; Ostafin & Friese, 2014), though it should be noted that neither of the latter studies assessed the influence of mindfulness training on the strength of automatic responses.

A second question concerns the mechanisms through which mindfulness influences automatic processes. Executive control is an attractive candidate given its role in moderating automatic appetitive processes in self-regulation (Barrett et al., 2004; Hofmann, Schmeichel, & Baddeley, 2012) and the increasing body of evidence showing that executive control can be strengthened by mindfulness training (Jha et al., 2007; Zeidan et al., 2010). The benefits of mindfulness may extend beyond executive control, however (Ostafin et al., 2013). A central focus in mindfulness training is to foster an accepting attitude, which may decrease the motivational imperative of impulses, create the insight that impulses do not last, or increase a decentered relation with impulses. These mechanisms can be viewed as involving a shift in frames from one in which relevance is represented as appetitive content to one in which relevance is represented as deconstructed phenomenology (qualia, wave-like dynamics, etc.). Finally, a benefit of continued nonjudgmental awareness may simply consist of the substitution of acting on an impulse with observing that impulse.

A third question regards the extent to which the effects of mindfulness can be shifted from System 2 to System 1. Initial practice will involve System 2 in that volitional control of attention is needed in order to maintain awareness on the selected object (e.g., sensations of the breath) and to apply an accepting attitude toward current experience. Continued practice should shift the effects of mindfulness to System 1, much like training automatizes cognitive and motor skills (Logan, 1988). This shift will benefit self-regulation attempts, as the executive control resources of System 2 are limited (Baumeister, Schmeichel, & Vohs, 2007). Future research would benefit by examining whether amount of practice increases the automaticity of mindfulness. For example, it would be of interest to examine whether executive control costs of mindfulness practice decrease as one develops expertise. It would also be of interest to examine whether the automatization process can be speeded up with strategies such as implementation intentions (Gollwitzer, 1999).

A final area for future research will be to examine whether the influence of mindfulness on automatic processes actually improves self-regulation outcomes. That is, are the beneficial effects of mindfulness training on dysregulated appetitive behavior (Bowen et al., 2009; Brewer et al., 2011; Kristeller, Wolever, & Sheets, 2014) and aversive emotion (Hofmann, Sawyer, Witt, & Oh, 2010) mediated by changes in automatic processes? Despite these and other questions that remain, the studies reviewed here provide evidence that mindfulness may indeed help to tame the elephantine habits of the mind.

References

Algom, D., Chajut, E., & Lev, S. (2004). A rational look at the emotional Stroop phenomenon: A generic slowdown, not a Stroop effect. *Journal of Experimental Psychology: General, 133*, 323–338.

Anderson, N. D., Lau, M. A., Segal, Z. V., & Bishop, S. R. (2007). Mindfulness-based stress reduction and attentional control. *Clinical Psychology and Psychotherapy, 14*, 449–463.

Barrett, L. F., Tugade, M. M., & Engle, R. W. (2004). Individual differences in working memory capacity and dual-process theories of the mind. *Psychological Bulletin, 130*, 553–573.

Baumeister, R. F., Schmeichel, B. J., & Vohs, K. D. (2007). Self-regulation and the executive function: The self as controlling agent. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (2nd ed., pp. 516–539). New York, NY: Guilford Press.

Bilalić, M., McLeod, P., & Gobet, F. (2008). Why good thoughts block better ones: The mechanism of the pernicious einstellung (set) effect. *Cognition, 108*, 652–661.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., . . . Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241.

Bodhi, B. (1984). *The noble eightfold path: Way to the end of suffering*. Onalaska, WA: Pariyatti Publishing.

Bodhi, B. (2011). What does mindfulness really mean? A canonical perspective. *Contemporary Buddhism, 12*, 19–39.

Bouton, M. E. (2004). Context and behavioral processes in extinction. *Learning & Memory, 11*, 485–494.

Bowen, S., Chawla, N., Collins, S. E., Witkiewitz, K., Hsu, S., Grow, J., . . . Marlatt, A. (2009). Mindfulness-based relapse prevention for substance use disorders: A pilot efficacy trial. *Substance Abuse, 30*, 295–305.

Breslin, F. C., Zack, M., & McMain, S. (2002). An information-processing analysis of mindfulness: Implications for relapse prevention in the treatment of substance abuse. *Clinical Psychology: Science and Practice, 9*, 275–299.

Brewer, J. A., Mallik, S., Babuscio, T. A., Nich, C., Johnson, H. E., Deleone, C. M., . . . Rounsaville, B. J. (2011). Mindfulness training for smoking cessation: Results from a randomized controlled trial. *Drug and Alcohol Dependence, 119*, 72–80.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*, 211–237.

Carels, R. A., Hoffman, J., Collins, A., Raber, A. C., Cacciapaglia, H., & O'Brien, W. H. (2001). Ecological momentary assessment of temptation and lapse in dieting. *Eating Behaviors, 2*, 307–321.

Carrithers, M. (1983). *Buddha: A very short introduction*. Oxford, UK: Oxford University Press.

Carver, C. S., & Scheier, M. F. (1990). Origins and functions of positive and negative affect: A control-process view. *Psychological Review, 97*, 19–35.

Colzato, L. S., Ozturk, A., & Hommel, B. (2012). Meditate to create: The impact of focused-attention and open-monitoring training on convergent and divergent thinking. *Frontiers in Psychology, 3*, 116.

Cunningham, W. A., Preacher, K. J., & Banaji, M. R. (2001). Implicit attitude measures: Consistency, stability, and convergent validity. *Psychological Science, 12*, 163–170.

Darkes, J., & Goldman, M. S. (1993). Expectancy challenge and drinking reduction: Experimental evidence for a mediational process. *Journal of Consulting and Clinical Psychology, 61*, 344–353.

De Houwer, J. (2003a). On the role of stimulus-response and stimulus-stimulus compatibility in the Stroop effect. *Memory & Cognition, 31*, 353–359.

De Houwer, J. (2003b). A structural analysis of indirect measures of attitudes. In J. Musch & K. C. Klauer (Eds.), *The psychology of evaluation: Affective processes in cognition and emotion* (pp. 219–244). Mahwah, NJ: Lawrence Erlbaum.

De Houwer, J. (2006). What are implicit measures and why are we using them? In R. W. Wiers & A. W. Stacy (Eds.), *Handbook of implicit cognition and addiction* (pp. 11–28). Thousand Oaks, CA: Sage Publications, Inc.

De Houwer, J., Crombez, G., Baeyens, F., & Hermans, D. (2001). On the generality of the affective Simon effect. *Cognition and Emotion, 15*, 189–206.

Degner, J. (2009). On the (un-)controllability of affective priming: Strategic manipulation is feasible but can possibly be prevented. *Cognition and Emotion, 23*, 327–354.

Dennett, D. (1984). Cognitive wheels: The frame problem of artificial intelligence. In C. Hookaway (Ed.), *Minds, machines and evolution* (pp. 129–151). Cambridge, UK: Cambridge University Press.

Diehl, A., Ulmer, L., Mutschler, J., Herre, H., Krumm, B., Croissant, B., . . . Kiefer, F. (2010). Why is disulfiram superior to acamprosate in the routine clinical setting? A retrospective long-term study in 353 alcohol-dependent patients. *Alcohol and Alcoholism, 45*, 271–277.

Eberl, C., Wiers, R. W., Pawelczack, S., Rinck, M., Becker, E. S., & Lindenmeyer, J. (2013). Approach bias modification in alcohol dependence: Do clinical effects replicate and for whom does it work best? *Developmental Cognitive Neuroscience, 4*, 38–51.

Engle, R. W. (2002). Working memory capacity as executive attention. *Current Directions in Psychological Science, 11*, 19–23.

Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist, 49*, 709–724.

Erickson, L. M., Tiffany, S. T., Martin, E. M., & Baker, T. B. (1983). Aversive smoking therapies: A conditioning analysis of therapeutic effectiveness. *Behaviour Research and Therapy, 21*, 595–611.

Fazio, R. H. (1990). Multiple processes by which attitudes guide behavior: The MODE model as an integrative framework. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 23, pp. 75–109). New York, NY: Academic.

Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology, 50*, 229–238.

Field, M., & Cox, W. M. (2008). Attentional bias in addictive behaviors: A review of its development, causes, and consequences. *Drug and Alcohol Dependence, 97*, 1–20.

Foster, J. H., Marshall, E. J., & Peters, T. J. (2000). Outcome after in-patient detoxification for alcohol dependence: A naturalistic comparison of 7 versus 28 days stay. *Alcohol and Alcoholism, 35*, 580–586.

Frijda, N. H. (1988). The laws of emotion. *American Psychologist, 43*, 349–358.

Gethin, R. (2011). On some definitions of mindfulness. *Contemporary Buddhism, 12*, 263–279.

Gibson, B. (2008). Can evaluative conditioning change attitudes toward mature brands? new evidence from the implicit association test. *Journal of Consumer Research, 35*, 178–188.

Gilhooly, K. J., & Murphy, P. (2005). Differentiating insight from non-insight problems. *Thinking and Reasoning, 11*, 279–302.

Goldstein, J. (1993). *Insight meditation: The practice of freedom*. Boston, MA: Shambhala.

Goldstein, J. (2002). *One dharma*. New York, NY: HarperCollins.

Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist, 54*, 493–503.

Greenberg, J., Reiner, K., & Meiran, N. (2012). "Mind the trap": Mindfulness practice reduces cognitive rigidity. *PLoS One, 7*, e36206.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74*, 1464–1480.

Grilo, C. M., Masheb, R. M., & Wilson, G. T. (2005). Efficacy of cognitive behavioral therapy and fluoxetine for the treatment of binge eating disorder: A randomized double-blind placebo-controlled comparison. *Biological Psychiatry, 57*, 301–309.

Guilford, J. P. (1950). Creativity. *American Psychologist, 5*, 444–454.

Gunaratana, B. H. (2002). *Mindfulness in plain English*. Somerville, MA: Wisdom Publications.

Hayes, S. C. (2004). Acceptance and commitment therapy, relational frame theory, and the third wave of behavioral and cognitive therapies. *Behavior Therapy, 35*, 639–665.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York, NY: Guilford Press.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169–183.

Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. *Perspectives on Psychological Science, 4*, 162–176.

Hofmann, W., Gschwendner, T., Castelli, L., & Schmitt, M. (2008). Implicit and explicit attitudes and interracial interaction: The moderating role of situationally available control resources. *Group Processes and Intergroup Relations, 11*, 69–87.

Hofmann, W., Gschwendner, T., Friese, M., Wiers, R. W., & Schmitt, M. (2008). Working memory capacity and self-regulatory behavior: Toward an individual differences perspective on behavior determination by automatic versus controlled processes. *Journal of Personality and Social Psychology, 95*, 962–977.

Hofmann, W., Schmeichel, B. J., & Baddeley, A. D. (2012). Executive functions and self-regulation. *Trends in Cognitive Sciences, 16*, 174–180.

Hollands, G. J., Prestwich, A., & Marteau, T. M. (2011). Using aversive images to enhance healthy food choices and implicit attitudes: An experimental test of evaluative conditioning. *Health Psychology, 30*, 195–203.

Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science, 6*, 537–559.

Houben, K., Wiers, R. W., & Jansen, A. (2011). Getting a grip on drinking behavior: Training working memory to reduce alcohol abuse. *Psychological Science, 22*, 968–975.

Hunt, W. A., Barnett, L. W., & Branch, L. G. (1971). Relapse rates in addiction programs. *Journal of Clinical Psychology, 27*, 455–456.

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective and Behavioral Neuroscience, 7*, 109–119.

Kabat-Zinn, J. (1994). *Wherever you go, there you are*. New York, NY: Hyperion.

Keren, G., & Schul, Y. (2009). Two is not always better than one: A critical evaluation of two-system theories. *Perspectives on Psychological Science, 4*, 533–550.

Kershaw, T. C., & Ohlsson, S. (2001). Training for insight: The case of the nine-dot problem. In J. D. Moore & K. Stenning (Eds.), *Proceedings of the twenty-third annual conference of the cognitive science society* (pp. 489–493). Mahwah, NJ: Lance Erlbaum Associates.

Klingberg, T. (2010). Training and plasticity of working memory. *Trends in Cognitive Sciences, 14*, 317–324.

Klinger, E. (1998). The search for meaning in evolutionary perspective and its clinical implications. In P. T. P. Wong & P. S. Fry (Eds.), *The human quest for meaning: A handbook of psychological research and clinical applications* (pp. 27–50). Mahwah, NJ: Erlbaum.

Knoblich, G., Ohlsson, S., Haider, H., & Rhenius, D. (1999). Constraint relaxation and chunk decomposition in insight problem solving. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 25*, 1534–1555.

Kristeller, J., Wolever, R. Q., & Sheets, V. (2014). Mindfulness-based eating awareness training (mb-eat) for binge eating: A randomized clinical trial. *Mindfulness, 5*, 282–297.

Ladouceur, R., Sylvain, C., Boutin, C., Lachance, S., Doucet, C., Leblond, J., & Jacques, C. (2001). Cognitive treatment of pathological gambling. *Journal of Nervous and Mental Disease, 189*, 774–780.

Levenson, R. W., Ekman, P., & Ricard, M. (2012). Meditation and the startle response: A case study. *Emotion, 12*, 650–658.

Logan, G. D. (1988). Toward an instance theory of automatization. *Psychological Review, 95*, 492–527.

Löw, A., Lang, P. J., Smith, J. C., & Bradley, M. M. (2008). Both predator and prey: Emotional arousal in threat and reward. *Psychological Science, 19*, 865–873.

Luchins, A. S. (1942). Mechanization in problem solving: The effect of Einstellung. *Psychological Monographs, 54*, 1–95.

Lutz, A., Slagter, H. A., Dunne, J. D., & Davidson, R. J. (2008). Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences, 12*, 163–169.

MacLeod, C., Rutherford, E., Campbell, L., Ebsworthy, G., & Holker, L. (2002). Selective attention and emotional vulnerability: Assessing the causal basis of their association through the experimental manipulation of attentional bias. *Journal of Abnormal Psychology, 111*, 107–123.

Marlatt, G. A. (1994). Addiction, mindfulness, and acceptance. In S. C. Hayes, N. S. Jacobson, V. M. Follette, & M. J. Dougher (Eds.), *Acceptance and change: Content and context in psychotherapy* (pp. 175–197). Reno, NV: Context Press.

Mennella, J. A., & Beauchamp, G. K. (1996). The human infants' response to vanilla flavors in mother's milk and formula. *Infant Behavior and Development, 19*, 13–19.

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63*, 81–97.

Mitchell, C. J., De Houwer, J., & Lovibond, P. F. (2009). The propositional nature of human associative learning. *Behavioral and Brain Sciences, 32*, 183–198.

Moore, A., & Malinowski, P. (2009). Meditation, mindfulness and cognitive flexibility. *Consciousness and Cognition, 18*, 176–186.

Most, S. B., Chun, M. M., Widders, D. M., & Zald, D. H. (2005). Attentional rubbernecking: Cognitive control and personality in emotion-induced blindness. *Psychonomic Bulletin & Review, 12*, 654–661.

Moyers, B. (Producer). (1998). *Portrait of addiction*. Retrieved from http://billmoyers.com/content/moyers-on-addiction-close-to-home/

Neely, J. H. (1977). Semantic priming and retrieval from lexical memory: Roles of inhibitionless spreading activation and limited-capacity attention. *Journal of Experimental Psychology: General, 106*, 226–254.

Nigro, G., & Neisser, U. (1983). Point of view in personal memories. *Cognitive Psychology, 15*, 467–482.

Norcross, J. C., Ratzin, A. C., & Payne, D. (1989). Ringing in the new year: The change processes and reported outcomes of resolutions. *Addictive Behaviors, 14*, 205–212.

O'Brien, C. P., Childress, A. R., Ehrman, R., & Robbins, S. J. (1998). Conditioning factors in drug use: Can they explain compulsion? *Journal of Psychopharmacology, 12*, 15–22.

Olson, M. A., & Fazio, R. H. (2001). Implicit attitude formation through classical conditioning. *Psychological Science, 12*, 413–417.

Olson, M. A., & Fazio, R. H. (2004). Trait inferences as a function of automatically activated racial attitudes and motivation to control prejudiced reactions. *Basic and Applied Social Psychology, 26*, 1–11.

Ostafin, B. D., Bauer, C., & Myxter, P. (2012). Mindfulness decouples the relation between automatic alcohol motivation and heavy drinking. *Journal of Social and Clinical Psychology, 31*, 729–745.

Ostafin, B. D., & Friese, M. (2014). *Mindfulness training moderates the relation between an implicit measure of race attitude and interracial behavior.* Manuscript in preparation.

Ostafin, B. D., & Kassman, K. T. (2012). Stepping out of history: Mindfulness improves insight problem solving. *Consciousness and Cognition, 21*, 1031–1036.

Ostafin, B. D., Kassman, K. T., & Wessel, I. (2013). Breaking the cycle of desire: Mindfulness and executive control weaken the relation between an implicit measure of alcohol valence and preoccupation with alcohol-related thoughts. *Psychology of Addictive Behaviors, 27*, 1153–1158.

Ostafin, B. D., & Marlatt, G. A. (2008). Surfing the urge: Experiential acceptance moderates the relation between automatic alcohol motivation and hazardous drinking. *Journal of Social and Clinical Psychology, 27*, 404–418.

Ostafin, B. D., Marlatt, G. A., & Greenwald, A. G. (2008). Drinking without thinking: An implicit measure of alcohol motivation predicts failure to control alcohol use. *Behaviour Research and Therapy, 46*, 1210–1219.

Ostafin, B. D., Verwoerd, J., & Wessel, I. (2014). *Untying the knot of fear: Mindfulness training weakens attentional bias toward trauma-film stimuli*. Manuscript in preparation.

Palfai, T. P., & Ostafin, B. D. (2003). Alcohol-related motivational tendencies in hazardous drinkers: Assessing implicit response tendencies using the modified-IAT. *Behaviour Research and Therapy, 41*, 1149–1162.

Papies, E. K., Barsalou, L. W., & Custers, R. (2012). Mindful attention prevents mindless impulses. *Social Psychological and Personality Science, 3*, 291–299.

Posner, M., & Snyder, C. R. R. (1975). Attention and cognitive control. In R. L. Solso (Ed.), *Information processing and cognition: The Loyola symposium* (pp. 55–85). Hillsdale, NJ: Erlbaum.

Qin, S., Hermans, E. J., van Marle, H. J. F., Luo, J., & Fernández, G. (2009). Acute psychological stress reduces working memory-related activity in the dorsolateral prefrontal cortex. *Biological Psychiatry, 66*, 25–32.

Rahula, W. (1959). *What the Buddha taught*. New York, NY: Grove.

Raio, C. M., Orederu, T. A., Palazzolo, L., Shurick, A. A., & Phelps, E. A. (2013). Cognitive emotion regulation fails the stress test. *PNAS Proceedings of the National Academy of Sciences of the United States of America, 110*, 15139–15144.

Raymond, J. E., Shapiro, K. L., & Arnell, K. M. (1992). Temporary suppression of visual processing in an RSVP task: An attentional blink? *Journal of Experimental Psychology: Human Perception and Performance, 18*, 849–860.

Reynolds, R. I. (1982). Search heuristics of chess players of different calibers. *The American Journal of Psychology, 95*, 383–392.

Rieskamp, J., & Otto, P. E. (2006). SSL: A theory of how people learn to select strategies. *Journal of Experimental Psychology: General, 135*, 207–236.

Roediger, H. L. (1990). Implicit memory: Retention without remembering. *American Psychologist, 45*, 1043–1056.

Schoenmakers, T. M., de Bruin, M., Lux, I. F. M., Goertz, A. G., Van Kerkhof, Dorieke H. A. T., & Wiers, R. W. (2010). Clinical effectiveness of attentional bias modification training in abstinent alcoholic patients. *Drug and Alcohol Dependence, 109*, 30–36.

Schoenmakers, T., Wiers, R. W., Jones, B. T., Bruce, G., & Jansen, A. T. M. (2007). Attentional re-training

decreases attentional bias in heavy drinkers without generalization. *Addiction, 102*, 399–405.
Shannon, C. E. (1950). Programming a computer for playing chess. *Philosophical Magazine, 41*, 256–275.
Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*, 373–386.
Shurick, A. A., Hamilton, J. R., Harris, L. T., Roy, A. K., Gross, J. J., & Phelps, E. A. (2012). Durable effects of cognitive restructuring on conditioned fear. *Emotion, 12*, 1393–1397.
Simon, H. A. (1972). Theories of bounded rationality. In B. McGuire & R. Radner (Eds.), *Decisions and organization* (pp. 161–176). Amsterdam: North-Holland Publishing.
Simon, H. A., & Simon, P. A. (1962). Trial and error search in solving difficult problems: Evidence from the game of chess. *Behavioral Science, 7*, 425–429.
Simons, D. J., & Chabris, C. F. (1999). Gorillas in our midst: Sustained inattentional blindness for dynamic events. *Perception, 28*, 1059–1074.
Sinha, R., Shaham, Y., & Heilig, M. (2011). Translational and reverse translational research on the role of stress in drug craving and relapse. *Psychopharmacology, 218*, 69–82.
Skinner, B. F. (1948). 'Superstition' in the pigeon. *Journal of Experimental Psychology, 38*, 168–172.
Slagter, H. A., Lutz A., Greischar, L. L., Francis, A. D., Nieuwenhuis, S., Davis, J. M., & Davidson, R. J. (2007). Mental training affects distribution of limited brain resources. *PLoS Biology, 5*, 138.
Sokolov, E. N. (1963). Higher nervous functions: The orienting reflex. *Annual Reviews of Physiology, 25*, 545–580.
Stanovich, K. E., Cunningham, A. E., & West, R. F. (1981). A longitudinal study of the development of automatic recognition skills in first graders. *Journal of Reading Behavior, 13*, 57–74.
Stanovich, K. E., & West, R. F. (2000). Individual differences in reasoning: Implications for the rationality debate? *Behavioral and Brain Sciences, 23*, 645–665.
Steffens, M. C. (2004). Is the implicit association test immune to faking? *Experimental Psychology, 51*, 165–179.
Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review, 8*, 220–247.
Strick, M., van Noorden, T. H. J., Ritskes, R. R., de Ruiter, J. R., & Dijksterhuis, A. (2012). Zen meditation and access to information in the unconscious. *Consciousness and Cognition, 21*, 1476–1481.
Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology, 18*, 643–662.
Sucitto, A. (2010). *Turning the wheel of truth: Commentary on the Buddha's first teaching*. Boston, MA: Shambhala.
Teasdale, J. D., & Chaskalson, M. (2011). How does mindfulness transform suffering? II: The transformation of dukkha. *Contemporary Buddhism, 12*, 103–124.
Teasdale, J. D., Moore, R. G., Hayhurst, H., Pope, M., Williams, S., & Segal, Z. V. (2002). Metacognitive awareness and prevention of relapse in depression: Empirical evidence. *Journal of Consulting and Clinical Psychology, 70*, 275–287.
Tolman, E. C. (1948). Cognitive maps in rats and men. *Psychological Review, 55*, 189–208.
Triesch, J., Ballard, D. H., Hayhoe, M. M., & Sullivan, B. T. (2003). What you see is what you need. *Journal of Vision, 3*, 86–94.
Vago, D. R., & Silbersweig, D. A. (2012). Self-awareness, self-regulation, and self-transcendence (S-ART): A framework for understanding the neurobiological mechanisms of mindfulness. *Frontiers in Human Neuroscience, 6*, 296.
Van Gucht, D., Vansteenwegen, D., Van, D. B., & Beckers, T. (2008). Conditioned craving cues elicit an automatic approach tendency. *Behaviour Research and Therapy, 46*, 1160–1169.
Vervaeke, J. (2011, March). Can foolishness lead to mental illness? *Mind matters: Towards a new understanding of psychopathology.* Lecture conducted from the University of Toronto, Toronto, Canada. Retrieved from http://www.youtube.com/watch?v=EE5xNA3yHYc&list=PLFDA9061A3FAC3E7D&index=1
Wild elephants raid fields in southern Vietnam (2013). *Thanh Nien news*. Retrieved from http://www.thanhnienews.com/2010/pages/20130215-wild-elephants-damage-crops-in-southern-vietnam-during-tet.aspx
von Uexküll, J. (1957). A stroll through the worlds of animals and men. In C. H. Schiller (Ed.), *Instinctive behavior: The development of a modern concept* (pp. 5–80). New York, NY: International Universities Press.
Walsh, M., & Greaney, J. (2014). *Insight problem solving is improved by mindfulness but not by relaxation*. Manuscript submitted for publication.
Watson, J. B., & Rayner, R. (1920). Conditioned emotional reactions. *Journal of Experimental Psychology, 3*, 1–14.
Wenk-Sormaz, H. (2005). Meditation can reduce habitual responding. *Advances in Mind-Body Medicine, 21*, 33–49.
Wiers, R. W., Eberl, C., Rinck, M., Becker, E. S., & Lindenmeyer, J. (2011). Retraining automatic action tendencies changes alcoholic patients' approach bias for alcohol and improves treatment outcome. *Psychological Science, 22*, 490–497.
Williams, K. D., Cheung, C. K. T., & Choi, W. (2000). Cyberostracism: Effects of being ignored over the internet. *Journal of Personality and Social Psychology, 79*, 748–762.
Wood, W., & Neal, D. T. (2007). A new look at habits and the habit-goal interface. *Psychological Review, 114*, 843–863.
Wood, W., Quinn, J. M., & Kashy, D. A. (2002). Habits in everyday life: Thought, emotion, and action. *Journal of Personality and Social Psychology, 83*, 1281–1297.
Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z., & Goolkasian, P. (2010). Mindfulness meditation improves cognition: Evidence of brief mental training. *Consciousness and Cognition, 19*, 597–605.

Section 2

Personality and Social Psychology Perspectives

Burning Issues in Dispositional Mindfulness Research

6

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The deliberate exercise of mindful attention has been practiced for 2,500 years as a way to contact with, and gain insight into, ongoing events and experiences. In comparison, the application of modern scientific methods to the study of mindfulness is recent, but to date this work has revealed manifold benefits of mindfulness training and practice. In the last 10 years, the development and increasingly widespread use of psychometric instruments to assess individual differences in mindfulness have resulted in numerous benefits to our empirical understanding of the construct. Likewise, emerging descriptions and operationalization of mindfulness have contributed to understanding the construct, revealing how mindfulness itself—apart from the training programs designed to enhance it—is related to numerous adaptive outcomes at neurobiological, psychological, and behavioral levels, and for a variety of normative and clinical populations. Despite this progress, the use of psychometric instruments to measure mindfulness has sparked a number of contentious issues regarding our understanding of the construct, its measurement, and its development. In this chapter, we consider theory and review empirical research to address four burning issues sparked by the recent interest in dispositional mindfulness:

1. How is mindfulness best defined and measured?
2. Are dispositional mindfulness measures dissociable from other measures of attention?
3. Are measures of dispositional mindfulness valid predictors of theoretically important regulatory outcomes?
4. How does mindfulness develop?

How Is Mindfulness Best Defined and Measured?

Proposed definitions of mindfulness in the scientific literature span a wide range, sharing both commonalities and marked differences. Most writers and researchers trace their use of the term mindfulness to Buddhist psychology. Thus, establishing consensus on a definition of mindfulness and its lived expression may begin with a study of Buddhist scholarship. Such scholarship is built on a deep familiarity with Buddhist source

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texts, and the navigation of difficulties stemming from translational and cultural differences that have accrued over centuries. An inspection of this literature reveals a range of interpretations of the meaning of mindfulness. Scholar Georges Dreyfus (2011) notes that "Buddhism is a plural tradition that has evolved over centuries to include a large variety of views about mindfulness" (p. 42). Thus it is important to emphasize that there is no single, authorative definition of mindfulness (Anālayo, 2013).

Limitations of space and expertise will not permit a discussion of the various understandings of mindfulness. For the present purposes we simply offer a brief look at two approaches to understanding mindfulness—the classical or canonical accounts, and the science-based accounts, as both have informed mindfulness operationalizations for research purposes. Scholarly accounts of classical mindfulness are based on the Pali Canon, the oldest surviving, complete collection of Buddhist texts. These texts offer rich descriptions of mindfulness that have informed subsequent interpretations and are still widely used today.

Even within this approach are layered meanings of mindfulness, and here we note just a few concise, contemporary descriptions of basic mindfulness from well-regarded scholars:

- "…an alert but receptive equanimous observation." (Anālayo, 2003, p. 60)
- "…watchfulness, the lucid awareness of each event that presents itself on the successive occasions of experience." (Bodhi, 2011, p. 21)
- "The mind's ability to keep the object in the ken [focus] of attention without losing it." (Dreyfus, 2011, p. 47)
- "A kind of lucid holding of attention on an object, where the mind is both aware of the object and, in some sense, aware that it is aware of the object." (Gethin, 2015, p. 29)

These descriptions highlight a sustained attentiveness to, or awareness of perceptual events as they appear. The reference to attention in some texts and awareness in others may stem from the fact that outside of cognitive science, the terms are sometimes used interchangeably (e.g., Merikle & Joordens, 1997). Some scholars have used both to describe mindfulness (e.g., Bodhi, 2006, 2011), and in fact, both terms may be applicable, for two reasons. First, there is a close interrelation between attention and awareness in daily life (e.g., Lamme, 2003); second, and more specifically, an integration of attention and meta-awareness helps to distinguish mindfulness from related states. For example, attention may be concentrated, but only when coupled with meta-awareness—an apprehension of the current state of the mind that serves to monitor that focused attentiveness—does it become mindful (Dreyfus, 2011).

Quality of attention and/or awareness is also central to contemporary scientific definitions of mindfulness, as the well-known definition by Kabat-Zinn (1994, p. 4) illustrates: "Paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally."

The role of non-judgment or acceptance in mindfulness represents a major point of difference between classical and some scientific conceptions of mindfulness. Classical mindfulness, as interpreted by Bodhi (e.g., 2011) and others, gives judgment or evaluation a key place in the practice of mindfulness. Evaluation here concerns discrimination, a reflective consideration of what is healthy and unhealthy, wise or unwise action, that comes with the conjoining of sustained attentiveness and comprehension. Bodhi (2011, p. 26) makes the role of evaluation clear: "…the practitioner of mindfulness must at times evaluate mental qualities and intended deeds, make judgments about them, and engage in purposeful action." In this way, classical mindfulness is value-laden, bringing to bear capacities of attention and discerning thought to regulate mental states and behavior. It is in the place of thought, and evaluative thought in particular, that represents one major difference between classical and a number of science-based, and particularly clinical conceptualizations of mindfulness.

Distinctions between classical Buddhist and science-based conceptions of mindfulness also provide a helpful lens to better understand differences between the various operationalizations of mindfulness. Like both major approaches to conceptualizing mindfulness discussed here, the various self-report scale operationalizations of mindfulness highlight quality of attention, either as the central feature (e.g., Mindful Attention Awareness Scale; MAAS; Brown & Ryan, 2003), or among a set of factors (e.g., Five Facet Mindfulness Questionnaire; FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). Beyond the attention factor, however, the various scales differ widely in their inclusion of other factors (e.g., describing, nonjudgment). The presence of these other factors has been strongly influenced by clinical perspectives on mindfulness. For example, the FFMQ and its ancestor, the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004) have their conceptual origin in Dialectical Behavior Therapy (Linehan, 1993). The Philadelphia Mindfulness Scale (Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008) has its conceptual origins in Kabat-Zinn's (1994) definition. Quaglia, Brown, Lindsay, Creswell, and Goodman (2015) discuss the conceptual origins of the extant mindfulness scales in further detail.

Going forward, it is important that researchers clearly state the conceptual provenance of each mindfulness measure used in research. This will help to convey the particular understanding of mindfulness that is being examined and how that operationalized perspective on mindfulness is associated with the outcomes assessed. Addressing issues concerning the definition and operationalization of mindfulness will also benefit from scholarship and research to isolate the specific cognitive and other psychological processes involved in mindfulness (e.g., Davis & Thompson, 2015). In this and other ways there is considerable opportunity for interchange between Buddhist scholarship and Western science in seeking shared, empirically grounded understandings of mindfulness.

Are Dispositional Mindfulness Measures Dissociable from Other Measures of Attention?

If mindfulness is fundamentally a construct concerning attention, then it is important to show both its convergence with, and divergence from related attentional constructs. Among the most frequently studied constructs is attentional control, understood as the capacity to voluntarily select and focus on a specific object to the exclusion of others; this has been associated with several adaptive outcomes, such as lower attentional bias to threatening information (Derryberry & Reed, 2002). Attentional control and mindfulness appear to have several adaptive outcomes in common. For example, both capacities involve an increased stability and continuity of attention toward a focal object, and both may be enhanced by training. Evidence supports a relation between them; two measures of mindfulness, the MAAS and the FFMQ Act with Awareness subscale moderately correlated with self-reported attentional control in a recent study (Brown, Goodman, & Inzlicht, 2013). Relatedly, Mrazek, Smallwood, and Schooler (2012) found modest negative correlations between the MAAS and four convergent measures of mind-wandering, a construct antithetical to attentional control. There is also evidence that mindfulness training improves attentional control (e.g., Chiesa, Calati, & Serretti, 2011). For example, Mrazek et al. (2012) found behavioral indicators of reduced mind-wandering following 8 min of mindfulness practice among novices, which converges with outcomes from studies of lengthier mindfulness training (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010).

Despite such expectable relations, there is substantial theoretical divergence between mindfulness and attentional control. In particular, mindfulness is distinct in its interrelatedness with meta-awareness and its receptive quality to ongoing phenomena. The term meta-awareness has multiple meanings, the simplest being knowledge of the state of the mind at a given moment,

including the quality of one's attention (Brown & Cordon, 2009). The integration of attention and meta-awareness also helps to distinguish mindfulness from concentration, which deeply informs the attentional control construct (Derryberry & Reed, 2002). Thus, attention may be concentrated, but without meta-awareness to help preserve the continuity of focused attentiveness, it is lacking in mindfulness (see Brown & Cordon, 2009; Dreyfus, 2011 for further discussion). Mindfulness also involves a capacity to broaden the field of attention, or to "set up" awareness of an ever-widening domain of internal and external experiences. This involves the capacity to flexibly alter the breadth of attention, from a penetrative focus to a broad panoramic view of experience (Bodhi, 2004). Thus, mindfulness represents an attention capacity characterized by flexibility and breadth—qualities distinct from the concentrated nature of attentional control.

From this brief theoretical overview, it follows that measures of mindfulness should be associated with attentional control—as initial evidence reviewed earlier showed—but also predict theoretically relevant outcomes over and above attentional control. Emerging evidence supports this incremental validity (Brown et al., 2013; Quaglia, Goodman, & Brown, 2015). For example, Brown et al. (2013) found both the MAAS and FFMQ Act with Awareness measures to predict reduced amplitudes of the late positive potential (LPP)—an electrocortical indicator of emotional reactivity—in response to unpleasant, high arousal images after controlling for attentional control (which was not related to LPP amplitudes in this study). Additionally, the MAAS and other measures of dispositional mindfulness have been related to specific mental health, physical health, interpersonal, and behavioral outcomes for which research on attentional control has had little to say.

Taking together this theory and evidence, there is currently little basis to conclude that trait mindfulness measures like the MAAS are merely capturing "experienced lapses of attention" (Grossman, 2011, p. 1038), a contention of mindfulness scales grounded in the problematic notion of face validity, the superficial appearance, or face value of scale items as reflections of a construct. Because it relies on subjective judgment, face validity is typically not a scientific criterion for judging the value of a measure (e.g., Gravetter & Forzano, 2009; Walsh & Betz, 2001). However, we believe that self-report measures of the mindfulness should be the subject of rigorous empirical scrutiny. Studies using self-report measures of mindfulness should incorporate measures of attention to assess their convergent, discriminant, and incremental validity. In addition to concerns with validity, such research will enhance our understanding of how mindfulness fits into the nomological network of other, established indexes of attention (e.g., Posner & Rothbart, 2007).

Are Measures of Dispositional Mindfulness Valid Predictors of Regulatory Outcomes?

Mindfulness is studied scientifically in three primary ways: As an outcome of formal mindfulness training (e.g., cumulative hours of practice), as a state evoked by brief exercises among mindfulness-naïve populations, and as a disposition via psychometric instruments. Despite common interests, researchers must guard against the assumption that these distinct modes of inquiry are capturing the same phenomenon (Davidson, 2010), or that they are predicated on the same foundational assumptions about mindfulness. Examination of the similarities and differences among the findings from these different measurements of mindfulness will help address many of the validity concerns regarding the use of self-report mindfulness measures. If the three methods show convergent results, this would lend credence to the claim that they are examining the same phenomenon, or at minimum, a closely related family of phenomena. In this section, we review evidence demonstrating empirical convergence between these three operationalizations—psychometric, induction, and intervention—particularly focusing on a widely researched outcome of interest, emotion regulation.

Eight self-report measures of trait mindfulness for adult respondents have been published. Three of these measures—the FFMQ (Baer et al., 2006), its ancestor the KIMS (Baer et al., 2004), and the MAAS (Brown & Ryan, 2003)—have been used most widely. Despite differences in their conceptual foundations and intended uses, the FFMQ/KIMS and the MAAS have shown correlations with theoretically meaningful indicators of well-being and psychopathology (for a review see Brown, Ryan, & Creswell, 2007). In fact, a major area of convergence in findings between self-report measures of mindfulness and mindfulness-based and mindfulness-integrated interventions is in mental health outcomes. The MAAS and FFMQ, for example, have been correlated with lower anxiety, depression, mood disturbance, perceived stress and other mental health indicators. Mindfulness-based interventions, including Mindfulness-based Stress Reduction (MBSR; Kabat-Zinn, 1990) and Mindfulness-based Cognitive Therapy (MBCT; Segal, Teasdale, & Williams, 2004), have been shown to beneficially impact the same and similar indicators (see Baer, 2003; Grossman, Niemann, Schmidt, & Walach, 2004; Hofmann, Sawyer, Witt, & Oh, 2010 for reviews).

Physiological Concomitants of Emotion Regulation

Given research showing that mindfulness and its enhancement are related to mental health, research has recently sought to examine whether this quality of attention, and training to enhance it, can improve emotion regulation, a key underpinning for mental health, behavior regulation, social relationships, and other domains of adaptive functioning (Gross, 1998). According to Gross (1998), "Emotion regulation refers to the processes by which individuals influence the emotions they have, when they have them, and how they are experienced and expressed" (p. 275). While still nascent, evidence from research on dispositional mindfulness, mindfulness inductions, and mindfulness interventions has shown convergence across neural, neuroendocrine, and other physiological levels of analysis.

Neural Markers of Affective Style

Several correlational and experimental studies have examined whether mindfulness promotes positive affective style. Affective style refers to individual differences in emotional reactivity and regulation in response to emotional provocation (Davidson, 1998). The most widely used measure of affective style is hemispheric brain asymmetry in electrical activity in the prefrontal cortex. Captured using electroencephalography (EEG), prefrontal asymmetry reflects the magnitude of hemispheric differences in the frequency of alpha-band activity, where greater relative left-sided alpha activity has proven a reliable indicator of generally positive affective style (but see Harmon-Jones & Harmon-Jones, 2011), and associated with approach motivation, higher subjective and eudaimonic well-being (Urry et al., 2004), and adaptive responses to stressors (Davidson, 2000). Conversely, greater relative right-sided alpha activity has been associated with avoidance motivation, withdraw-oriented dispositions, and the experience of some negative emotions (Davidson, Ekman, Saron, Senulis, & Friesen, 1990).

Recent research from our lab revealed that higher levels of MAAS-assessed dispositional mindfulness were associated with greater relative left-sided alpha activity in prefrontal regions (Goodman, Brown, & Haver, 2012). In contrast, measures of depression and emotion dysregulation were associated with more right-predominant alpha asymmetry. Mindfulness training has shown similar results. Davidson et al. (2003) found that, compared to wait-list controls, participants in an 8-week MBSR program showed significant shifts from baseline levels toward greater relative left-sided cortical activation at the end of the program, and at 4 months after training. This shift toward a more positive affective style was associated with improvements in immune functioning, as measured by antibody response to flu virus inoculation. Similar shifts toward left-sided asymmetry have been found among participants with substantially less meditation practice. Students who practiced mindfulness of breathing for an average of 6–13 min a day over the course of a 5-week training program

exhibited significant shifts toward left-sided activation compared to controls (Moyer et al., 2011). Even a brief mindfulness induction, operationalized as a 15-min guided breath meditation, produced significant shifts toward left-sided asymmetry among depression sufferers (Barnhofer, Chittka, Nightingale, Visser, & Crane, 2010). In sum, dispositional mindfulness, induced mindfulness, and mindfulness training have each predicted prefrontal alpha asymmetry in a manner indicative of positive affective style.

Neural Markers of Emotional Reactivity

Another recent area of inquiry on mindfulness and emotion regulation has used neuroimaging to identify changes in brain structure and activation patterns tied to dampened emotional reactivity. In particular, this research has examined brain activation in regions associated with emotion-relevant threat detection, particularly the bilateral amygdalae and areas of the prefrontal cortices. For example, patients with social anxiety disorder showed reduced amygdala activity following an 8-week MBSR intervention (Goldin & Gross, 2010). In a healthy stressed sample Hölzel et al. (2010) found significant within-subject reductions in perceived stress following an MBSR program, and the degree of change in perceived stress was significantly correlated with decreases in gray matter density in the right amygdala. MBSR participants have also demonstrated less neural reactivity to a sadness provocation compared to controls (Farb et al., 2010), and reduced activity in the right amygdala during an induced state of mindfulness (Farb et al., 2007).

Studies examining the functional neural correlates of dispositional mindfulness are fewer, but consistent with results from mindfulness training. The Observe subscale of the KIMS has been correlated with lower amygdala activity (Frewen et al., 2010), and MAAS scores have been associated with less amygdala activation at rest (Way, Creswell, Eisenberger, & Lieberman, 2010) and during socioemotional threat (Creswell, Way, Eisenberger, & Lieberman, 2007). Recently Taren, Creswell, and Gianaros (2013) found that MAAS scores were associated with smaller gray matter amygdala volume, and Taren et al. (2013) found these scores to correlate with reduced amygdala-ACC resting state functional connectivity, a potential mechanism for stress resilience. Both studies provide evidence for a neurobiological pathway to explain how mindfulness may regulate emotional responses.

Neuroimaging research has also identified mindfulness-related activation differences in prefrontal cortical regions involved in emotion regulation, such as the dorsomedial prefrontal cortex (DMPFC), and the orbitofrontal cortex (OFC), which have been associated with emotional reappraisal (Davidson, 2000; Ochsner & Gross, 2005) and the top-down inhibition of amygdala activity (Quirk & Beer, 2006). Among meditators with 1100–17000 h of practice, cumulative hours of meditation significantly predicted gray matter thickness of the OFC (Hölzel et al., 2008), and increases in OFC activation have been found in people after as little as 4 days of mindfulness training (Zeidan et al., 2011). Evidence has also shown increases in DMPFC activations following MBSR (Farb et al., 2010).

Similar patterns of activation have been predicted using scales sensitive to individual differences in mindfulness. The Observe and Act with Awareness subscales of the KIMS have predicted increases in DMPFC activity (Frewen et al., 2010), and total KIMS scores have predicted increases in DMPFC activation, which in turn were associated with reduced amygdala activation during the reappraisal of negative stimuli (Modinos, Ormel, & Aleman, 2010). Additionally, the MAAS has been significantly related to increases in OFC activity during states of rest (Way et al., 2010) and increases in right and life ventrolateral prefrontal cortex (VLPFC), ventromedial prefrontal cortex (VMPFC), MPFC, and right dorsolateral prefrontal cortex (DLPFC) during socioemotional threat (Creswell et al., 2007). Creswell et al. (2007) also found strong negative associations between a number of these PFC regions and the amygdala among higher MAAS scorers, suggesting a more efficient PFC down-regulation of amygdala responses. Thus, measures of dispositional mindfulness have predicted similar patterns of neural activation in the prefrontal cortex as those attributed to formal mindfulness training.

Neuroendocrine Markers of Stress

These activation patterns in the PFC and amygdala have been associated with reduced secretions of salivary cortisol (Urry et al., 2006), a neuroendocrine marker of stress responses that can compromise healthy immune and other biological functioning when chronically activated. Emerging research (Brown, Weinstein, & Creswell, 2012) has shown that dispositional mindfulness modulates cortisol and affective responses during the Trier Social Stress Task (TSST), a reliable induction of social evaluative threat (Dickerson & Kemeny, 2004). Similar reductions in cortisol after acute stress have been discovered following only 5 days of mindfulness-integrated training (Tang et al., 2007). Paralleling these findings, women diagnosed with breast cancer who completed an MBSR program showed lower cortisol levels under social evaluative threat compared to controls (Witek-Janusek et al., 2008). Salivary cortisol levels and autonomic stress responses have been shown to decrease from 6 to 14 months post-MBSR (Carlson, Speca, Faris, & Patel, 2007). Cardiovascular responses are also subject to stress, and reductions in autonomic (cardiovascular) stress reactivity during the TSST were found to correlate with the frequency of meditation practice among participants in a mindfulness-integrated training program (Kemeny et al., 2012). These results have been corroborated in an investigation of the role of dispositional mindfulness on TSST-related heart rate variability responses (Holt, 2012).

Interestingly, recent electrocortical research on dispositional mindfulness suggests that the modulating role of this quality of attention on emotional reactivity may begin very soon after stimulus contact. As noted earlier, Brown et al. (2013) found that MAAS and FFMQ Act with Awareness scores predicted reduced event-related potential amplitudes following the display of highly arousing unpleasant images, specifically in the late positive potential—an electrocortical marker of emotional arousal beginning 400–500 ms after stimulus onset. These findings suggest that dispositional mindfulness plays an emotion regulatory role during an early phase of emotion processing, potentially lessening or even circumventing the need for reappraisal, response modulation, and other, "downstream" emotion regulatory efforts. Yet experimental research with induced and trained mindfulness is needed to show whether this early modulation of reactivity to emotionally provocative stimuli can be attributed to mindfulness itself, rather than factors that may be associated with it.

Dispositional Mindfulness as a Moderator of Mindfulness Training Effects

The convergent findings discussed here do not definitively demonstrate that research on dispositional, induced, and trained mindfulness are investigating the same phenomenon. Yet a final body of evidence we briefly review adds further weight to this proposition. Specifically, evidence has shown that changes in dispositional mindfulness are sensitive to participation in mindfulness interventions. For example, within-subject differences in Freiburg Mindfulness Inventory dispositional mindfulness (Walach, Buchheld, Buttenmuller, Kleinknecht, & Schmidt, 2006) were found among subjects following a brief 4-day mindfulness training intervention (Zeidan et al., 2011). Significant increases in trait mindfulness were also observed on several FFMQ subscales (Act with Awareness, Observe, and Non-Judging) among participants in an MBSR intervention (Hölzel et al., 2011). Further, FFMQ mindfulness was found to mediate the relation between formal mindfulness practice and measures of symptom reduction and well-being (Carmody & Baer, 2008), suggesting that the increases in dispositional mindfulness resulting from mindfulness practice were at least partially responsible for the adaptive outcomes. Similar results have been found with the MAAS. MBSR interventions have resulted in within- and between-subject improvements in MAAS-assessed mindfulness in several recent studies (e.g., Jensen, Vangkilde, Frokjaer, & Hasselbalch, 2012; Kilpatrick et al., 2011).

Finally, in a study of chronically depressed individuals, Michalak, Heidenreich, Meibert, and Schulte (2008) found that higher MAAS scores at post-MBCT significantly predicted lower risk of depressive relapse/recurrence up to a year following treatment.

It has been argued (Grossman, 2011) that the evidence for pre–post treatment mindfulness score changes only suggests that trainees are likely to endorse more mindfulness scale items at the end of training than at baseline. However Brown, Ryan, Loverich, Biegel, and West (2011) responded that in the common practice of pre–post training assessment, participants are not likely to know what each scale they complete actually measures, being administered as part of a battery of similar scales. Further, some scales, such as the MAAS, have not shown evidence of social desirability or other response bias (Brown & Ryan, 2003). Shapiro, Brown, Thoresen, and Plante (2011) also showed that dispositional (MAAS) improvements were maintained up to a year after MBSR training, when any enthusiastic flush from the training had likely dissipated. Brown et al. (2011) also note that scores on self-report scales can change in an unexpected direction after mindfulness training, as Brown, Kasser, Ryan, Alex Linley, and Orzech (2009) found with the FMI. Finally, that fact that changes in scaled mindfulness have tracked changes in mental health outcomes over time in expected directions (e.g., Brown & Ryan, 2003; Shapiro et al., 2011) suggests that the increases in dispositional mindfulness associated with mindfulness training are not only veridical, but also helpful in gauging whether training programs produce the key outcome they are designed for—namely, cross-situationally stable mindfulness.

In sum, research to date supports the criterion validity of several psychometric measures of trait mindfulness. It reveals that there are meaningful differences in mindfulness between untrained and trained populations, and that variance in the disposition predicts subjective and neurophysiological indicators of adaptive emotional functioning in ways consistent with experimental realizations of mindfulness. Perhaps most importantly, dispositional mindfulness appears to predict adaptive emotional and biological functioning in ways consistent with current theory about mindfulness, mindfulness training, and their effects.

How Does Mindfulness Develop?

Self-report measures of mindfulness have been commonly used in research involving participants who have little or no formal training in mindfulness. The application of self-report measures among untrained populations raises three questions concerning the development of mindfulness: (1) Are measures of trait mindfulness actually assessing mindful capacities if, as Grossman (2011) has argued, mindfulness is dependent on formal training for its cultivation? (2) If, as Kabat-Zinn (2003) and others have argued, mindfulness is an inherent capacity of the mind, why are some people more mindful than others, as reflected in mindfulness scale score variance? And (3) How can research on the development of mindfulness be used to inform our understanding of its enhancement?

Are Measures of Trait Mindfulness Assessing Mindful Capacities?

Jon Kabat-Zinn (2003), the founder of the MBSR program writes that, "mindfulness… being about attention, is also of necessity universal. There is nothing particularly Buddhist about it. We are all mindful to one degree or another, moment by moment. It is an inherent human capacity" (p. 146). Consistent with this understanding, Brown and Ryan (2003) write, "Recognizing that most everyone has the capacity to attend and to be aware, we nonetheless assume…that individuals differ in their propensity or willingness to be aware and to sustain attention to what is occurring in the present" (p. 822). These views stand in contrast to the argument that mindfulness is only the result of practice, a state that cannot be easily evoked among novices, and "requires gradual refinement by means of systematic practice…and is markedly different from everyday modes of awareness" (Grossman, 2011, p. 1035). In this

view, only those who have engaged in specific, formal mental training exhibit mindfulness.

In parallel with this disagreement within the scientific community, there are also differing views among scholars on whether qualities such as mindfulness are inherent to the human mind (e.g., Olendzki, 2011). Dunne (2011) suggests these views fall along a spectrum from Innatist to Constructivist. The former view holds that, because qualities such as mindfulness are innate or inherent to the person, progress is marked by removing factors that obscure them. Conversely, Constructivists tend to emphasize the acquisition and construction of these qualities.

Is mindfulness a rarified state open only to those undergoing training? Whether mindfulness is accessible to regular people and "beginners," or can only be experienced by those trained in it is a point of debate that will not be resolved here. But evidence that this capacity can be enhanced through training is clearly consistent with viewing mindfulness as a natural capacity. As Brown et al. (2011) note, when it comes to mindfulness, we all start somewhere. As discussed earlier, several measures of dispositional mindfulness predict theoretically meaningful outcomes consistent with mindfulness theory and practice, even among untrained respondents (see Brown et al., 2011 for further discussion).

Why Are Some People More Mindful Than Others?

Most scholars and mindfulness researchers agree that formal mindfulness practice is the "royal road" to stabilize higher mindfulness. Research supports the claim that such practice is indeed related to higher mindfulness. For example, Brown and Ryan (2003) found that Zen meditators reported significantly higher mindfulness than age-, gender- and geographic location-matched non-meditators. In a randomized controlled trial, Shapiro et al. (2011) found that MBSR participants had higher levels of mindfulness than cohort controls, measured immediately after the intervention and at 2 and 12 months following the intervention. Similarly, Jensen et al. (2012) found greater increases in dispositional mindfulness among MBSR participants compared to controls.

Yet factors outside the context of formal mindfulness training may also foster the development of mindfulness (Brown & Ryan, 2004). To date, little research has sought to identify the physiological, psychological, and socioenvironmental factors that may impact levels of dispositional mindfulness. But incipient research suggests that dispositional mindfulness may vary according to a number of factors, from genetics to caregiver-child attachment style to classroom educational supports. For example, Murakami, Matsunaga, and Ohira (2009) recently discovered that differences in a serotonin transporter gene polymorphism (5HTTLPR) modulated the effects of a brief mindfulness induction on parasympathetic nervous system activity under conditions of emotional provocation, suggesting that genetics may contribute to the capacity to enter into a mindfully attentive state.

While many kinds of learning and skill development are considered domain-specific, in that training in one domain does not influence performance in other domains, it has been theorized that training in attention may generalize to a variety of functional domains (Posner & Rothbart, 2007). Consistent with this view, differences in cognitive processing resulting from formal meditation training have been shown to generalize to performance on a variety of tasks, presumably because they target core processes such as attention (Jha, Krompinger, & Baime, 2007; Slagter, Davidson, & Lutz, 2011) and working memory (Jha et al., 2010). Given the ubiquity of these core processes across a wide variety of tasks suggests that fundamental mindful capacities may be trained during activities that necessitate the deployment of attention.

Social developmental factors such as caregiver–child attachment style may also relate to the development of mindfulness (Ryan, Brown, & Creswell, 2007; Shaver, Lavy, Saron, & Mikulincer, 2007). Shaver et al. (2007) pointed out that mindfulness and attachment security are associated with similar positive outcomes, and those authors found that insecure attachment

styles were related to lower dispositional mindfulness. While preliminary, this research suggests that supports for the development of secure attachment may sharpen mindful capacities. Social Emotional Learning (SEL), typically promoted in school-based interventions, may be functionally related to mindfulness. Among its five central competencies are self-awareness, self-management, and social awareness (Collaborative for Academic, Social, and Emotional Learning, 2005). A recent meta-analysis of 213 SEL studies found greater social and emotional skills, as well as improved academic performance in participants versus controls (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Social modeling may also enhance mindfulness through exposure to the attentiveness of others (Ryan et al., 2007). For example, an adaptation of MBCT for use with children (Semple, Lee, Rosa, & Miller, 2009) incorporates parent training to model mindful intentions and behavior at home. Children randomized to this adaptation of MBCT exhibited fewer attention problems than wait-listed controls, and these changes were still present 3 months later. Along the same line, Goodman, Trapp, and Davis (2015) found that perceived support for autonomy and competence in classroom contexts facilitated mindfulness among students before their final examination, which then predicted better exam performance.

While investigating developmental and contextual factors that may enhance natural capacities for mindfulness is important, it is also valuable to explore factors that could inhibit its development. For example, dissociation and emotional numbing, experiences common to post-traumatic stress disorder, have been considered antithetical to mindfulness (Follette, Palm, & Pearson, 2006). A history of psychological symptoms, such as anxiety, depression, and perceived stress may be due to underlying factors, including attention biases, that also impede the natural development of mindfulness (Harvey, Watkins, Mansell, & Shafran, 2004). This may help to explain why clinical interventions incorporating mindfulness have shown as good or better outcomes in some populations than treatments that do not incorporate mindfulness (e.g., Piet & Hougaard, 2011; Segal et al., 2010). Many forms of psychotherapy encourage an open, receptive attention to even challenging aspects of personal experience (Brown & Ryan, 2004; Martin, 1997), but interventions specifically incorporating mindfulness may also target patterns of attention that are biased against aversive internal experiences. This correction could ultimately lead to increased mindfulness.

Widely regarded as one of the most important Buddhist documents on mindfulness practice, the Satipaṭṭhāna Sutta is clear that mindful presence can be applied in the most ordinary of day-to-day tasks (Nanamoli & Bodhi, 1995). We suggest that while formal mindfulness training is the most clearly marked path to develop mindfulness, other causes and conditions may also be at play. Dispositionally mindful individuals may experience several factors that promote the development of this quality. Research is needed to discover these factors.

What Is the Relation Between Informally and Formally Developed Mindfulness?

There may also be a beneficial synergy between informally developed mindfulness and formal mindfulness training. Shapiro et al. (2011) found that dispositional mindfulness moderated the relation between MBSR and its numerous beneficial outcomes in a sample of undergraduate students. Those reporting higher dispositional mindfulness before the MBSR program benefited more from the intervention, evident in larger increases in mindfulness, higher subjective well-being, empathy, and hope, and larger decreases in stress. Revisiting the distinction between the Innatist versus Constructivist views on mindfulness, the present discussion suggests a third possibility, namely that informally developed mindfulness may support the effectiveness of systematic training. Thus, dispositional mindfulness could be likened to a raw material, like a gemstone, whose inherent qualities are enhanced through careful efforts.

Conclusion

Research on dispositional mindfulness has sparked a variety of contentious issues concerning the definition, operationalization, validity, and development of mindfulness. Here, we have attempted to show how several individual difference measures of mindfulness have contributed to the development of theory and to a growing body of empirical findings on mindfulness. To better understand the nature and expression of trait mindfulness, research would do well to examine attentional covariates of mindfulness in addition to the relations between mindfulness and neurally mediated systems of attention (Posner & Petersen, 1990). Longitudinal studies examining biological and contextual factors that influence the development of dispositional mindfulness may foster greater understanding of how to foster this quality and improve mindfulness training programs. These and other investigations may not only help to address outstanding questions, but also create opportunities for researchers to expand and better integrate our knowledge of mindfulness, and thereby promote a more rigorous science on the topic.

References

Anālayo, B. (2003). *Satipaṭṭhāna: The direct path to realization*. Cambridge, UK: Windhorse.

Anālayo, B. (2013). *Mindfulness in early Buddhism*. Unpublished manuscript, University of Hamburg.

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*, 125–143.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45.

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report: The Kentucky Inventory of Mindfulness Skills. *Assessment, 11*(3), 191–206.

Barnhofer, T., Chittka, T., Nightingale, H., Visser, C., & Crane, C. (2010). State effects of two forms of meditation on prefrontal EEG asymmetry in previously depressed individuals. *Mindfulness, 1*, 21–27.

Bodhi, B. (2004). *A systematic study of the Majjhima Nikaya: The Satipatthana Sutta [audio files]*. Retrieved from http://www.bodhimonastery.org/a-systematic-study-of-the-majjhima-nikaya.html.

Bodhi, B. (2006). *The nature of mindfulness and its role in Buddhist meditation: A correspondence between B. Alan Wallace and the Venerable Bhikkhu Bodhi*. Unpublished manuscript, Santa Barbara Institute for Consciousness Studies, Santa Barbara, CA.

Bodhi, B. (2011). What does mindfulness really mean? A canonical perspective. *Contemporary Buddhism, 12*, 19–39.

Brown, K. W., & Cordon, S. L. (2009). Toward a phenomenology of mindfulness: Subjective experience and emotional correlates. In F. Didonna (Ed.), *Clinical handbook of mindfulness* (pp. 59–81). New York, NY: Springer.

Brown, K. W., Goodman, R. J., & Inzlicht, M. (2013). Dispositional mindfulness and the attenuation of neural responses to emotional stimuli. *Social Cognitive and Affective Neuroscience, 8*, 93–99.

Brown, K. W., Kasser, T., Ryan, R. M., Alex Linley, P., & Orzech, K. (2009). When what one has is enough: Mindfulness, financial desire discrepancy, and subjective well-being. *Journal of Research in Personality, 43*, 727–736.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.

Brown, K. W., & Ryan, R. M. (2004). Perils and promise in defining and measuring mindfulness: Observations from experience. *Clinical Psychology: Science and Practice, 11*, 242–248.

Brown, K. W., Ryan, R. M., Loverich, T. M., Biegel, G. M., & West, A. M. (2011). Out of the armchair and into the streets: Measuring mindfulness advances knowledge and improves interventions: Reply to Grossman (2011). *Psychological Assessment, 23*, 1041–1046.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*, 211–237.

Brown, K. W., Weinstein, N., & Creswell, J. D. (2012). Trait mindfulness modulates neuroendocrine and affective responses to social evaluative threat. *Psychoneuroendocrinology, 37*, 2037–2041.

Cardaciotto, L., Herbert, J. D., Forman, E. M., Moitra, E., & Farrow, V. (2008). The assessment of present-moment awareness and acceptance: The Philadelphia Mindfulness Scale. *Assessment, 15*, 204–223.

Carlson, L. E., Speca, M., Faris, P., & Patel, K. (2007). One year pre-post intervention follow-up of psychological, immune, endocrine and blood pressure outcomes of mindfulness-based stress reduction (MBSR) in breast and prostate cancer patients. *Brain, Behavior, and Immunity, 21*, 1038–1049.

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine, 31*, 23–33.

Chiesa, A., Calati, R., & Serretti, A. (2011). Does mindfulness training improve cognitive abilities? A systematic review of neuropsychological findings. *Clinical Psychology Review, 31*, 449–464.

Collaborative for Academic, Social, and Emotional Learning. (2005). *Safe and sound: An educational leader's guide to evidence-based social and emotional learning programs—Illinois edition*. Chicago, IL: Author.

Creswell, J. D., Way, B. M., Eisenberger, N. I., & Lieberman, M. D. (2007). Neural correlates of dispositional mindfulness during affect labeling. *Psychosomatic Medicine, 69*, 560–565.

Davidson, R. J. (1998). Affective style and affective disorders: Perspectives from affective neuroscience. *Cognition and Emotion, 12*, 307–330.

Davidson, R. J. (2000). Affective style, psychopathology, and resilience: Brain mechanisms and plasticity. *American Psychology, 55*, 1196–1214.

Davidson, R. J. (2010). Empirical explorations of mindfulness: Conceptual and methodological conundrums. *Emotion, 10*, 8–11.

Davidson, R. J., Ekman, P., Saron, C., Senulis, J., & Friesen, W. V. (1990). Approach/withdrawal and cerebral asymmetry: Emotional expression and brain physiology. *Journal of Personality and Social Psychology, 58*, 330–341.

Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkrantz, M., Muller, D., Santorelli, S. F., … Sheridan, J. F. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine, 65*, 564–570.

Davis, J. H., & Thompson, E. (2015). Developing attention and decreasing affective bias: Toward a cross-cultural cognitive science of mindfulness. In K. W. Brown, J. D. Creswell, & R. M. Ryan (Eds.), *Handbook of mindfulness: Theory, research, and practice*. New York: Guilford.

Derryberry, D., & Reed, M. A. (2002). Anxiety-related attentional biases and their regulation by attentional control. *Journal of Abnormal Psychology, 111*, 225–236.

Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin, 130*, 355–391.

Dreyfus, G. (2011). Is mindfulness present-centered and non-judgmental? A discussion of the cognitive dimensions of mindfulness. *Contemporary Buddhism, 12*, 41–54.

Dunne, J. (2011). Toward an understanding of non-dual mindfulness. *Contemporary Buddhism, 12*, 71–88.

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing student's social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*, 405–432.

Farb, N. A. S., Anderson, A. K., Mayberg, H., Bean, J., McKeon, D., & Segal, Z. V. (2010). Minding one's emotions: Mindfulness training alters the neural expression of sadness. *Emotion, 10*, 25–33.

Farb, N. A. S., Segal, Z. V., Mayberg, H., Bean, J., McKeon, D., Fatima, Z., & Anderson, A. K. (2007). Attending to the present: Mindfulness meditation reveals distinct neural modes of self-reference. *Social Cognitive and Affective Neuroscience, 2*, 313–322.

Follette, V., Palm, K. M., & Pearson, A. N. (2006). Mindfulness and trauma: Implications for treatment. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 24*, 45–61.

Frewen, P. A., Dozois, D. J. A., Neufeld, R. W. J., Lane, R. D., Densmore, M., Stevens, T. K., & Lanius, R. A. (2010). Individual differences in trait mindfulness predict dorsomedial prefrontal and amygdala response during emotional imagery: An fMRI study. *Personality and Individual Differences*, *49*, 479–484.

Gethin, R. (2015). Buddhist conceptualizations of mindfulness. In K. W. Brown, J. D. Creswell, & R. M. Ryan (Eds.), *Handbook of mindfulness: Theory, research, and practice*. New York: Guilford.

Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*, 83–91.

Goodman, R. J., Brown, K. W., & Haver, D. B. (2012). *Electrocortical evidence for the benefits of being present: Individual differences in mindfulness and emotion regulation predict resting frontal brain asymmetry.* Poster presented at the Society for Personality and Social Psychology Conference, San Diego, CA.

Goodman, R. J., Trapp, S. K., & Davis, J. L. (2015). *Opening minds by supporting motivation needs: Autonomy and competence facilitate mindfulness and academic performance*. Manuscript submitted for publication.

Gravetter, F. J., & Forzano, L.-A. B. (2009). *Research methods for the behavioral sciences* (3rd ed.). Belmont, CA: Wadsworth.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*, 271–299.

Grossman, P. (2011). Defining mindfulness by how poorly I think I pay attention during everyday awareness and other intractable problems for psychology's (re)invention of mindfulness: Comment on Brown et al. (2011). *Psychological Assessment, 23*, 1034–1040.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits. A meta-analysis. *Journal of Psychosomatic Research, 57*, 35–43.

Harmon-Jones, E., & Harmon-Jones, C. (2011). Social neuroscience of asymmetrical frontal cortical activity: Considering anger and approach motivation. In A. Todorov, S. Fiske, & D. Prentice (Eds.), *Social neuroscience: Toward understanding the underpinnings of the social mind* (pp. 173–187). New York, NY: Oxford University Press.

Harvey, A. G., Watkins, E., Mansell, W., & Shafran, R. (2004). *Cognitive behavioral processes across psychological disorders: A transdiagnostic approach to research and treatment*. Oxford: Oxford University Press.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169–183.

Holt, M. P. (2012). *Dispositional mindfulness and cardiovascular functioning under stress: Predictions of social evaluative stress reactivity and recovery*. Unpublished doctoral dissertation, Virginia Commonwealth University, Richmond, VA.

Hölzel, B. K., Carmody, J., Evans, K. C., Hoge, E. A., Dusek, J. A., Morgan, L., Pitman, R. K., & Lazar, S. W. (2010). Stress reduction correlates with structural changes in the amygdala. *Social Cognitive and Affective Neuroscience, 5*, 11–17.

Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S. W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research: Neuroimaging, 191,* 36–42.

Hölzel, B. K., Ott, U., Gard, T., Hempel, H., Weygandt, M., Morgen, K., & Vaitl, D. (2008). Investigation of mindfulness meditation practitioners with voxel-based morphometry. *Social Cognitive and Affective Neuroscience, 3,* 55–61.

Jensen, C. G., Vangkilde, S., Frokjaer, V., & Hasselbalch, S. G. (2012). Mindfulness training affects attention—Or is it attentional effort? *Journal of Experimental Psychology, 141*, 105–123.

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience, 7*, 109–119.

Jha, A. P., Stanley, E. A., Kiyonaga, A., Wong, L., & Gelfand, L. (2010). Examining the protective effects of mindfulness training on working memory capacity and affective experience. *Emotion, 10*, 54–64.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your mind to face stress, pain and illness*. New York, NY: Dell.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. New York: Hyperion.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice, 10*, 144–156.

Kemeny, M. E., Foltz, C., Cavanagh, J. F., Cullen, M., Giese-Davis, J., Jennings, P., … Ekman, P. (2012). Contemplative/emotion training reduces negative emotional behavior and promotes prosocial responses. *Emotion*, *12*, 338–350.

Kilpatrick, L. A., Suyenobu, B. Y., Smith, S. R., Bueller, J. A., Goodman, T., Creswell, J. D., … Naliboff, B. D. (2011). Impact of mindfulness-based stress reduction training on intrinsic brain connectivity. *Neuroimage, 56,* 290–298.

Lamme, V. A. F. (2003). Why visual attention and awareness are different. *Trends in Cognitive Sciences, 7*, 12–18.

Linehan. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York: Guilford.

Martin, J. P. (1997). Mindfulness: A proposed common factor. *Journal of Psychotherapy Integration, 7*, 291–312.

Merikle, P. M., & Joordens, S. (1997). Parallels between perception without attention and perception without awareness. *Consciousness and Cognition, 6*(2–3), 219–236.

Michalak, J., Heidenreich, T., Meibert, P., & Schulte, D. (2008). Mindfulness predicts relapse/recurrence in major depressive disorder after mindfulness-based cognitive therapy. *The Journal of Nervous and Mental Disease, 196*, 630–633.

Modinos, G., Ormel, J., & Aleman, A. (2010). Individual differences in dispositional mindfulness and brain activity involved in reappraisal of emotion. *Social Cognitive and Affective Neuroscience, 5*, 369–377.

Moyer, C. A., Donnelly, M. P. W., Anderson, J. C., Valek, K. C., Huckaby, S. J, Wiederholt, D. A., … Rice, B. L. (2011). Frontal electroencephalographic asymmetry associated with positive emotion is produced by very brief meditation training. *Psychological Science, 22,* 1277–1279.

Mrazek, M. D., Smallwood, J., & Schooler, J. W. (2012). Mindfulness and mind-wandering: Finding convergence through opposing constructs. *Emotion, 12*, 442–448.

Murakami, H., Matsunaga, M., & Ohira, H. (2009). Association of serotonin transporter gene polymorphism and emotion regulation. *NeuroReport, 20*, 414–418.

Nanamoli, B., & Bodhi, B. (1995). *The middle length discourses of the Buddha: The Majjhima Nikaya*. Boston, MA: Wisdom Publications.

Ochsner, K. N., & Gross, J. J. (2005). The cognitive control of emotion. *Trends in Cognitive Sciences, 9*, 242–249.

Olendzki, A. (2011). The construction of mindfulness. *Contemporary Buddhism, 12*, 55–70.

Piet, J., & Hougaard, E. (2011). The effect of mindfulness-based cognitive therapy for prevention of relapse in recurrent major depressive disorder: A systematic review and meta-analysis. *Clinical Psychology Review, 31*, 1032–1040.

Posner, M. I., & Petersen, S. E. (1990). The attention system of the human brain. *Annual Review of Neuroscience, 13*, 25–42.

Posner, M. K., & Rothbart, M. I. (2007). Research on attention networks as a model for the integration of psychological science. *Annual Review of Psychology, 58*, 1–23.

Quaglia, J. T., Brown, K. W., Lindsay, E. K., Creswell, J. D., & Goodman, R. J. (2015). From conceptualization to operationalization of mindfulness. In K. W. Brown, J. D. Creswell, & R. M. Ryan (Eds.), *Handbook of mindfulness: Theory, research, and practice*. New York: Guilford Press.

Quaglia, J. T., Goodman, R. J., & Brown, K. W. (2015). Trait mindfulness predicts efficient top-down attention to and discrimination of facial expressions. *Journal of Personality*. doi:10.1111/jopy.12167.

Quirk, G. J., & Beer, J. S. (2006). Prefrontal involvement in the regulation of emotion: Convergence of rat and human studies. *Current Opinion in Neurobiology, 16*, 723–727.

Ryan, R. M., Brown, K. W., & Creswell, J. D. (2007). How integrative is attachment theory? Unpacking the meaning and significance of felt security. *Psychological Inquiry, 18*, 177–182.

Segal, Z. V., Bieling, P., Young, T., MacQueen, G., Cooke, R., Martin, L., … Levitan, R. D. (2010). Antidepressant monotherapy vs. sequential pharmacotherapy and mindfulness-based cognitive therapy, or placebo, for relapse prophylaxis in recurrent depression. *Archives of General Psychiatry*, *67*, 1256–1264.

Segal, Z. V., Teasdale, J. D., & Williams, J. M. (2004). Mindfulness-based cognitive therapy: Theoretical rationale and empirical status. In S. C. Hayes, V. M. Follete, & M. M. Linehan (Eds.), *Mindfulness and acceptance*. New York, NY: The Guilford Press.

Semple, R. J., Lee, J., Rosa, D., & Miller, L. F. (2009). A randomized trial of mindfulness-based cognitive therapy for children: Promoting mindful attention to enhance social-emotional resiliency in children. *Journal of Child and Family Studies, 19*, 218–229.

Shapiro, S. L., Brown, K. W., Thoresen, C., & Plante, T. G. (2011). The moderation of mindfulness-based stress reduction effects by trait mindfulness: Results from a randomized controlled trial. *Journal of Clinical Psychology, 67*, 267–277.

Shaver, P. R., Lavy, S., Saron, C. D., & Mikulincer, M. (2007). Social foundations of the capacity for mindfulness: An attachment perspective. *Psychological Inquiry, 18*, 264–271.

Slagter, H. A., Davidson, R. J., & Lutz, A. (2011). Mental training as a tool in the neuroscientific study of brain and cognitive plasticity. *Frontiers in Human Neuroscience, 5*, 12–17.

Tang, Y. Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q., … Posner, M. I. (2007). Short-term meditation training improves attention and self-regulation. *Proceedings of the National Academy of Sciences, 104*, 17152–17156.

Taren, A., Creswell, J. D., & Gianaros, P. (2013). Dispositional mindfulness co-varies with smaller amygdala and caudate volumes in community adults. *PLoS One, 8*(5), e64574. doi:10.1371/journal.pone.0064574.

Taren, A. et al. (2013). Neural pathways of mindfulness and stress reduction: Amygdala functional connectivity covaries with dispositional mindfulness and changes with mindfulness meditation training. Manuscript submitted for publication.

Urry, H. L., Nitschke, J. B., Dolski, I., Jackson, D. C., Dalton, K. M., Mueller, C. J., … Davidson, R. J. (2004). Making a life worth living: Neural correlates of well-being. *Psychological Science*, *15*, 367–372.

Urry, H. L., van Reekum, C. M., Johnstone, T., Kalin, N. H., Thurow, M. E., Schafer, H. S., … Davidson, R. J. (2006). Amygdala and ventromedial prefrontal cortex are inversely coupled during regulation of negative affect and predict diurnal pattern of cortisol secretion among older adults. *Journal of Neuroscience, 26*, 4415–4425.

Walach, H., Buchheld, N., Buttenmuller, V., Kleinknecht, N., & Schmidt, S. (2006). Measuring mindfulness—The Freiburg Mindfulness Inventory (FMI). *Personality and Individual Differences, 40*, 1543–1555.

Walsh, W. B., & Betz, N. E. (2001). *Tests and assessment* (4th ed.). Upper Saddle River, NJ: Prentice-Hall.

Way, B. M., Creswell, J. D., Eisenberger, N. I., & Lieberman, M. D. (2010). Dispositional mindfulness and depressive symptomatology: Correlations with limbic and self-referential neural activity during rest. *Emotion, 10*, 12–24.

Witek-Janusek, L., Albuquerque, K., Rambo Chroniak, K., Chroniak, C., Durazo-Arvizu, R., & Mathews, H. (2008). Effect of mindfulness based stress reduction on immune function, quality of life and coping in women newly diagnosed with early stage breast cancer. *Brain, Behavior, and Immunity, 22*, 969–981.

Zeidan, F., Martucci, K. T., Kraft, R. A., Gordon, N. S., McHaffie, J. G., & Coghill, R. C. (2011). Brain mechanisms supporting the modulation of pain by mindfulness meditation. *Journal of Neuroscience, 41*, 5540–5548.

The "Why," "What," and "How" of Healthy Self-Regulation: Mindfulness and Well-Being from a Self-Determination Theory Perspective

7

Patricia P. Schultz and Richard M. Ryan

To be a self-regulating being requires awareness. We live in a world with stimulating enticements, myriad distractions, and continuously arising and competing motives and desires. Letting some pass, and acting on those that are most congruent with living well, is a formidable task. Doing so entails a center of observation outside the fray, and a capacity to make use of it.

Self-determination theory (SDT; Ryan & Deci, 2000), akin to many other philosophical traditions and psychological frameworks, views awareness as a critical component of healthy self-regulation and well-being (Deci & Ryan, 1980, 1985; Ryan, Huta, & Deci, 2008). According to SDT, awareness is central to the process of healthy regulation. When people act with *autonomy*, they engage in behaviors that are congruent with their self-endorsed values and authentic interests. Extensive research has shown the significant physical and mental benefits that such autonomous regulation yields. In contrast, when people engage in activities based in introjections or external pressures, the regulation of their behavior is *controlled*, and such regulation is associated with diminished persistence and performance, and more impoverished experience and well-being (Ryan & Deci, 2000). The distinctions between the autonomous and controlled reasons underlying people's behaviors constitutes the "why" approach of SDT.

Additionally, within SDT, processes associated with awareness impact the content, or the "what" of people's goals. Individuals can focus on attaining *extrinsic goals* (e.g., wealth, popularity, attractive image) or *intrinsic goals* (e.g., personal growth, community contributions, close relationships). The evidence reveals differential consequences of both the pursuit and attainment of extrinsic versus intrinsic goals, especially with regard to well-being (e.g., Kasser & Ryan, 1993, 1996). Both the "why" and the "what" of behavior regulation are predictive of more optimal development, social relationships, and wellness (Deci & Ryan, 2000). Specifically, by acting autonomously and pursuing intrinsic goals people can live *eudaimonically*, with the rich positive experience that attends living well (Ryan, Curren, & Deci, 2013).

In this chapter we therefore address an important "how" of eudaimonic living, namely how

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both more autonomous regulation and more intrinsic goal selection are facilitated by the open and receptive awareness that defines the construct of *mindfulness* (Brown & Ryan, 2003). To do so we present a brief overview of SDT, delineate the construct of mindfulness, and review evidence of how this quality of consciousness relates to both the regulatory processes through which behaviors are enacted, and the content of goals that individuals pursue.

Self-Determination Theory

SDT is an empirically driven theory of human motivation and development that posits that humans are inherently active, curious, and growth-oriented creatures who naturally strive toward both the integration of a coherent and unified sense of self, and the integration of the individual within a broader social framework (Deci & Ryan, 2000). Similar to other organismic theories of personality development, SDT postulates that people spontaneously seek challenges, pursue interests, and strive for social connectedness (Ryan, 1995). Through the extension of their inherent capacities and integrated motives, individuals more fully actualize their human potentials and experience more eudaimonic lifestyles (Ryan, Huta, et al., 2008; Ryan et al., 2013).

Yet within the SDT perspective, this natural inclination toward growth and integration is not viewed as by any means automatic, or even a typically smooth, developmental pathway. Just like a seed needs critical nutrients to flourish, the integrative processes of human psychological development require specific supports. In SDT the most critical of these are described by the concept of *basic psychological needs* (Deci & Ryan, 2000; Ryan, 1995), which represent the cross-developmental and culturally universal necessities for growth and wellness. SDT specifies three basic needs: *competence* (i.e., mastery and efficacy), *autonomy* (i.e., volition and self-endorsement of one's behaviors), and *relatedness* (i.e., a sense of belonging and of being cared for). Substantial research shows that social contexts and personal relationships that support the fulfillment of these basic needs facilitate intrinsic motivation, integrated self-regulation, and wellness; whereas need thwarting environments, lifestyles, or activities are associated with antagonist outcomes (Deci & Ryan, 2012).

A Differentiated View of Motivation: The "Why" of Self-Regulation

Unlike many theories that conceptualize motivation as a unitary construct, SDT specifies different types of motivation underlying behavior regulation. First, SDT posits that humans have evolved to be liberally endowed with *intrinsic motivation*, or behavior energized by its inherent satisfactions. Intrinsic motivation is typified by activities such as play, exploration, sport and leisure reading, in which people exercise capacities and experience growth. Intrinsic motivation is also a prototype of human autonomy, in that intrinsically motivated activities are invariantly experienced as self-determined, or volitional.

Yet, despite the importance of intrinsic motivation for learning and development, most daily activities are not intrinsically motivated, but rather are instrumental in nature. That is, much of our behavior is *extrinsically motivated*. Although many researchers have viewed extrinsic motivation as heteronomously driven or controlled (e.g., deCharms, 1968), SDT has long proposed that extrinsic motivation is more complex. SDT instead describes a spectrum model of extrinsic regulations spanning from highly controlled to highly autonomous forms of self-regulation (Deci & Ryan, 1985; Ryan & Deci, 2000).

The most controlled form of regulation in this spectrum is *external regulation*, which pertains to behaviors that are enacted to comply with external contingencies, both punishing and rewarding. External regulation can drive behavior, but it is often poorly maintained, and/or accompanied by negative affect. A closely related form of extrinsic motivation is *introjected regulation*. Introjected acts are performed to experience self- and/or other-contingent approval. Although "internally" regulated, introjected behaviors are experienced as controlled because the individual

feels pressured to avoid guilt and/or projected disapproval, or conversely to garner esteem and ego-enhancement. Introjection can be a powerful motivator (e.g., Ryan, Koestner, & Deci, 1991), but it comes with costs such as unstable persistence, stress, and lower well-being.

On the more autonomous end of this spectrum is *identified regulation*, in which the individual personally embraces and reflectively endorses his or her actions. As a result, identified regulation is associated with more persistence, better performance, and more positive affect than controlled forms of regulation. The most autonomous form of extrinsic motivation is *integrated regulation*, in which the person has fully assimilated her identified regulation into the self, coordinating it with other values and goals. Like intrinsically motivated actions, integrated actions are highly autonomous and wholeheartedly engaged. But integrated regulations are still technically extrinsic because they are undertaken to attain outcomes separable from the actions themselves. Typically it is only through self-reflection and awareness that one is able to recognize one's own values and needs, and therefore able to bring new regulations into such congruence. Thus, as we shall detail, *mindfulness* is a crucial ingredient for the integrated regulation of behavior, and truly autonomous extrinsic self-regulation.

At this point hundreds of studies have verified: (a) that this spectrum of regulations forms a continuum of autonomy (e.g. Roth, Assor, KanatMaymon, & Kaplan, 2007; Ryan & Connell, 1989); and (b) that more effective behavioral regulation and enhanced well-being are associated with higher relative autonomy in multiple domains (e.g., Blais, Sabourin, Boucher, & Vallerand, 1990; Gagné & Deci, 2005; Reeve & Jang, 2006; Ryan, Patrick, Deci, & Williams, 2008).

"Internal" Promoters of Autonomous Self-Regulation

Taking into account the manifold positive personal consequences of intrinsic regulation and more autonomous forms of extrinsic regulation, considerable research within SDT has focused on the social contextual factors that affect relative autonomy (see Ryan & Deci, 2000). Nonetheless, and more relevant to our focus in this paper, internal processes are also important. At the core of volitional and self-endorsed regulation lies the capacity to reflectively consider one's behavior and its congruency with one's personal values and needs (Ryan & Deci, 2006). That is, the existential commitment to act consistently with one's authentic self, and be sensitive to external circumstances, impacts the regulatory process. When awareness of inner and outer circumstances is blocked, so too is a person's ability to attend to prompts arising from basic needs, to mobilize resilience, and to consciously self-organize and regulate actions (Ryan, Legate, Niemiec, & Deci, 2012). Thus, mindfulness, conceptualized as internal and external awareness of the present moment, is a quality of consciousness that has been shown to lead to greater autonomy (Brown & Ryan, 2003). When mindful, people are aware of what is truly taking place and thus better able to make purposeful decisions, engage their "self-compatibility checker" (Kuhl & Kazen, 1994), and function in a more integrated way. Yet before elaborating on this, we turn next to what people are pursuing in their lives, or their goals contents, which is also affected by mindfulness.

Intrinsic Versus Extrinsic Aspirations: The "What" of Behavioral Regulation

Although so far we have emphasized the "why" of self-regulation (i.e., the regulatory processes through which outcomes are pursued), SDT also concerns the "what" of self-regulation, or the content of the outcomes or goals pursued and their associated well-being consequences. Research in a number of cultures has shown that the pursuit and attainment of intrinsic goals (i.e., goals such as personal growth, affiliation, or community contributions) have a positive relation to basic need satisfaction and a variety of well-being outcomes. In contrast, extrinsic goals and aspirations (i.e., goals that reflect extrinsic values, such as wealth, image, or fame) are related to need thwarting and accordingly, greater ill-being (Kasser, 2002; Kasser &

Ryan, 1993, 1996). Studies have also found that the attainment of intrinsic goals predicts more long-lasting well-being compared to the achievement of extrinsic goals (Vansteenkiste, Ryan, & Deci, 2008).

Why do these two types of aspiration have vastly different consequences? The explanation lies in the extent to which they ultimately facilitate or undermine basic psychological need satisfaction (Ryan, Sheldon, Kasser, & Deci, 1996). Intrinsic goals are more closely associated with the satisfaction of fundamental needs. For example, willingly giving to others, which is associated with relationship and community goals, leaves one with a sense of autonomy (because the act is volitional), competence (because one is having a positive impact) and relatedness (because one is connecting); these in turn foster enhanced well-being. In contrast, extrinsic aspirations are more closely related to obtaining external approval or visible signs of worth, and thus are generally less likely to directly provide need satisfaction, or may even distract from it, leading to greater ill-being (e.g., Niemiec, Ryan, & Deci, 2009; Vansteenkiste et al., 2007; Weinstein & Ryan, 2010). In the following sections, we will review how mindfulness fuels both the movement toward more autonomous reasons for acting, and the pursuit of intrinsic goal contents. But first, it is important to precisely define mindfulness, and differentiate it from concepts that are sometimes mistakenly confused with it.

The Construct of Mindfulness

Within the theoretical framework of SDT we have drawn on the definition and measurement of mindfulness introduced by Brown and Ryan (2003). In their approach mindfulness is defined as a receptive state of mind wherein *attention*, informed by a sensitive *awareness* of what is occurring at the moment, plainly observes internal (e.g., psychological and somatic experiences) and external events that are taking place (Brown & Ryan, 2003; Kabat-Zinn, 2003). Attention and awareness, key elements in defining mindfulness, are important components of consciousness (Brown & Ryan, 2003). Awareness is the background "tracking system" of consciousness, monitoring an individual's internal and external happenings. Attention, on the other hand, is the mechanism of focusing on a particular stimulus present in the conscious awareness (Westen, 1999). Therefore, an individual can be aware of a plethora of stimuli, but it is the attention that directs what, within the "ground" of awareness, is in focus.

As is often the case, differing schools of thought highlight various aspects of mindfulness both theoretically and operationally (Dimidjian & Linehan, 2003; Hayes & Wilson, 2003). Brown and Ryan's definition of mindfulness as receptive attention and awareness differs from other approaches that include within the idea of mindfulness qualities such as acceptance (Bishop et al., 2004); active cognitive operations on external stimuli (Langer, 1989); diminished self-talk, non-judgment, and non-doing (Leary & Tate, 2007), or holding a particular set of philosophical, ethical or therapeutic beliefs (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). All of these qualities are indeed associated with mindful states (Brown & Ryan, 2004; Brown, Ryan, & Creswell, 2007a, 2007b), but from the viewpoint of Brown and Ryan, these other elements all follow from a truly open and receptive awareness, and many are consequences of mindfulness. Regardless of the specific definition or measures, however, research conducted over the last three decades on dispositional mindfulness, induced mindful states, and mindfulness training interventions has demonstrated the benefits of this attribute of consciousness for a wide range of outcomes, such as psychological and physical health, and the quality of one's relationships and performance in multiple domains (e.g., Baer, 2003, 2006; Brown et al., 2007a; Grossman, Niemann, Schmidt, & Walach, 2004).

Mindfulness Versus Self-Awareness

It is important to differentiate between the concept of mindfulness from the constructs of self-awareness and reflexive consciousness, which

have received much attention (e.g., Buss, 1980; Carver & Scheier, 1981). In a nutshell, such theories describe self-awareness in terms of knowledge about the self. For example, *private self-consciousness* is described as a tendency to be highly aware of internal states (Carver & Scheier, 1981). Nonetheless, this type of self-consciousness can reflect any type of internal state, including negative reactions or evaluative dispositions toward internal or external events rather than receptive openness. Similarly, *reflexive consciousness* (e.g., Baumeister, 1999) refers to metacognitive processes that operate within thoughts, emotions, and other contents of consciousness, and thus can involve varied cognitive and intellectual operations and biases.

Mindfulness is, in contrast, "prereflexive" and has at its root a perceptual and non-evaluative character: it means to simply and openly observe current events or engage in "bare" attention. It is not thoughts or cognitions, but rather the space between them that sets the context where they occur (Brown et al., 2007b). Drawing from a Zen metaphor, this quality of consciousness is like a polished mirror, merely reflecting what passes before it, without distortions or conceptual thoughts. The separation between consciousness (context) and mental content, also referred to as *decentering* and *desensitization* (Martin, 1997), allows more autonomous self-regulation because behavior is informed by authentic awareness, rather than distorted self-cognitions. To be clear, this unbiased receptivity is not an aloofness or disconnection with the world, but rather a more "alert participation in the ongoing process of living" (Gunaratana, 2002, p. 142).

Empirical evidence supports these distinctions between mindfulness and self-awareness. Research shows at best weak, and sometimes negative, relations of mindfulness and indicators of self-awareness, including private self-consciousness, public self-consciousness, reflection, and self-monitoring (Beitel, Ferrer, & Cecero, 2005; Brown & Ryan, 2003). More relevant to the present discussion, whereas mindfulness has been associated with adaptive outcomes and psychological health (e.g., Baer, 2003; Brown & Ryan, 2003), self-awareness, particularly the aspect of "self-reflectiveness" (Trapnell & Campbell, 1999), has been related to maladaptive outcomes and poorer mental health.

Self-Regulation and Mindfulness: The "Why"

We have argued that the motives underlying behavior are closely related to the quality of engagement as well as to wellness consequences; such that those who pursue authentic interests and values are overall more vital and healthy. Yet, to pursue this trajectory of integration and autonomy, SDT posits that people are aided by environments that support the fulfillment of needs for autonomy, competence, and relatedness. Support for autonomy plays a particularly key role. This is evident in the fact that although support for relatedness and competence may foster the internalization of a behavior (i.e., one's adoption of a regulation or value), these supports by themselves are not enough to promote integration, which is a process necessary for true self-regulation (e.g., Deci, Eghrari, Patrick, & Leone, 1994; Grolnick & Ryan, 1989; Williams & Deci, 1996). Hence, for integration to occur, people need to freely process and endorse their motives and regulations, as well as synthesize their meaning with other aspects of self, that is, feel the autonomy need satisfied.

Because mindfulness relates to one's capacity to openly attend to current internal and external experiences, it enables and supports the self-insight and the self-reflection necessary for ensuring one's values are in accordance with one's behavior. Furthermore, it builds a framework that aids the blend of that particular behavior with values that are already part of the self. This awareness is an important substrate of integration, and therefore a critical ingredient of autonomy development (Deci & Ryan, 1985). In other words, one can only be highly autonomous when one is clearly aware of one's values and goals, and thus is able to engage in behaviors that are congruent with one's true self, free from external pressures or internal distortions or judgments.

Aiming to empirically demonstrate the previous argument, Brown and Ryan (2003) conducted the first studies that explicitly investigated mindfulness and related it to the SDT framework. The authors developed the Mindful Attention Awareness Scale (MAAS) to measure this construct both as a disposition and as a "state." They demonstrated that the MAAS was positively correlated with both dispositional and state autonomy, as well as with the other two basic needs described by SDT, relatedness and competence. Moreover, to understand the role of mindfulness in regular day-to-day living, they conducted additional investigations using experience-sampling procedures. Both student and working adult samples, after having completed a measure of trait mindfulness, were assessed for state mindfulness, affect, and the relative autonomy of their behavior at the receipt of a pager signal, sent three times a day on a quasi-random basis. In both samples, higher levels of both dispositional and state mindfulness predicted more autonomous activity in daily life and lower levels of unpleasant affects. Interestingly, the effects of trait and state mindfulness on autonomy were independent, suggesting that even momentary experiences of mindfulness contribute to more volitional self-regulation and emotional well-being.

These positive relations between autonomous regulation and mindfulness beg the question of the mechanisms and processes through which these relations occur. We shall now discuss processes through which they may obtain, namely: (1) interference with automatic maladaptive behaviors that are incongruent with one's endorsed values; (2) promotion of less ego-involvement and cognitive distortion, freeing the self from internal and external pressures.

De-automatizing and Integrative Role of Mindfulness

One of the pathways for the salutary effects of mindfulness is that it may decrease the likelihood of automatic maladaptive behaviors. Research on automatic and implicit processes has shown that a substantial part of our day-to-day cognitive, emotional, and overt behavior does not require conscious awareness and attention. In other words, a good deal of our thoughts and actions occur automatically without intentional effort (Bargh, 1997; Deci & Ryan, 1980; Tart, 1994). Despite the many pragmatic benefits for this automaticity of behavior (e.g., one's speed in response to situational demands, or the greater availability of cognitive resources for more relevant tasks; Aarts & Dijksterhuis, 2000; Mitchell, Nosek, & Banaji, 2003), there are also costly consequences. When acting non-consciously one is more susceptible to engage in many habitual problematic and self-defeating behaviors, which if reflected upon are not congruent with one's self-endorsed values (e.g., Clark & Rhyno, 2005; Levesque & Brown, 2007; Ryan & Deci, 2006; Verplanken & Velsvik, 2008). Mindfulness, through awareness and attention, pulls people closer to what is currently taking place, without judgmental or evaluative attachments. This awakened state allows consciousness to become clear and fresh, which, in turn, acts as a liberating agent of conditioned responses, and allows people to better reflect upon the "why" of actions, thus promoting more self-endorsed, autonomous behavior (Brown et al., 2007a). This connects with evidence showing that enhanced attention and awareness can prevent the enactment of automatic habits or reactions (e.g., Dijksterhuis & Knippenberg, 2000). For example, Gollwitzer (1999) experimentally induced individuals to be aware of their automatic stereotypic beliefs toward elderly people, and found that subsequently these stereotypic thoughts were less readily automatically triggered. In this same way, mindfulness has been shown to be a protective factor against automatization of behavior, thus leading to more self-determined, autonomous regulation.

Levesque and Brown (2007) investigated the role of mindfulness as a moderator between implicit regulation (assessed using the Implicit Association Test—IAT; Greenwald, McGhee, & Schwartz, 1998) and explicit regulation of day-to-day behavior using an experience-sampling strategy. Both implicit and explicit measures

assessed the degree to which the participant's regulation was autonomous or controlled. Results showed that implicit regulation style predicted day-to-day regulation only for those lower in dispositional mindfulness. That is, for those high in mindfulness, the degree of daily autonomy was relatively high independently of implicit autonomy level; in other words, it was high even when participants implicitly associated themselves with pressure and control. These results underscore the de-automatizing role of mindfulness, overriding maladaptative tendencies and catalyzing self-endorsed behavior. This is thought to occur because mindfulness acts as a brake or redirector between salient primes and responses to them (Deci & Ryan, 1980).

Focusing on this integrative aspect of mindfulness, Brown and Ryan (2003) reported that those higher in trait mindfulness showed greater congruence between implicit or non-conscious emotional state (assessed using the IAT; Greenwald et al., 1998) and explicit self-reported counterpart. Given that implicit measures are not controlled by consciousness, these results indicate that more mindful individuals are more attuned to their implicit emotions demonstrated by greater concordance with the analogous explicit self-descriptions. Note that, in the case of emotions, this last study suggests that mindfulness is related to a greater association between implicit and explicit emotional states; whereas when it comes to motivation, mindfulness seems to be associated with a greater dissociation between maladaptive implicit motivational orientation and adaptive behavioral motivation. These results are not contradictory because in both cases mindfulness appears to provide a space for reflection: individuals who are more attuned to their emotions are in a better position to be in touch with their true selves and behave genuinely; individuals who have an implicit tendency toward controlled motivation, but are able to stop and reframe their course of action, may behave more autonomously. Thus regardless of the direction of the relationship between implicit and explicit measures, this open awareness works as a facilitator of integration and authentic self-regulation.

To add to these findings, another study by Brown and Ryan (2003) found that mindfulness was associated with "emotional intelligence" (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995), specifically in a dimension that is closely associated with emotional self-knowledge: clarity of emotional experience. Such self-insight is thought to be a crucial result of the present-centered awareness essential for self-regulation and more integrated functioning.

Liberating Role of Mindfulness: A Thought Is Just a Thought

Open attention and awareness also foster autonomous behavior because they can help free individuals from the external and internal controlling forces that are alien to the authentic self (Brown et al., 2007a). As Hodgins and Knee (2002) put it, "Individuals who are functioning autonomously…are responsive to reality rather than directed by ego-invested preconceived notions" (p. 89). Mindful individuals have an observant stance toward experience rather than a cognitive reflexive stance that constantly informs thoughts about the self. Stated differently, they recognize the "self" as a process of integration and assimilation and not as the product of self-evaluations. This raises the question of "self": What is "self" and how can we formally define it?

Scholars from many fields, echoing the centrality that the construct presents for the human experience, have been concerned with the concept of "self" (Brown, Ryan, Creswell, & Niemiec, 2008). The two notions of self that predominate today are the "I" self (McAdams, 1990), mainly studied within organismic and developmental theories (e.g., Deci & Ryan, 1991; Loevinger & Blasi, 1991); and the "Me" self at the core of social constructionist views of self.

The "Me" self or "self-as-object" refers to the creation of personal identity, and is derived from the Mead-Cooley tradition (Ryan, 1993; Ryan & Deci, 2011). This concept of self concerns one's identification with specific roles, attributes, group memberships, and beliefs, which individuals are often motivated to protect or enhance. Under this

view of self, people strive to meet the standards associated with these internalized and culturally derived-self images (Ryan & Brown, 2003). When maintaining such self-representations becomes a predominant goal, it brings with it a variety of anxieties, conflicts, and defensive reactions (Brown, Ryan, et al., 2008).

On the other hand, the "I" self or "self-as-process" view construes self not as a concept or set of self-evaluations, but rather as the inherent integrative tendencies of people to grow and create coherence in their experiences. Behavior motivated by the "I" self is more fully self-endorsed and whole-hearted, and is more likely to be positively experienced, whereas behavior motivated by the "Me" self is more closely related to controlled regulation (Ryan et al., 2012). Mindfulness, with its open attention to the present moment, promotes the "I" self regulation and its synthetic tendencies by a greater allowing of and interest in what is occurring, and by freeing the individual from evaluative mental concepts, ego-involvement, and self-centered biases, all characteristics of the "Me" self (Ryan & Rigby, 2015).

There is growing evidence linking mindfulness with both (1) less ego-involvement and defensive reactions, and lower stress appraisals and (2) more autonomous self-regulation. First, many studies using the SDT framework demonstrated how ego-investment in outcomes impedes autonomy, increases pressure and tension, and lowers vitality (e.g., Nix, Ryan, Manly, & Deci, 1999; Ryan, 1982). In addition, other investigations showed how actions performed mindfully are less likely to be driven by ego-concerns, and less prone to high stress reactions (Kernis & Goldman, 2006; Niemiec et al., 2010; Ryan & Brown, 2003; Weinstein, Brown, & Ryan, 2009). As Brown, Ryan, et al. (2008) describe, mindfulness "entails a shift in the locus of personal subjectivity from conceptual representations of the self and others to awareness itself" (p. 82). As a consequence, it lessens the intra- and interpersonal pressures that the Me-self entails, and liberates the individual from the often automatic cognitive distortions and defensive reactions that can disrupt the integrative process underlying true self-regulation or autonomy (Brown, Ryan, et al., 2008; Martin & Erber, 2005; Ryan & Brown, 2003). Expressed differently, for highly mindful people, rejections or successes do not involve their self-worth and are not destabilizing rather, are simply seen as part of the personal growth process, a hallmark of the "I" self. As a result, this "quieting of the ego" allows them to behave volitionally and without the need to prove, maintain, or stay attached to conceptions of the Me-self, which is a pathway toward integrated functioning (Niemiec, Ryan, & Brown, 2008; Ryan & Rigby, 2015).

Several studies support the argument that mindfulness, because of its grounding in reality and detachment from ego-involved contingencies and self-centered biases, attenuates reactivity to threatening or stressful situations (see Baer, 2003; Brown, Ryan, et al., 2008). As a prime example, Niemiec and colleagues (2010) conducted several experiments informed by *Terror Management Theory* (TMT; Greenberg, Solomon, & Pyszczynski, 1997). TMT posits that humans respond defensively to reminders of death (e.g., through suppression of death thoughts, self-esteem enhancement, and defense of their cultural worldview). In seven experiments, Niemiec et al. demonstrated that trait mindfulness mitigates defensive responses to existential threat. Moreover, these experiments showed that this effect was due to the fact that those higher in mindfulness more fully processed death thoughts in an immediate sense, and because of that, were less likely to be holding on to threat and behaving defensively in subsequent moments. These studies connect with other research on relationship conflicts (Barnes, Brown, Krusemark, Campbell, & Rogge, 2007); social exclusion (Creswell, Eisenberg, & Lieberman, 2008), emotional threat (Arch & Craske, 2006), and other ego threats by showing that an open, mindful processing of situations promotes fewer defensive reactions to adverse situations, and, in turn, increases adaptive responses and well-being (Brown, Ryan, et al., 2008).

In another example Weinstein et al. (2009) demonstrated how mindfulness, by fostering less

defensive thinking patterns and more openness toward challenging events, promotes less negative cognitive appraisals of situations, and reduced levels of perceived stress. Across four studies that included experimental, longitudinal, and experience sampling designs, the authors found that mindful individuals made more benign stress appraisals, and reported more adaptive stress responses, and these, in turn, fully or partially mediated the relations between mindfulness and well-being. For example, in a longitudinal study, first-semester freshmen within a single course completed measures of mindfulness, cognitive appraisal, coping, and ill-being at three points during the semester: at the beginning, 1–2 days before the mid-term, and during final exams. The longitudinal design underscored that more mindful individuals tended to appraise challenging situations as less threatening, and respond in more adaptive ways over time.

In sum, it appears that open and receptive observation of internal and external events can lead to positive outcomes. Moreover, when behavior is not driven by ego-concerns, it is more likely to be congruent and authentic. An alternative but not antithetical explanation is that mindfulness, in its ability to enhance self-endorsed behavior, may prompt a more selective choice of situations (Brown & Ryan, 2003; Weinstein et al., 2009). This higher predominance of self-endorsed volitional activity may be conducive to a greater tolerance of unpleasant situations, thus over time reducing exposure to stressors, which in turn contributes to well-being.

Self-Regulation and Mindfulness: The "What"

So far we argued that mindfulness facilitates more autonomous self-regulation, leading to greater satisfaction of the fundamental psychological needs of autonomy, competence, and relatedness, and thus wellness. Nonetheless, also critical to SDT is the goal content or the "what" of authentic functioning (Deci & Ryan, 2000; Ryan et al., 1996).

Mindfulness as a Pathway to Intrinsic Goal Orientation

A growing body of research suggests that mindfulness increases one's focus on intrinsic aspirations, resulting in greater well-being and healthier lifestyle decisions (Brown & Kasser, 2005). Mindfulness has also been associated with greater empathy and compassion for others (Beitel et al., 2005; Brown et al., 2007a). For example, Shapiro, Schwartz, and Bonner (1998) reported that medical students who received mindfulness training displayed increases in empathy over time relative to a control group, even in high-stress contexts such as finals week. Barnes et al. (2007), in an investigation of the role of mindfulness in romantic relationship stress, found that it might enhance healthy romantic relationship functioning. The authors suggest that these benefits stem from an inclination to other-centeredness or a greater disposition to be present to the partner, even in challenging situations. Mindfulness has also been related to the promotion of intrinsic values such as community involvement, relationships, ecological stewardship, and lower materialism over extrinsic values such as popularity and wealth (Brown & Kasser, 2005; Brown, Kasser, Ryan, & Konow, 2008).

Pertinent to this discussion is a study conducted by Brown and Kasser (2005) on a diverse national sample of adults differing in lifestyle. They compared intrinsic and extrinsic value orientation, mindfulness, and multiple indicators of subjective well-being and ecologically responsible behavior. Results indicated that higher levels of mindfulness were related to greater intrinsic value orientation; and both variables were associated with subjective well-being and more ecologically responsible behavior. Brown and Kasser suggested that mindfulness may foster greater reflection on one's consumption and market choices and their ecological impacts. In turn, they suggested that increased environmental and prosocial behaviors supply intrinsic satisfactions that enhance well-being (De Young, 1996, 2000).

In yet another relevant project, Brown, Kasser, Ryan, Linley, and Orzech (2009) conducted a series of studies on the role of mindfulness on

financial desire discrepancy (the difference between what one has and what one desires) and subjective well-being. In an initial study of British undergraduates, results revealed that mindfulness was associated with smaller financial discrepancy, which partially explained the positive relationship between mindfulness and well-being. Two more studies replicated these findings, controlling for financial status and showing similar findings for working adults. A final, quasi-experimental investigation was conducted to elucidate causation pathways. Participants were attendees at residential mindfulness meditation training centers who participated in a 4-week-training program. Findings suggested that increases in mindfulness were related to declines in financial desire discrepancy and increases in subjective well-being. Furthermore, these relations were not accounted for by financial status or recent financial status changes. While these studies highlight the associations between mindfulness, intrinsic values, and well-being, other research within SDT suggests that these salutary effects stem, in part, from the promotion of healthy self-regulation (Brown & Ryan, 2003, 2004; Deci & Ryan, 2000; Kasser & Ryan, 1996).

To summarize, the arguments above underscore the idea that mindfulness increases one's valuing of intrinsic goals and life pursuits. Intrinsic aspirations are, in turn, inherently related to basic need satisfaction, in contrast to extrinsic goals, which are pursued for their instrumental value, and only fulfill basic needs indirectly or even distract from them. Finally, basic need satisfaction is associated with autonomous self-regulation and well-being. Considering the pressured societies we live in, where, as never before, consumerist messages seductively incite the pursuit of material goods, the display of wealth, and portray the glories of fame, mindfulness is an important asset that can act as a buffer, and reduce susceptibility to such extrinsic prompts and values. That is, because of their heightened awareness of internal and external states, more mindful individuals may more easily realize that materialistic values are distant from their most essential needs and from behaviors that represent healthy self-regulation (Brown et al., 2009).

Conclusions

Mindfulness is a deceptively simple concept concerning an open, receptive awareness to the present. Yet this simple phenomenon has manifold influences on the pathways leading toward authentic self-regulation and well-being. In this chapter we reviewed evidence concerning *how* this state of consciousness permeates critical components of SDT, globally referred to as the "why" and the "what" of regulation of behavior; thus, framing mindfulness as an essential "how" of living well.

Central to autonomous self-regulation is the capacity to reflectively consider one's behavior and its congruency with one's personal values and needs. The enhanced attention and awareness of mindfulness promotes such ability. This awakened state also allows consciousness to acquire a clarity and freshness that act as liberating agents of automatic responses, and brings people to reflect upon the "why" of actions, hence fostering more self-endorsed behavior. Finally, it appears that mindfulness can function as an antidote against external and internal controlling forces that frequently undermine the selection and enactment of more volitional behaviors. Mindfulness is a powerful integrative agent, and SDT views integration as crucial to the development of more autonomous forms of motivation.

When awareness of inner and outer circumstances is heightened, so are people's abilities to attend to prompts arising from basic needs, and to consciously self-organize and self-regulate their actions in a manner fulfilling such needs. Consequently, one is more likely to focus on and attain intrinsic life goals, living more eudaimonically in the process. This is supported by both research connecting mindfulness to intrinsic over extrinsic goals, and the relations between these goals and qualities of action, vitality, and overall wellness.

Beyond all the aforementioned benefits of mindfulness, we must not overlook a valuable aspect of this construct: the vividness that it adds to current experience and the moment-to-moment sensory contact with life, without dense evaluative filtering of experience (Brown & Ryan, 2003; Kabat-Zinn, 2005). In the chaotic, often rushed

environment of modern society, where people strive to accomplish something every minute and where multi-tasking is the normal mode of operation, there is consequently little time for contemplation of one's experiences, and little inclination to turn off the cruise control in order to reflect on the present moment. In this lifestyle of speed and production, with its increasing commercial, social, and political attention capturing messages and pressures, mindfulness emerges as a pivotal tool for autonomous, vital, living.

References

Aarts, H., & Dijksterhuis, A. (2000). Habits as knowledge structures: Automaticity in goal-directed behavior. *Journal of Personality and Social Psychology, 78*, 53–63.

Arch, J. J., & Craske, M. G. (2006). Mechanism of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy, 45*, 1435–1447.

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*, 125–143.

Baer, R. A. (2006). *Mindfulness-based treatment approaches: Clinician's guide to evidence base and applications*. San Diego, CA: Elsevier Academic Press.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45.

Bargh, J. A. (1997). Automaticity in social psychology. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 109–183). New York, NY: Guilford Press.

Barnes, S., Brown, K. W., Krusemark, E., Campbell, W. K., & Rogge, R. D. (2007). The role of mindfulness in romantic relationship satisfaction and responses to relationship stress. *Journal of Marital and Family Therapy, 33*, 482–500.

Baumeister, R. F. (1999). The nature and structure of the self: An overview. In R. F. Baumeister (Ed.), *The self in social psychology* (pp. 1–20). Philadelphia, PA: Psychology Press.

Beitel, M., Ferrer, E., & Cecero, J. J. (2005). Psychological mindedness and awareness of self and others. *Journal of Clinical Psychology, 61*, 739–750.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., … Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241.

Blais, M. R., Sabourin, S., Boucher, C., & Vallerand, R. J. (1990). Toward a motivational model of couple happiness. *Journal of Personality and Social Psychology, 59*, 1021–1031.

Brown, K. W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Social Indicators Research, 74*, 349–368.

Brown, K. W., Kasser, T., Ryan, R. M., Linley, P. A., & Orzech, K. (2009). When what one has is enough: Mindfulness, financial desire discrepancy, and subjective well-being. *Journal of Research in Personality, 43*, 727–736.

Brown, K. W., Kasser, T., Ryan, R. M., & Konow, J. (2008). *Materialism, acquisition, and unpleasant affect*. Unpublished manuscript, Virginia Commonwealth University.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.

Brown, K. W., & Ryan, R. M. (2004). Perils and promise in defining and measuring mindfulness: Observations from experience. *Clinical Psychology: Science and Practice, 11*, 242–248.

Brown, K. W., Ryan, R. M., Creswell, J. D., & Niemiec, C. P. (2008). Beyond me: Mindful responses to social threat. In H. A. Wayment & J. J. Bauer (Eds.), *Transcending self-interest* (pp. 75–84). Washington, DC: American Psychological Association.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007a). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*, 211–237.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007b). Addressing fundamental questions about mindfulness. *Psychological Inquiry, 18*, 272–281.

Buss, A. H. (1980). *Self-consciousness and social anxiety*. San Francisco, CA: Freeman.

Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation*. New York, NY: Springer.

Clark, D. A., & Rhyno, S. (2005). Unwanted intrusive thoughts in nonclinical individuals: Implications for clinical disorders. In D. A. Clark (Ed.), *Intrusive thoughts in clinical disorders: Theory, research, and treatment* (pp. 1–29). New York, NY: Guilford.

Creswell, J. D., Eisenberger, N. I., & Lieberman M. D. (2008). *Neurobehavioral correlates of mindfulness during social exclusion*. Unpublished manuscript.

De Young, R. (1996). Some psychological aspects of reduced consumption behavior: The role of intrinsic satisfaction and competence motivation. *Environment and Behavior, 28*, 358–409.

De Young, R. (2000). Expanding and evaluating motives for environmentally responsible behavior. *Journal of Social Issues, 56*, 509–526.

deCharms, R. (1968). *Personal causation*. New York, NY: Academic Press.

Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality, 62*, 119–142.

Deci, E. L., & Ryan, R. M. (1980). Self-determination theory: When mind mediates behavior. *Journal of Mind and Behavior, 1*, 33–44.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum.

Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. In R. Dienstbier (Ed.), *Perspectives on motivation* (Nebraska symposium on motivation, Vol. 38, pp. 237–288). Lincoln, NE: University of Nebraska Press.

Deci, E. L., & Ryan, R. M. (2000). The "what" and the "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227–268.

Deci, E. L., & Ryan, R. M. (2012). Motivation, personality, and development within embedded social contexts: An overview of self-determination theory. In R. M. Ryan (Ed.), *Oxford handbook of human motivation* (pp. 85–107). Oxford, UK: Oxford University Press.

Dijksterhuis, A., & Knippenberg, A. V. (2000). Behavioral indecision: Effects of self-focus on automatic behavior. *Social Cognition, 18*, 55–74.

Dimidjian, S., & Linehan, M. M. (2003). Defining an agenda for future research on the clinical application of mindfulness practice. *Clinical Psychology: Science and Practice, 10*, 166–171.

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior, 26*, 331–362.

Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist, 54*(7), 493–503.

Greenberg, J., Solomon, S., & Pyszczynski, T. (1997). Terror management theory of self-esteem and social behavior. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 61–139). San Diego, CA: Academic Press.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology, 74*, 1464–1480.

Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children's self-regulation and competence in school. *Journal of Educational Psychology, 81*, 143–154.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*, 35–43.

Gunaratana, B. H. (2002). *Mindfulness in plain English*. Boston, MA: Wisdom Publications.

Hayes, S. C., & Wilson, K. G. (2003). Mindfulness: Method and process. *Clinical Psychology: Science and Practice, 10*, 161–165.

Hodgins, H. S., & Knee, C. R. (2002). The integrating self and conscious experience. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 87–100). Rochester, NY: University of Rochester Press.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice, 10*, 144–156.

Kabat-Zinn, J. (2005). *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness*. New York, NY, US: Delta Trade Paperback/Bantam Dell; US.

Kasser, T. (2002). *The high price of materialism*. Cambridge, MA: MIT Press.

Kasser, T., & Ryan, R. M. (1993). A dark side of the American dream: Correlates of financial success as a central life aspiration. *Journal of Personality and Social Psychology, 65*, 410–422.

Kasser, T., & Ryan, R. M. (1996). Further examining the American dream: Differential correlates of intrinsic and extrinsic goals. *Personality and Social Psychology Bulletin, 22*, 280–287.

Kernis, M. H., & Goldman, B. M. (2006). A multicomponent conceptualization of authenticity: Theory and research. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 38, pp. 283–357). San Diego, CA: Elsevier Academic Press.

Kuhl, J., & Kazen, M. (1994). Self-discrimination and memory: State orientation and false self-ascription of assigned activities. *Journal of Personality and Social Psychology, 66*, 1103.

Langer, E. J. (1989). *Mindfulness*. Reading, MA: Addison-Wesley/Addison Wesley Longman.

Leary, M. R., & Tate, E. B. (2007). The multi-faceted nature of mindfulness. *Psychological Inquiry, 18*, 251–255.

Levesque, C., & Brown, K. W. (2007). Mindfulness as a moderator of the effect of implicit motivational self-concept on day-to-day behavioral motivation. *Motivation and Emotion, 31*, 284–299.

Loevinger, J., & Blasi, A. (1991). Development of the self as subject. In J. Stranss & G. Goethals (Eds.), *The self: Interdisciplinary approaches* (pp. 150–167). New York, NY: Springer.

Martin, J. R. (1997). Mindfulness: A proposed common factor. *Journal of Psychotherapy Integration, 7*, 291–312.

Martin, L. L., & Erber, R. (2005). Commentary: The wisdom of social psychology: Five commonalities and one concern. *Psychological Inquiry, 16*, 194–202.

McAdams, D. P. (1990). *The person*. San Diego, CA: Harcourt Brace Jovanovich.

Mitchell, J. P., Nosek, B. A., & Banaji, M. R. (2003). Contextual variations in implicit evaluation. *Journal of Experimental Psychology: General, 132*, 455–469.

Niemiec, C. P., Brown, K. W., Kashdan, T. B., Cozzolino, P. J., Breen, W. E., Levesque-Bristol, C., & Ryan, R. M. (2010). Being present in the face of existential threat: The role of trait mindfulness in reducing defensive responses to mortality salience. *Journal of Personality and Social Psychology, 99,* 344–365.

Niemiec, C. P., Ryan, R. M., & Brown, K. W. (2008). The role of awareness and autonomy in quieting the ego: A self-determination theory perspective. In H. A. Wayment & J. J. Bauer (Eds.), *Transcending self-*

interest (pp. 107–116). Washington, DC: American Psychological Association.

Niemiec, C. P., Ryan, R. M., & Deci, E. L. (2009). The path taken: Consequences of attaining intrinsic and extrinsic aspirations in post-college life. *Journal of Research in Personality, 43*, 291–306.

Nix, G., Ryan, R. M., Manly, J. B., & Deci, E. L. (1999). Revitalization through self-regulation: The effects of autonomous versus controlled motivation on happiness and vitality. *Journal of Experimental Social Psychology, 35*, 266–284.

Reeve, J. M., & Jang, H. (2006). What teachers say and do to support students' autonomy during a learning activity. *Journal of Educational Psychology, 98*, 209–218.

Roth, G., Assor, A., KanatMaymon, Y., & Kaplan, H. (2007). Autonomous motivation for teaching: How self-determined teaching may lead to self-determined learning. *Journal of Educational Psychology, 99*, 761–774.

Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology, 43*, 450–461.

Ryan, R. M. (1993). Agency and organization: Intrinsic motivation, autonomy and the self in psychological development. In J. Jacobs (Ed.), *Nebraska symposium on motivation: Developmental perspectives on motivation* (Vol. 40, pp. 1–56). Lincoln, NE: University of Nebraska Press.

Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality, 63*, 397–427.

Ryan, R. M., & Brown, K. W. (2003). Why we don't need self-esteem: Basic needs, mindfulness, and the authentic self. *Psychological Inquiry, 14*, 71–76.

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology, 57*, 749–761.

Ryan, R. M., Curren, R. R., & Deci, E. L. (2013). What humans need: Flourishing in Aristotelian philosophy and self-determination theory. In A. S. Waterman (Ed.), *The best within us*. Washington, DC: APA Books.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development and well-being. *American Psychologist, 55*, 68–78.

Ryan, R. M., & Deci, E. L. (2006). Self-regulation and the problem of human autonomy: Does psychology need choice, self-determination, and will? *Journal of Personality, 74*, 1557–1585.

Ryan, R. M., & Deci, E. L. (2011). Multiple identities within a single self: A self-determination theory perspective on internalization within contexts and cultures. In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self & identity* (pp. 253–274). New York, NY: Guilford.

Ryan, R. M., Huta, V., & Deci, E. L. (2008). Living well: A self-determination theory perspective on eudaimonia. *Journal of Happiness Studies, 9*, 139–170.

Ryan, R. M., Koestner, R., & Deci, E. L. (1991). Ego-involved persistence: When free-choice behavior is not intrinsically motivated. *Motivation and Emotion, 15*, 185–205.

Ryan, R. M., Legate, N., Niemiec, C. P., & Deci, E. L. (2012). Beyond illusions and defense: Exploring the possibilities and limits of human autonomy and responsibility through self-determination theory. In P. R. Shaver & M. Mikulincer (Eds.), *Meaning, mortality, and choice* (pp. 215–233). Washington, DC: American Psychological Association.

Ryan, R. M., Patrick, H., Deci, E. L., & Williams, G. C. (2008). Facilitating health behaviour change and its maintenance: Interventions based on Self-Determination Theory. *European Health Psychologist, 10*, 1–4.

Ryan, R. M., & Rigby, C. S. (2015). Did the Buddha have a self? No-self, self and mindfulness in Buddhist thought and western psychologies. In K. W. Brown, R. M. Ryan, & J. D. Creswell (Eds.), *Handbook of mindfulness*. New York, NY: Guilford.

Ryan, R. M., Sheldon, K. M., Kasser, T., & Deci, E. L. (1996). All goals are not created equal: An organismic perspective on the nature of goals and their regulation. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action*. New York, NY: Guilford.

Salovey, P., Mayer, J. D., Goldman, S. L., Turvey, C., & Palfai, T. P. (1995). Emotional attention, clarity, and repair: Exploring emotional intelligence using the trait meta-mood scale. In *Emotion, disclosure, & health* (pp. 125–154). Washington, DC: American Psychological Association.

Shapiro, S. L., Schwartz, G., & Bonner, G. (1998). Effects of mindfulness-based stress reduction on medical and premedical students. *Journal of Behavioral Medicine, 21*, 581–599.

Tart, C. T. (1994). *Living the mindful life*. Boston, MA: Shambhala.

Trapnell, P. D., & Campbell, J. D. (1999). Private self-consciousness and the five-factor model of personality: Distinguishing rumination from reflection. *Journal of Personality and Social Psychology, 76*, 284–304.

Vansteenkiste, M., Neyrinck, B., Niemiec, C. P., Soenens, B., De Witte, H., & Van Den Broeck, A. (2007). On the relations among work value orientations, psychological need satisfaction and job outcomes: A self-determination theory approach. *Journal of Occupational & Organizational Psychology, 80*, 251–277.

Vansteenkiste, M., Ryan, R. M., & Deci, E. L. (2008). Self-determination theory and the explanatory role of psychological needs in human well-being. In L. Bruni, F. Comim, & M. Pugno (Eds.), *Capabilities and happiness* (pp. 181–223). Oxford, UK: Oxford University Press.

Verplanken, B., & Velsvik, R. (2008). Habitual negative body image thinking as psychological risk factor in adolescents. *Body Image, 5*, 133–140.

Weinstein, N., Brown, K. W., & Ryan, R. M. (2009). A multi-method examination of the effects of mindfulness on stress attribution, coping, and emotional well-

being. *Journal of Research in Personality, 43*, 374–385.

Weinstein, N., & Ryan, R. M. (2010). When helping helps: Autonomous motivation for prosocial behavior and its influence on well-being for the helper and recipient. *Journal of Personality and Social Psychology, 98*, 222–244.

Westen, D. (1999). *Psychology: Mind, brain, and culture* (2nd ed.). New York, NY: Wiley.

Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology, 70*, 767–779.

Self-Regulatory Strength and Mindfulness

8

Michael J. MacKenzie and Roy F. Baumeister

Self-regulation (also referred to as self-control) has become a popular research topic in psychology over the past few decades. During this recent time period, researchers and thinkers have recognized the significance of self-regulation and its importance for understanding human well-being and human nature. Self-regulation is a pervasive feature of everyday life (Hofmann, Baumeister, Förster, & Vohs, 2012). A range of activities such as deciding what to wear, suppressing unwanted thoughts, inhibiting a rude (or honest) remark, and feigning laughter all involve self-regulation and self-control. This ability is one of humans' defining characteristics. Other animals may have some ability for self-control; however, self-control in non-human animals pales in comparison to humans. As will be discussed in greater detail later, effective self-regulation is an important part of living a successful life. Conversely, failure at self-regulation is a central factor involved in many problems for both the individual and society at large. Self-regulation is an impressive evolutionary achievement and very likely an essential step for development of civilization and culture. Being able to restrain one's desires and override initial responses allows a great degree of flexibility, far surpassing that of any other species. Among other benefits, self-regulation enables people to pursue and achieve long-term benefits when these require short-term sacrifices and costs. According to some views (e.g., Baumeister, 2005) the central thrust of human evolution was the emergence of the capacity to create and sustain culture, and self-regulation is intimately connected with this evolutionary advancement and the development of culture and civilization.

In this chapter we provide a general background on self-regulation, followed by a more detailed explanation of the strength model of self-regulation, and then we discuss its relation to mindfulness. First, the chapter will define self-regulation (and self-control). Following this, the operation of self-regulation and its basic elements are discussed, and a strength model of self-regulation is explicated. Some research highlighting the benefits of successful self-regulation is outlined. Last, some aspects of mindfulness are looked at from the strength model perspective of self-regulation and relations between the two are addressed.

Definition of Self-Regulation

To regulate something means to change or adjust it. More specifically, to regulate means to change in a particular sort of way: a way that is in

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accordance with some rule, ideal, goal or some other kind of standard. In brief, self-regulation is regulation of the self by the self (Baumeister, Heatherton, & Tice, 1994; Carver & Scheier, 1981). To self-regulate, then, means to change some thought, feeling, or behavior in such a way that it conforms to some standard.

The term self-control can be used interchangeably with self-regulation. However, some authors maintain an important distinction between the two. Self-control refers to the active, conscious, effortful capacity of self-regulation. Self-regulation can also occur at the unconscious level (see Bargh, 1990; Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trotschel, 2001; Chartrand & Bargh, 1996; Fitzsimons & Bargh, 2003). In other words, there may be unconscious self-regulation but no unconscious self-control. This chapter, however, will focus on conscious self-regulation, and so self-regulation and self-control can be used interchangeably for present purposes.

Self-control is the ability to override reactions to impulses, urges, and habitual responses in such a way that the following thoughts, feelings, or behaviors will fall in line with personal or cultural standards. Self-control has sometimes been equated with impulse control, but impulse control is in a sense a misnomer. The impulse itself is not being controlled. What is being controlled is how one deals with the given impulse. Thus, self-control enables people to adjust their own behaviors and inner states, thereby enabling a high degree of adaptability and flexibility.

Elements of Self-Regulation

Self-regulation can be broken down into three main components. The first is establishing a goal or desired state. This is also generally referred to as having a standard. The second is monitoring progress toward the standard. The third is the capacity to make the desired changes. This refers to the strength or ability one has to make changes. A deficit in any one of these components can lead to self-regulation failure. We shall now explain each of these.

Standards

Self-regulation is about changing the self, but without standards any change would be random and without aim or purpose. Standards provide guidance for how one should change. A standard can be a rule, law, or social norm which one is motivated to follow. A standard could also be a personal goal, value, or ideal. The reasons behind selecting or creating a particular standard can be a complex, dynamical cognitive process influenced by a variety of interpersonal, intrapersonal, and situational variables (Higgins, 1987). Despite this complexity, humans do not often lack standards. In fact, rather than a lack of standards, the more common problem is an overabundance of standards. This can lead to self-regulatory breakdown, especially if standards conflict (Baumeister et al., 1994). Moral dilemmas typically involve two conflicting standards, so that adhering to one standard entails violating another. Standards that are vague, ambiguous, or unclear can make self-regulation difficult and prone to failure. Another common clash between standards involves the desire to feel better in the short-term versus the desire to achieve some long-term goal. Imagine a person on a diet who is feeling upset and is contemplating eating some junk food. To alleviate his or her negative feelings, a person will prefer a short-term solution over a long-term solution; therefore, eating some unhealthy food can offer an immediate although temporary wave of pleasure. But this short-term goal conflicts with the long-term goal of losing weight. Thus, being upset or in a negative emotional state can compromise other standards involving self-control. This regulation of immediate emotional distress has been shown to override other patterns of self-control related to distal goals (Tice, Bratslavsky, & Baumeister, 2001).

Some work on standards comes from Higgins and his colleagues (e.g., Higgins, 1987; Higgins, Roney, Crowe, & Hymes, 1994; Shah, Higgins, & Friedman, 1998). This research makes a distinction between *ideal* standards and *ought* standards. Ideal standards represent positive strivings toward the way one would like to be. Ought standards are also based on how one would like to be,

but they involve following particular duties, obligations, or laws. Higgins and colleagues suggest that violations of these types of standards are accompanied by different emotions. The type of negative emotion is what differs. Failure to self-regulate toward ideals produces low arousal emotions, such as disappointment and sadness. On the other hand, failure to self-regulate toward ought standards produces high arousal emotions such as stress and worry. Simply having standards is not enough to ensure that they will be followed. One must be motivated to adhere to a standard. Higgins and colleagues (e.g., Higgins & Spiegel, 2004) suggest that there are also different motivational patterns used to engage in self-regulation. Such patterns are commonly referred to as regulatory focus. Some individuals are promotion-focused: they are primarily motivated to reach desirable outcomes by pursuing ideal standards using eager, approach-oriented strategies. Other individuals are prevention focused: they are primarily motivated to reach desirable outcomes by pursuing ought standards using vigilant, avoidance-oriented strategies. When the regulatory standard type (ideal or ought) matches regulatory focus style (promotion or prevention), it is referred to as regulatory fit. Research suggests that when people experience regulatory fit, self-regulatory outcomes are improved (Higgins, 2000). For example, research by Keller and Bless (2006) found that individuals performed better on a cognitive task when their chronic regulatory focus style matched the situationally induced self-regulatory mechanisms of the task. When the task was described in a self-regulatory prevention way (as the potential for loss), those with a chronic prevention focus performed better compared to when the same task was described in a self-regulatory promotion way (as the potential for gain). However, some ideas by Higgins and colleagues have received criticism. Tangney, Niedenthal, Covert, and Barlow (1998) tested some of Higgins' hypotheses. A major finding was that violating certain types of standards was not significantly related to a distinct emotional experience (i.e., low arousal vs. high arousal). Thus, the core point of the theory, linking different standards to different emotional patterns, is under question. At present it seems reasonable to conclude that violating standards often brings some emotional distress, but there appears to be very little recently published work that pursues the notion of specific, differentiated standards linked to specific emotions.

In sum, standards are a necessary but not sufficient ingredient for successful self-regulation. Without standards, self-regulation would be without purpose and offer no conceivable benefits. Sometimes, one can hold standards that conflict with each other, which can cause certain self-regulatory patterns to be compromised. But having standards alone is not enough to successfully achieve them. One must have a desire and motivation to reach a standard. A standard that exhorts one to eat healthy food or quit smoking will have little effect if the person lacks motivation to try to live up to it.

Monitoring

Monitoring refers to keeping track of activities that are relevant to achieving a goal or standard and noting the extent to which progress is being made. A prominent book by Carver and Scheier (1981) argued that one of the main functions of self-awareness is to facilitate self-regulation. Indeed, it would be quite difficult to change a behavior if one were not aware of it. Self-awareness involves more than just being aware that one exists, or that one has brown hair. It involves a comparison of aspects of the self to standards. For example, one can be aware that one is overweight only by comparison to some social or medical standard. Borrowing from cybernetic theory, Carver and Scheier suggested that self-regulation is similar to a feedback loop. The feedback loop involves four steps called test, operate, (re)test, and exit (TOTE; Miller, Galanter, & Pribram, 1960). The first test phase consists of comparing one's current status on a particular thing to the relevant standard. If the standard is met, there is no need to move on to the next phase. However, if the standard has not been reached, then the operate phase will begin.

The operate phase involves making changes and attempting to make the current status fall into line with the relevant standard. At some point during or after the operate phase, another test will occur. If this test determines the standard has been met, then the feedback loop will be exited, otherwise it will resume or continue the operate phase. A good example of the ill effects of reduced self-awareness (and therefore monitoring) on self-regulation is alcohol use. Alcohol intoxication reduces self-awareness (Hull, 1981) and is associated with an array of self-regulatory impairments (Baumeister et al., 1994). A major reason appears to be that alcohol intoxication stops people from keeping track of relevant behaviors, so they succumb to excess. Monitoring, then, is an important tool for successful self-regulation.

The Strength Model

The third element of self-regulation is the capacity to make changes. For successful self-regulation, it is not enough for one to have standards and monitor progress toward those standards. One must also exert effort toward achieving those standards. This aspect of self-regulation can be thought of as the operate phase of the TOTE model.

Recent evidence suggests that successful self-control depends on a limited resource (see Baumeister & Tierney, 2011; Gailliot et al., 2007; Gailliot & Baumeister, 2007). Folk wisdom has recognized that "willpower" is an important part of self-control. Scientific investigation has found that such a notion of willpower is not far off the mark. The terms *limited resource model*, *energy model*, and *strength model* will be used interchangeably.

Baumeister et al. (1994) suggested that an individual's capacity for self-control was limited. They contended that self-control can be viewed as an energy model, where initial acts involving self-control would lead to less effective self-control in subsequent tasks because of the depletion of an energy resource. Subsequent research had participants perform two self-control tasks in a row as a way to test the energy model (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven, Tice, & Baumeister, 1998). This two-task paradigm allowed researchers to test three competing models of self-regulation. First, if self-regulation primarily involved information processing and operated as a cognitive construct, the recent use of self-control on the first task should make schemas of self-control more accessible and therefore the participant should perform better on the second task. Second, if self-control operated as a skill, participants would display a similar performance on both tasks, but would gradually get better over time. Third, if self-control operated as the limited resource model predicts, participants should perform worse on the second task of self-control than on the first, because the available energy resource would be temporarily reduced.

Many subsequent empirical findings have supported the limited resource model of self-control. When participants performed acts controlling thoughts, behaviors, or feelings, the ability to perform on subsequent self-control tasks was impaired. Muraven et al. (1998) had participants watch an emotionally distressing movie clip with a specific set of instructions. Some were instructed to suppress their emotional reactions, others were instructed to exaggerate their reactions, and others were instructed to not alter their emotions. After this task, participants did a test of physical stamina using a handgrip exerciser. It was found that those who had had to alter their emotional reactions in some way (either suppressing or exaggerating) performed worse on the handgrip task, compared to those who did not alter emotional reactions. It seems, then, that those who had to regulate their emotions consumed some of the resource, which left less available to use in the handgrip task.

In another study, participants began the experiment on an empty stomach and were seated at a table with a freshly baked pile of chocolate chip cookies on one side, and a bowl of radishes on the other. Some participants were told that their task was to only eat the radishes; they were then left alone on the room with the cookies and radishes in front of them. Participants in the control

condition were told they could eat the cookies. The second self-control task was a series of difficult (unsolvable) puzzles. The results supported the limited resource model. Those who were told to only eat the radishes gave up on the puzzles significantly faster than those who ate the cookies. The results suggest that resisting the temptation to eat the cookies drained some self-control resource. Participants in this depleted state had less self-regulatory strength to persevere on the next, unrelated self-regulatory task (Baumeister et al., 1998).

Another study found that participants who completed a thought suppression exercise were more likely to drink free beer than those who had solved math problems (Muraven, Collins, & Nienhaus, 2002). Math problems may be unpleasant but they do not require self-control and therefore do not deplete the self, whereas suppressing thoughts is an important form of self-regulation.

Furthermore, a recent meta-analysis by Hagger, Wood, Stiff, and Chatzisarantis (2010) combined results from 83 similar self-control depletion studies and found a significant effect of depletion on self-control task performance. Participants who had been depleted from using self-control on an initial task exerted less self-control and therefore performed worse on a second task, compared to those who were not depleted. It was also found that the effect size of depletion on self-control task performance was influenced by the duration of time between self-control tasks. When there was less rest time between tasks, depletion from the first task had a stronger effect on performance of the second task. Hagger et al. (2010) also reported that when participants have put in some training on a self-control task, they perform better on that task when in a depleted state compared to those who have not previously trained on the task. This pattern of depleted self-control ability is commonly referred to as "ego depleted." The term was selected to pay homage to Sigmund Freud, one of the most prominent thinkers to use an energy model of the self (ego).

All of these studies show that the first and second act of self-control do not have to be related in order for depletion effects to occur. Suppressing emotions impairs perseverance on a subsequent hand exercise, and resisting chocolate chip cookies hampers persistence on difficult puzzles. This implies that a common resource is being drawn upon for a range of self-regulation tasks. These studies offer support for a vital component of the strength model: they show that self-regulation depends on a limited resource that becomes depleted when one exerts self-regulatory efforts.

Increasing Self-Control Strength

Another prediction of the strength model is that self-control should gradually improve over time with regular exercise. Thus, self-control may resemble a muscle: after immediate usage it gets tired and less effective, but with continual exercise it should get stronger (Baumeister, Vohs, & Tice, 2007; Muraven & Baumeister, 2000). Some research supports this prediction. Muraven, Baumeister, and Tice (1999) had some participants practice particular self-regulatory tasks (e.g., maintaining good posture) for 2 weeks. Other participants did not practice anything over the same 2-week period. Following this, participants returned to the laboratory and completed two consecutive self-regulatory tasks (a thought suppression task followed by a persistence task). It was found that those who practiced self-regulation for 2 weeks lasted longer (compared to their previously measured baseline score) on the persistence task than those who did not practice. The 2-week exercise period apparently improved self-regulatory stamina. The self-control muscle, so to speak, did not tire out as easily in the group who had exercised it for 2 weeks. Another study by Oaten and Cheng (2006) found similar self-regulatory improvements after a period of regular exercise. They found that those who were assigned to a 2-month long physical exercise program, compared to those not in the program, displayed reduced impairments on a second self-control task and also reported an increase in self-control behavior such as reduced cigarette smoking and eating healthier. A series of studies by Gailliot, Plant, Butz, and Baumeister (2007) found that participants who completed 2 weeks

of self-regulation exercises (e.g., changing speaking patterns, using their nondominant hand for common tasks) performed better on a second self-regulatory task than those who did not do the self-regulation exercises.

After recent use of self-control it becomes fatigued, tired, and less effective. The ability for one to use self-control more effectively and for longer periods of time can be enhanced if one regularly exercises self-control. Thus, recent evidence seems to support the idea that self-control resembles a muscle that becomes fatigued after use and increases in strength with regular practice.

Conservation and Motivation

If self-regulation relies on limited resource, then people would be expected to allocate self-regulation resources in an efficient and judicious manner, which would entail not expending them on superfluous or frivolous tasks. Thus, ego depletion effects indicate conservation rather than complete expenditure of the resources. Indeed, Muraven, Shmueli, and Burkley (2006) demonstrated that people conserve their self-regulatory resources as needed. This research found that performance on self-control tasks was more likely to be impaired when participants knew they had to do another self-control task later, as compared to when no further task was anticipated. Apparently, those who were anticipating doing another self-control task had the wherewithal to conserve some of their resources.

Motivation is another factor involved in self-control. Muraven and Slessareva (2003) found that participants who were depleted (from completing a previous self-control task) and offered an incentive (e.g., getting paid for better performance) to complete a subsequent self-control task performed significantly better than those who were also depleted but not offered any incentive. An incentive did not influence task performance for those who were not depleted. Findings from this study show that when people have been depleted by an initial self-control task, an increase in motivation can override depletion effects and thus enhance performance on subsequent self-control tasks.

Some research has found that personal beliefs and self-affirmation can influence typical depletion effects. Schmeichel and Vohs (2009) found that thinking about important personal values counteracted the ill effects of depletion. This study had participants rank order a list of personal values (e.g., friends, family, aesthetics). Those in the self-affirmation condition then thought about and wrote about their top ranked value. It was found that engaging in this self-affirmation activity between self-control tasks significantly facilitated performance on the second self-control task. This effect was only found for depleted participants. For participants who did not engage in an initial depleting self-control task, self-affirmation had no effect on performance of the second task. Another study by Job, Dweck, and Walton (2010) found that participants who believed willpower was unlimited were less impaired by ego depletion than participants who did not believe willpower was unlimited.

A recent study by Vohs, Baumeister, and Schmeichel (2012) examined the extent to which beliefs and motivations influence self-control. They found that when depletion was mild (completing one self-control task), particular beliefs and motivations eliminated the typical depletion effects. Specifically, those who were manipulated to believe that willpower was unlimited (Experiment 1) or motivated by task importance (Experiment 2) did not display self-regulation impairment on a following self-control task. However, when participants had completed multiple self-control tasks, belief and motivation did not improve self-control performance. When ego depletion was more extensive, motivation and belief did not countervail the typical depletion effects.

The contrary effects of beliefs about unlimited willpower with mild versus severe depletion help explain a seeming paradox. If Job et al. (2010) were correct that believing in unlimited willpower could actually make willpower unlimited, then it would be surprising if any society in the world had failed to adopt such a highly adaptive

belief. Yet belief in unlimited willpower is very far from the norm. The reason, presumably, is that such a belief is counterproductive just when willpower is most needed (i.e., when demands for self-control are high).

Summary of the Strength Model

Performance on a second self-control task is impaired as a result of having used some of the limited resources on an initial self-control task. The strength model suggests that an act of self-control consumes a limited resource. After engaging in self-control, availability of the resource is temporarily reduced, and one will be less effective at self-control while in this depleted state. The same resource is used for a variety of self-regulatory tasks such as resisting temptations, suppressing thoughts, and persisting on difficult tasks. If one uses self-regulatory resources within a certain domain, all other domains are vulnerable to impairment. According to the strength model, self-control resembles a muscle. Like a muscle, self-control capacity can be improved with regular practice and exercise.

Evidence has strongly supported the strength model of self-control, and some recent research has augmented certain aspects of it. Particularly, some research (e.g., Job et al., 2010; Muraven & Slessareva, 2003) suggests that personal beliefs (e.g., believing willpower is unlimited), and motivation (such as monetary incentives) can counteract typical depletion impairments. Other research shows that personal beliefs and motivation can offset typical self-control impairments associated with depletion, but only in cases of mild depletion (Vohs et al., 2012). As depletion becomes more severe, the influence of belief and motivation diminishes. Hence, it appears that there are variables involved with self-control ability that are not directly related to strength or a limited resource. But it seems that these other variables are only relevant at mild levels of depletion. It is likely that self-regulation ability is an interaction between biologically based energy levels and subjective psychology factors.

Benefits of High Self-Control

Self-control is an important feature of success and well-being. Successful self-control is crucial for the optimal function of humans on the individual and collective level. Inadequate self-control, on the other hand, is a core feature of many societal and individual ills. This section will outline some domains in life where successful self-regulation is an important factor.

The importance of dispositional self-control was highlighted by Walter Mischel and his colleagues (e.g., Mischel, Ebbesen, & Zeiss, 1972; Mischel, Shoda, & Peake, 1988; Shoda, Mischel, & Peake, 1990) on the delay of gratification. Delay of gratification is an important form of self-control because it requires one to override impulsive reactions in order to obtain a more desirable outcome at a later time. The research by Mischel and colleagues investigated differences in trait levels of self-regulation. In these delay of gratification studies children were presented with a choice to have an immediate treat or a more desirable treat at a later time. Some children were unable to resist and nibbled away at the treat right away, while other children were able to wait and ultimately received the more desirable treat. Follow-up studies found that the ability to delay gratification as a child predicts personal well-being as a young adult. Those who had been able to resist the immediate temptation as a child were more likely to do well in school, to be popular, to have higher SAT scores, and to exhibit better mental health than those who had had poor self-control and had been unable to resist the immediate temptation (Mischel et al., 1988; Shoda et al., 1990).

Poor self-control has also been recognized as one of the most important aspects for understanding crime (Gottfredson & Hirschi, 1990; Pratt & Cullen, 2000). People usually engage in criminal behavior because they have poor self-control and have a hard time controlling responses to antisocial impulses. Hollywood likes to portray criminals as well thought out, calculated, criminal masterminds (e.g., the "criminal genius"). However these are not the characteristics of the everyday person who engages in crime. Criminals

tend to be impulsive and often fail to consider long-term goals or consequences. Another way, then, that effective self-control is beneficial for both society and the individual is that it reduces one's tendency for acting on antisocial impulses or urges.

Tangney, Baumeister, and Boone (2004) measured trait levels of self-control and then examined several areas of self-regulatory functioning. Those who had higher self-control scores were better off than those with low self-control scores on almost all of the outcomes. Individuals with higher self-control scores performed better in school, had higher empathy, maintained healthier relationships with friends and family, and their relationships involved less conflict. Further, those with high self-control had higher self-esteem, better psychological adjustment, better emotion regulation abilities, and fewer impulse control problems. High self-control, then, is a valuable trait that research suggests is beneficial to both the individual and society.

The Strength Model of Self-Regulation and Mindfulness

Mindfulness has been defined as a receptive attention to and awareness of present events and experience (Brown & Ryan, 2003). A host of benefits have been associated with increased mindfulness such as improved psychological well-being and physical health, better relationship quality, and improved self-regulation (see Brown, Ryan, & Creswell, 2007). Overall, mindfulness has been shown to facilitate healthy and adaptive human functioning across several domains. Following Masicampo and Baumeister (2007), we suggest that there are two areas where the distinction between self-regulatory processes and mindfulness requires attention. First, some conceptual overlap between self-regulation exercise and mindfulness interventions is addressed. Second, the possibility of a bidirectional relationship between self-regulation and mindfulness is examined.

As discussed previously, the strength model of self-control suggests that self-control may operate like a muscle. Research shows that when self-control is consistently exercised, one's general capacity for self-control increases (gets stronger). An increase in self-control ability has been strongly associated with improvements across a wide range of areas related to well-being. It is possible, then, that mindfulness interventions are a type of self-control exercise. The mindfulness interventions discussed by Brown et al. (2007) have similar characteristics to some of the self-control procedures used in psychological experiments. For example, the mindfulness-based stress reduction procedure involves participants focusing their awareness on thoughts or a specific image for over an hour in a daily exercise routine. Some self-control procedures involve similar attention control tasks (e.g., Gailliot, Baumeister et al., 2007; Vohs, Baumeister, & Ciarocco, 2005). One of these tasks requires participants to watch a silent, 6 min video of a woman speaking, which also has words popping up in the corner. Some participants were instructing to not look at the words, and thus to focus their attention on a specific feature. Holding attention during this 6 min task despite a series of distracting stimuli was enough to induce self-control depletion. Hence, it appears that the awareness control exercises used in mindfulness interventions may be a similar, but longer lasting, type of attention control task used in self-control research.

Other types of mindfulness interventions require participants to consciously monitor and control their physical movements. For example, Hanh (1976) suggests one way to increase mindfulness is to move in slow motion while doing common household tasks and fully focus your attention on the task. This practice is similar to exercises used to increase self-control ability that requires participants to monitor their posture (Muraven et al., 1999) or use their nondominant hand for common daily tasks such as brushing teeth or opening doors (Gailliot, Baumeister et al., 2007). The procedures proposed by Hanh and the self-control researchers require people to engage in common tasks in unusual ways that require conscious control.

Brown et al. (2007) suggest that those with higher dispositional mindfulness have increased

well-being and better self-control ability. However, it is also possible that successful self-control leads to increased mindfulness and well-being. One route by which increased self-control could lead to mindfulness is through goal regulation. An important component of entering a mindful state is achieving some peace of mind or clarity of thought. Unwanted worry or anxiety deriving from uncompleted or unplanned tasks may be a distraction and hinder such clarity of thought. It is possible, then, that those who have successful goal management and regulation (i.e., self-control) have a greater disposition to enter mindful states.

Other research has found that engaging in mindfulness meditation can counteract self-control depletion. Mindfulness meditation consists of blocking out distractions and focusing one's attention on the current moment. A recent study by Friese, Messner, and Schaffner (2012) had some depleted participants mindfully meditate for 5 min before a second self-control task. It was found depleted participants who engaged in a brief session of mindfulness meditation performed just as well on the second task as did those who were not depleted. The authors suggest that mindfulness meditation may counter typical depletion effects because it increases self-awareness and feelings relaxation. In this experimental design, depleted participants who meditated (compared to those who did not) presumably exerted additional attention control before the second task. Despite this, those who meditated still outperformed their non-meditating depleted counterparts. It is possible, then, that there are unique features of mindfulness that improve self-control.

Self-control and mindfulness interventions have a number of features in common. Both have similar procedures, execution, and require participation in daily exercises over extended periods of time. Both also involve regulating one's thoughts or behaviors. Self-control and mindfulness interventions produce similar results related to improving physical and psychological well-being. Furthermore, it is not exclusively the case that increased mindfulness causes increased self-control. Mindful states may be most accessible to individuals who already display a high degree of self-control. Therefore, future research should continue to investigate the extent to which the benefits of mindfulness interventions are unique to specific aspects of mindfulness such as nonattachment and metacognitive insight, and the extent to which they are a result of general self-regulatory processes.

Concluding Remarks

Successful self-control is a vital characteristic that contributes to well-being in a variety of domains. This chapter summarized the strength model of self-control, which states that the ability to self-regulate relies on limited resource. Research has consistently shown that after completing an initial self-control task, performance on subsequent self-control tasks is impaired. Another aspect of the strength model of self-control suggests that self-control resembles a muscle. With regular exercise and practice, one's capacity for self-control can increase.

Mindfulness is an important and useful area of research that is receiving an increasing amount of attention. Mindfulness is associated with increased well-being in life across a range of domains (see Brown & Ryan, 2003). Self-control exercises and mindfulness interventions appear to have some features in common and there is likely a bidirectional relationship between mindfulness and self-regulation. Future research on mindfulness should consider any possible theoretical overlap with self-regulation and clarify the distinction between them.

References

Bargh, J. A. (1990). Goal not = intent: Goal directed thought and behavior are often unintentional. *Psychological Inquiry, 1*, 248–251.

Bargh, J. A., Gollwitzer, P. M., Lee-Chai, A., Barndollar, K., & Trotschel, R. (2001). The automated will: Nonconscious activation and pursuit of behavioral goals. *Journal of Personality and Social Psychology, 81*, 1014–1027.

Baumeister, R. F. (2005). *The cultural animal: Human nature, meaning, and social life*. New York, NY: Oxford University Press.

Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology, 74*, 1252–1265.

Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). *Losing control: How and why people fail at self-regulation*. San Diego, CA: Academic.

Baumeister, R. F., & Tierney, J. (2011). *Willpower: Rediscovering the greatest human strength*. New York, NY: The Penguin Press.

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science, 16*, 351–355.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*, 211–237.

Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control theory approach to human behavior*. New York, NY: Springer.

Chartrand, T. L., & Bargh, J. A. (1996). Automatic activation of impression formation and memorization goals: Nonconscious goal priming reproduces effects of explicit task instructions. *Journal of Personality and Social Psychology, 71*, 464–478.

Fitzsimons, G. M., & Bargh, J. A. (2003). Thinking of you: Nonconscious pursuit of interpersonal goals associated with relationship partners. *Journal of Personality and Social Psychology, 84*, 148–164.

Friese, M., Messner, C., & Schaffner, Y. (2012). Mindfulness meditation counteracts self-control depletion. *Consciousness and Cognition, 21*, 1016–1022.

Gailliot, M. T., & Baumeister, R. F. (2007). The physiology of willpower: Linking blood glucose to self-control. *Personality and Social Psychology Review, 11*, 303–327.

Gailliot, M. T., Baumeister, R. F., DeWall, C. N., Maner, J. K., Plant, E. A., Tice, D. M., . . . Schmeichel, B. J. (2007). Self-control relies on glucose as a limited energy source: Willpower is more than a metaphor. *Journal of Personality and Social Psychology, 92,* 325–336.

Gailliot, M. T., Plant, E. A., Butz, D. A., & Baumeister, R. F. (2007). Increasing self-regulatory strength can reduce the depleting effect of suppressing stereotypes. *Personality and Social Psychology Bulletin, 33*, 281–294.

Gottfredson, M. R., & Hirschi, T. (1990). *A general theory of crime*. Stanford, CA: University Press.

Hagger, M. S., Wood, C., Stiff, C., & Chatzisarantis, N. L. D. (2010). Ego depletion and the strength model of self-control: A meta-analysis. *Psychological Bulletin, 136*, 495–525.

Hanh, T. N. (1976). *Miracle of mindfulness*. Boston, MA: Beacon.

Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review, 94*, 319–340.

Higgins, E. T. (2000). Making a good decision: Value from fit. *American Psychologist, 55*, 1217–1230.

Higgins, E. T., Roney, C. J., Crowe, E., & Hymes, C. (1994). Ideal versus ought predilections for approach and avoidance distinct self-regulatory systems. *Journal of Personality and Social Psychology, 66*, 276–286.

Higgins, E. T., & Spiegel, S. (2004). Promotion and prevention strategies for self-regulation: A motivated cognition perspective. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of self-regulation: Research theory, and application* (pp. 171–187). New York, NY: Guilford Press.

Hofmann, W., Baumeister, R. F., Förster, G., & Vohs, K. D. (2012). Everyday temptations: An experience sampling study of desire, conflict, and self-control. *Journal of Personality and Social Psychology, 102*, 1318–1335.

Hull, J. G. (1981). A self-awareness model of the causes and effects of alcohol consumptions. *Journal of Abnormal Psychology, 90*, 586–600.

Job, V., Dweck, C. S., & Walton, G. M. (2010). Ego depletion—is it all on your head? Implicit theories about willpower affect self-regulation. *Psychological Science, 21*, 1686–1693.

Keller, J., & Bless, H. (2006). Regulatory fit and cognitive performance: The interactive effect of chronic and situationally induced self-regulatory mechanisms on test performance. *Europena Journal of Social Psychology, 36*, 393–405.

Masicampo, E. J., & Baumeister, R. F. (2007). Relating mindfulness and self-regulatory processes. *Psychological Inquiry, 18*, 255–258.

Miller, G. A., Galanter, E., & Pribram, K. H. (1960). *Plans and the structure of behavior*. New York, NY: Holt, Rinehart & Winston.

Mischel, W., Ebbesen, E. B., & Zeiss, A. R. (1972). Cognitive and attentional mechanisms in delay of gratification. *Journal of Personality and Social Psychology, 21*, 204–218.

Mischel, W., Shoda, Y., & Peake, P. K. (1988). The nature of adolescent competencies predicted by preschool delay of gratification. *Journal of Personality and Social Psychology, 54*, 687–696.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin, 126*, 247–259.

Muraven, M., Baumeister, R. F., & Tice, D. M. (1999). Longitudinal improvement of self-regulation through practice: Building self-control strength through repeated exercise. *Journal of Social Psychology, 139*, 446–457.

Muraven, M., Collins, R. L., & Nienhaus, K. (2002). Self-control and alcohol restraint: An initial application of the self-control strength model. *Psychology of Addictive Behaviors, 16*, 113–120.

Muraven, M., Shmueli, D., & Burkley, E. (2006). Conserving self-control strength. *Journal of Personality and Social Psychology, 91*, 524–537.

Muraven, M., & Slessareva, E. (2003). Mechanisms of self-control failure: Motivation and limited resources. *Personality and Social Psychology Bulletin, 29*, 894–906.

Muraven, M., Tice, D. M., & Baumeister, R. F. (1998). Self-control as a limited resource: Regulatory depletion patterns. *Journal of Personality and Social Psychology, 74*, 774–789.

Oaten, M., & Cheng, K. (2006). Longitudinal gains in self-regulation from regular physical exercise. *British Journal of Health Psychology, 11*, 717–733.

Pratt, T. C., & Cullen, F. T. (2000). The empirical status of Gottfredson and Hirschi's general theory of crime: A meta-analysis. *Criminology, 38*, 931–964.

Schmeichel, B. J., & Vohs, K. D. (2009). Self-affirmation and self-control: Affirming core values counteracts ego depletion. *Journal of Personality and Social Psychology, 96*, 770–782.

Shah, J., Higgins, E. T., & Friedman, R. S. (1998). Performance incentives and means: How regulatory focus influences goal attainment. *Journal of Personality and Social Psychology, 74*, 285–293.

Shoda, Y., Mischel, W., & Peake, P. K. (1990). Predicting adolescent cognitive and self-regulatory competencies from preschool delay of gratification: Identifying diagnostic conditions. *Developmental Psychology, 26*, 978–986.

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*, 271–324.

Tangney, J. P., Niedenthal, P. M., Covert, M. V., & Barlow, D. H. (1998). Are shame and guilt related to distinct self-discrepancies? A test of Higgin's (1987) hypotheses. *Journal of Personality and Social Psychology, 75*, 256–268.

Tice, D. M., Bratslavsky, E., & Baumeister, R. F. (2001). Emotional distress regulation takes precedence over impulse control: If you feel bad, do it! *Journal of Personality and Social Psychology, 80*, 53–67.

Vohs, K. D., Baumeister, R. F., & Ciarocco, N. J. (2005). Self-regulation and self-presentation: Regulatory resource depletion impairs impression management and effortful self-presentation depletes regulatory resources. *Journal of Personality and Social Psychology, 88*, 632–657.

Vohs, K. D., Baumeister, R. F., & Schmeichel, B. J. (2012). Motivation, personal beliefs, and limited resources all contribute to self-control. *Journal of Experimental Social Psychology, 4*, 943–947.

Mindfulness and Emotion Regulation

9

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The exploration of mindfulness and its relation to emotions and emotion regulation is a widely researched area of the mindfulness literature. It is broadly acknowledged that mindfulness has a large impact on the awareness and labeling of emotions, the experience of emotions, and the level of positive and negative emotions that are experienced. As a result, varied conceptualizations of mindfulness include processes that relate to emotion regulation specifically. In this chapter, we begin by noting the implications for emotions and emotion regulation in a variety of models of mindfulness. Then, to highlight the wealth of research linking mindfulness to emotion regulation, we provide an overview of the role of mindfulness in general emotional states, emotional reactions to stimuli and events, and emotions over time. Importantly, however, in this chapter we will go beyond emotion regulation as an outcome of being mindful, and we will begin to link the impact of mindfulness on emotion regulation to behavioral change. Specifically, by highlighting research on smoking, alcohol use, and other addictive behaviors, we will demonstrate that emotion regulation serves as a key mechanism in the relationship between mindfulness and some domains of behavioral regulation.

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Conceptualizations of Mindfulness and Its Role in Emotion Regulation

Consensus about an empirical definition of mindfulness is still lacking. As a result, a number of operational definitions and conceptual models of the broad construct of mindfulness exist. Below, we describe several definitions/models of mindfulness, highlighting the aspects of each that relate to emotion regulation and models of emotion regulation.

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Brown and Ryan (2003) have advanced a unidimensional notion of mindfulness as "enhanced attention to and awareness of current experience or present reality" (p. 822). This singular and largely cognitive conceptualization ties high levels of mindfulness to emotion regulation by comparing mindfulness to constructs such as emotional intelligence and openness to experience and by describing a mindful mode of operation as an "open" or "receptive" attention and awareness that produces clarity of and receptivity toward emotions.

Other definitions of mindfulness include this cognitive component of attention and awareness as part of a larger system, as one of several theoretical subcomponents of which one or more are directly implicated in emotion regulation. Bishop et al. (2004) discuss mindfulness in terms of (1) the self-regulation of attention, and (2) an orientation to experience characterized by curiosity and openness to experience. Importantly, this second facet includes a curiosity and acceptance toward thoughts, feelings, and experiences that enter conscious awareness. Shapiro, Carlson, Astin, and Freedman (2006) reflect this same orientation to experience as a quality of "attitudes," one of three axioms (along with "intention" and "attention") which comprise mindfulness. The attitude necessary for mindful intention and attention includes compassion and openness, such that mindful experience of emotions becomes "the capacity not to continually strive for pleasant experiences, or to push aversive experiences away" (p. 377). From both of these perspectives, noticing and accepting emotions in this way over time would predict further experience of emotions (i.e., less avoidance of emotions), greater tolerance of emotional states, increased complexity of emotional representations (e.g., emotion differentiation), and less reactivity to emotions (i.e., lower likelihood of impulsive responses to emotions).

Leary, Adams, and Tate (2006) position mindfulness as a mode of "hypo-egoic regulation," whereby self-regulation occurs without a focus on the self. Hypo-egoic states are characterized by low self-awareness (in terms of the self as an object of reflection) and/or self-thoughts that are concrete and present-focused. Meditation is one suggested avenue for cultivating hypo-egoic states, whereby conscious thoughts are observed without reacting to them, and over time self-conscious thoughts decrease in number and intensity. Mindful states specifically are posited to reduce abstract and self-evaluative thoughts. The authors state "Often, people misregulate because they resist the reality in which they find themselves" (p. 1823). In contrast, mindfulness promotes acceptance of the current reality, including one's current emotional state. In addition, mindfulness involves focus on the present in concrete ways, which should reduce rumination and reactivity to experienced emotions. Cast in the light of the hypo-egoic regulation framework, highly mindful individuals should exhibit reduced self-conscious reflection on emotion, instead observing and accepting their emotions without attempting deliberate control of their emotional states; this lack of self-conscious, deliberate control should facilitate effective emotion regulation.

Mindfulness has been studied as a naturally occurring individual difference (i.e., *trait or dispositional mindfulness*), which refers to an individual's tendency to observe and accept present-moment experiences in day-to-day life (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Brown & Ryan, 2003). Researchers have also examined effects of short exercises (i.e., *mindfulness inductions*) and training programs (i.e., *mindfulness-based treatment*) intended to increase mindfulness. Although differences likely exist among these operation definitions of the theoretical construct of mindfulness, trait mindfulness, mindfulness inductions, and mindfulness-based treatments appear associated with improved emotion regulation, as will be discussed below. In fact, mindfulness-based treatments often specifically address or implicate emotion regulation.

Mindfulness-based Stress Reduction (MBSR; Kabat-Zinn, 1982, 1990) teaches mindfulness skills through mindfulness meditation exercises. These exercises encourage thoughts and feelings to be observed nonjudgmentally, without becoming absorbed in their content (Kabat-Zinn, 1982).

Through repeated nonjudgmental observation of feelings, an individual learns that emotions are transient states. In Mindfulness-based Cognitive Therapy (MBCT; Teasdale et al., 2000), this same approach of observing thoughts, emotions, and sensations nonjudgmentally is bolstered by a focus on "decentering" or detaching from one's thoughts and emotions. In this way, depressed individuals learn that negative emotions are transient states and that their negative emotions are separate from "self," which over time mitigates the consuming nature of negative emotions and thoughts. In Dialectical Behavior Therapy (DBT; Linehan, 1993) clients are taught mindfulness skills that are similar to skills gained from MBSR programs, including "observing," "describing," and "nonjudgment." As a treatment for Borderline Personality Disorder, which is characterized by extreme emotional instability, DBT targets emotion regulation directly by encouraging the synthesis of "dialectical" forces of acceptance of one's current state and change toward a better state. Acceptance and Commitment Therapy (ACT; Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Hayes, Strosahl, & Wilson, 1999) also encourages mindful acceptance of emotional states, particularly emphasizing the separation of thoughts, emotions, and sensations from the self-as-observer. This separation of thoughts from self allows for objective distance from emotions, thereby decreasing their impact on experience. Notably, mindfulness can be taught and encouraged through meditation (as is largely the case with MBSR and MBCT) as well as mindfulness exercises that do not necessarily involve meditation per se (as in DBT and ACT).

Mindfulness-based treatments have also been developed and applied to the treatment of substance use disorders. For example, Mindfulness-based Addiction Treatment (MBAT; Vidrine et al., 2015), based largely on MBCT, aims to help individuals to (1) become more aware of thoughts, feelings, and sensations from moment to moment, (2) develop a different way of relating to thoughts, feelings, and sensations, and (3) obtain the ability to disengage attention and choose skillful responses to any thoughts, feelings, or situations that arise. Similarly, Mindfulness-based Relapse Prevention (MBRP; Witkiewitz & Marlatt, 2004) encourages increased awareness of thoughts, emotions, and sensations that characterize high-risk situations for relapse to substance use, thereby allowing individuals to notice their often automatic urges for substance use and to choose not to use the addictive substance. A primary motive for returning to substance use among those who have quit is relief from negative affect (Baker, Brandon, & Chassin, 2004), so mindful emotion regulation serves to increase the likelihood of continued abstinence. (For further reference, see Baer, 2003, where many of these programs are reviewed in greater detail and in a broader context [i.e., not focused on emotion regulation].)

In summary, across varied theoretical conceptualizations of mindfulness as well as mindfulness-based programs and interventions, emotion regulation is consistently implicated as a consequence of fostering a mindful state. However, what evidence exists linking mindfulness to emotion regulation? Below, we briefly review some evidence linking mindfulness to positive and negative emotional states, as well as evidence linking mindfulness to the regulation of emotion following emotional stimuli, emotional events, and emotional states over time. Within this review, we highlight multiple avenues through which mindfulness benefits the regulation of emotions including: increased willingness to experience negative emotions, reduced reactivity to emotional stimuli and situations, dampened self-conscious emotions and self-esteem involvement, increased stability in emotions over time, and activation (or deactivation) of consistent brain areas early in the time course of affective processing.

Empirical Relations of Mindfulness with Emotion Regulation

An abundance of research exists linking high levels of mindfulness, or increases in mindfulness through training, to *lower levels of negative affect and higher levels of positive affect*. This robust finding occurs across varying samples (clinical

and non-clinical), varying ages (youth/adolescents through adults), and varying conceptualizations of mindfulness (especially dispositional and treatment). Some examples include: in cancer patients, mindfulness training predicted reduced anxiety, depression, and anger, and increased vigor (e.g., Speca, Carlson, Goodey, & Angen, 2000); across a range of clinical populations, mindfulness-based training programs are effective for a number of disorders marked by emotion dysregulation (see Baer, 2003, for a review); in healthy individuals, trait mindfulness has predicted self-reported affect (e.g., Brown & Ryan, 2003), and mindfulness meditation has predicted increased prefrontal activation asymmetries suggestive of temperamental shifts toward greater positive affect (Davidson et al., 2003); and in youth/adolescent psychiatric patients, self-reported trait mindfulness has predicted less negative affect and greater positive affect, happiness, and life satisfaction (Brown, West, Loverich, & Biegel, 2011) and mindfulness training reduced anxiety and depression (Biegel, Brown, Shapiro, & Schubert, 2009). Another testament to the robust nature of this relationship between mindfulness and lower negative/higher positive affect is that it emerges across methodologies—in cross-sectional designs, short-term longitudinal designs, and pre-test/post-test designs.

In addition to promoting higher positive affect and lower negative affect, mindfulness appears to enhance the regulation of unpleasant affective states. This evidence comes from experimental and quasi-experimental studies that examine links between mindfulness and responses to valenced stimuli and situations. Consistent with the conceptual models including nonjudgmental or non-attached awareness of negative states, some studies link mindfulness to *increased willingness to experience or stay with negative emotions*. In one study, a brief (15 min) mindfulness induction impacted responses to neutral and negative affective stimuli (Arch & Craske, 2006). Specifically, participants who underwent unfocused attention or worry inductions responded more negatively to neutral slides post-induction, while those in the focused breathing induction maintained moderately positive responses. Importantly, individuals who underwent a focused breathing task exhibited greater willingness to view highly negative pictures during an optional portion of the experiment.

Similarly, in another series of studies, highly mindful individuals exhibited a pattern of behavior consistent with greater nonjudgmental attention and awareness of existential threat. Niemiec et al. (2010) examined mindfulness in the context of terror management theory (Greenberg, Solomon, & Pyszczynski, 1997), which posits that when people's mortality is made salient to them, a host of defensive processes ensue collectively termed "worldview defense." These defenses include proximal defenses such as suppression of thoughts of one's own mortality, as well as distal defenses such as a cultural worldview and self-esteem. Niemiec et al. (2010) demonstrated that highly mindful individuals suppressed thoughts of death to a lesser extent following a mortality salience manipulation (i.e., describing thoughts of their own death and what happens to them when they die) than less mindful individuals, and that highly mindful individuals were willing to write about their own deaths for a longer period of time.

Importantly, theoretical and empirical work from a broad literature suggests that an increased willingness to experience negative emotions will benefit emotion regulation. For example, cognitive research on ironic suppression effects suggests that attempts to "not think about a white bear" actually increase those same prohibited thoughts (Wegner et al., 1987; Wenzlaff & Wegner, 2000), thus attempting to ignore or deny unpleasant thoughts and feelings can make them more influential. Similarly, a number of effective therapies discussed here (e.g., DBT, MBCT), as well as validated models of addictive behaviors (e.g., Baker, Piper, McCarthy, Majeskie, & Fiore, 2004), suggest that noticing and, thus, experiencing (negative) feelings is an important pre-cursor to responding to situations flexibly and adaptively (e.g., choosing not to use a substance in the presence of an urge; we return to this issue below).

Mindful emotion regulation appears to be characterized by a *reduced reactivity to emo-*

tional stimuli and situations (Arch & Craske, 2010; Britton, Shahar, Szepsenwol, & Jacobs, 2012; Raes, Dewulf, Van Heeringen, & Williams, 2009). Raes et al. (2009) found that high levels of trait mindfulness were inversely related to cognitive reactivity to sad moods, and that MBCT reduced cognitive reactivity from pretest to post-test, compared to a wait-list control group. Similarly, participants in an MBCT program exhibited decreased emotional reactivity following the Trier Social Stress Test, and a lack of anticipatory anxiety that was present in the control group (Britton et al., 2012). This reduced emotional reactivity to stress partially mediated improvements in depressive symptoms found in the MBCT group. In a sample of clinically anxious and control participants, trait mindfulness predicted lower negative affect and anxiety following a breathing task designed to mimic hyperventilation (Arch & Craske, 2010). The contribution of mindfulness to affective responses was over and above the contributions of anxiety and depression levels. Further probing revealed that the effect of trait mindfulness on post-stressor negative affect was present for individuals high in anxiety sensitivity but not for those low in anxiety sensitivity. In addition, reflective of the increased willingness to experience negative emotions discussed above, trait mindfulness was correlated positively with duration in the hyperventilation-breathing task when participants were encouraged to continue as long as they were able (Arch & Craske, 2010).

Of note, studies linking mindfulness to reduced emotional reactivity to specific stimuli or events have done so almost exclusively with *negative* stimuli or events. It is plausible, then, that highly mindful individuals are also less happy, joyful, proud, etc., when they experience positive events such as winning an award or receiving a compliment. To our knowledge, no studies address this point directly; however, at least one study suggests that mindful individuals display less variability in both positive and negative emotions in the course of their daily lives (Hill & Updegraff, 2012). However, whereas the positive effects of pleasant experiences are typically fleeting and much less powerful than negative experiences, a phenomenon known as the *negativity bias* (Baumeister et al., 2001), being highly mindful could also enhance one's ability to experience the rewards of positive events more fully. Indeed, a study of the effects of MBCT on day-to-day positive experience suggested that compared to baseline levels and compared to a control group, mindfulness training led to rating pleasant experiences as more positive and to experiencing more positive affect following pleasant experiences (i.e., more rewards from pleasant experiences; Geschwind et al., 2011). This aligns with findings linking mindfulness to positive affect and emotions in general (e.g., Brown & Ryan, 2003; Davidson et al., 2003) and with the broaden-and-build theoretical model that suggests that fostering mindfulness encourages an upward spiral of positive emotions and flourishing (Garland et al., 2010).

Consistent with the broaden-and-build theory, Catalino and Fredrickson (2011) found that "flourishers" (i.e., those with high emotional well-being and regular experiences of positive emotion) experience greater emotional "boosts" from pleasant experiences in their daily lives. That is, flourishers experience greater emotional reactivity to positive events. Furthermore, Catalino and Fredrickson found that greater reactivity to pleasant events was positively associated with dispositional mindfulness (particularly the observing and non-reactivity facets). Thus, mindfulness might predict greater emotional reactivity to pleasant events. This notion is akin to the concept of "savoring," through which individuals maximize benefits of positive life experiences through purposeful attention (Bryant & Veroff, 2007). Mindful savoring of pleasant experiences could potentially prompt upswings in positive emotion. Future research should further explore the role of mindfulness in emotional responses to specific positive experiences and how these differ from emotional responses to negative experiences.

The decentered perspective (i.e., a detachment from thoughts and emotions) fostered by mindfulness also appears to *dampen a number of negative self-conscious emotions and emotional responses* to self-concept threatening stimuli and

situations. For example, social rejection has a robust negative effect on individuals in laboratory studies (see Leary, Twenge, & Quinlivan, 2006, for a review). Heppner et al. (2008) explored the capacity for mindfulness to buffer aggressive reactions to social rejection. Sixty participants met in small groups to introduce themselves and to receive study instructions. Then, they were separated and wrote self-descriptive essays, which were ostensibly distributed to all other participants. Based on these essays, they voted for who they liked, respected, and wanted to work with on a later task. Participants were given (bogus) feedback about the voting to make them feel accepted or rejected by their fellow participants. Then, they were given the opportunity to play an aversive noise in the ears of their opponents in a competitive reaction time task. Short mindfulness instructions delivered just prior to receiving the rejection feedback predicted less aggressive behavior (shorter, less intense noise blast selections) in the competitive task (Heppner et al., 2008).

Similar to self-concept threats from others, as in the case of social rejection, a person's own reflections on negative behaviors he/she has performed can threaten self-concept. Individuals vary in the degree to which they can recall and discuss such negative events with awareness and without distortion (i.e., to make them appear less negative; Barrett, Williams, & Fong, 2002). Lakey, Kernis, Heppner, and Lance (2008) explored the role of mindfulness in such reflections on past negative behaviors. Participants answered a series of 25 questions that were progressively more personal and imposing (e.g., "Tell me about your most enjoyable experience," "Tell me about a time when you've done something unethical on an assignment" in the presence of trained interviewers. Their answers were later coded for verbal defensiveness, which is an assessment of the "traces left by defensive processes in the content and structure of speech" (Barrett et al., 2002, p. 777). They found that individuals who were highly mindful exhibited less verbal defensiveness when discussing past indiscretions. Along these same lines, as already discussed, Niemic et al. (2010) demonstrated that the defensiveness typically triggered by thoughts of one's own death was attenuated among highly mindful individuals. Furthermore, Leary et al., (2007) demonstrated that high levels of self-compassion, of which mindfulness is a central component, predicted reduced emotional reactivity to negative events across a variety of contexts, including recalling and imagining negative events, reacting to ambivalent feedback, and experiencing day-to-day negative events.

Importantly, experience sampling methodologies reveal similar benefits for mindful emotion regulation over time. Experience sampling methodologies involve repeated assessments of the same construct within the context of the participants' current experiences. Thus, experience sampling methodologies allow for examination of moment-to-moment experience, as well as trends in experience over time (e.g., instability). Utilizing experience sampling with a sample of adults and a sample of introductory psychology students, Brown and Ryan (2003) investigated moment-to-moment links between trait mindfulness, state mindfulness (in the student sample), pleasant and unpleasant affect, and autonomous self-regulation. For 21 (in the adult sample) or 14 (in the student sample) days, participants were sent pager messages on a quasi-random schedule which signaled them to complete one paper and pencil form from a bound packet. In both samples, dispositional mindfulness predicted day-to-day autonomy and unpleasant affect (but not pleasant affect). Momentary or state mindfulness predicted greater autonomy and pleasant affect, and less negative affect, and these relationships held controlling for trait mindfulness. In a more recent study (Hill & Updegraff, 2012), undergraduate participants reported on their current emotional experience approximately six times a day for a week. Dispositional mindfulness predicted fewer self-reported emotion regulation difficulties, as well as greater emotion differentiation. Importantly, greater emotion differentiation (positive and negative) mediated the relationship between mindfulness and reduced emotional instability (positive and negative)

over the course of the week. In other words, *more mindful individuals evidenced lower volatility or lability in their emotions*. More research is needed examining the role of mindfulness in everyday experiences of emotion and ongoing emotion regulation in naturally occurring contexts.

Neurological Underpinnings of Mindful Emotion Regulation

While much of the data linking mindfulness to emotional experience has been obtained using self-report methodologies, a growing body of research points to the neurological underpinnings of mindful emotion regulation. Several studies point to reduced reactivity to emotional stimuli and illustrate the down-regulating role being mindful plays in such reactions by virtue of (de-) activations of consistent brain areas, and at least one study suggests that mindful emotion regulation occurs early in affective processing.

High levels of mindfulness are linked to *increased activation in the prefrontal cortex and decreased amygdala activation when processing emotional stimuli*. These patterns of brain activation are thought to reflect lower negative affect and enhanced emotion regulation. Creswell, Way, Eisenberger, and Lieberman (2007) demonstrated that high levels of trait mindfulness were associated with enhanced prefrontal cortex activation when labeling negative affective stimuli. Similarly, Modinos, Ormel, and Aleman (2010) linked high levels of mindfulness skills to increased dorsomedial prefrontal cortex activation, an area involved in reappraisal. This increased activation was inversely related to amygdala activation in response to negative stimuli.

Neural mechanisms of mindfulness appear to operate in stark contrast to indices of emotional dysregulation such as depressive symptomatology. In one study (Way, Creswell, Eisenberger, & Lieberman, 2010), highly mindful individuals showed less resting activation in self-referential processing areas and in the amygdala (bilaterally), while depressive symptoms were correlated with greater resting activation in these areas (self-referential areas and the right amygdala). In addition to differences in resting activity, this same study showed less amygdala activation in response to emotional faces in highly mindful individuals, while depressive symptoms correlated positively with amygdala activation to emotional faces. Reduced resting activation largely accounted for the links between mindfulness and reduced activation in response to emotional stimuli.

Interestingly, the way mindfulness influences emotion regulation may differ as one becomes more experienced in being mindful. Taylor et al. (2011) compared the emotional responses of long-term meditators versus beginners. For both groups, positive and negative images were rated lower in emotional intensity when viewed in a mindful state compared to a baseline/normal state. Interestingly, the neural mechanisms underlying this were different for beginners versus experienced meditators. In beginners, viewing emotional images in a mindful state was related to down-regulation of the amygdala, while for experienced meditators, viewing emotional images was related to reduced activation in right medial prefrontal cortex and posterior cingulate cortex. This pattern suggests that higher-order cortical regions become less involved in emotion regulation in experienced meditators. In other words, when one is extensively trained in mindfulness, experiences of reduced emotional intensity may be explained by "accepting and fully experiencing emotional responses in the present moment without interference from internal thought and self-referent processes, as opposed to directly controlling low-order affective brain systems from higher-order cortical regions" (Taylor et al., 2011, p. 1531).

Mindfulness appears to be implicated in the process of emotion regulation versus reactivity in an early phase of emotional processing. Brown, Goodman, and Inzlicht (2012) investigated links between trait mindfulness and late positive potential (LPP) responses. LPPs are thought to index attention to emotional stimuli and to mark emotional arousal. Highly mindful individuals showed lower LPPs to highly arousing positive (erotica) and negative (corpses)

images. In this same study, neuroticism and negative affectivity (trait) were both linked to increased LPP responses to highly arousing negative images.

Mindful Emotion Regulation as a Mechanism of Behavioral Outcomes

As we have shown in this chapter, evidence is mounting that high levels of mindfulness are linked to more positive and less negative emotional states, as well as less variable emotional states. Furthermore, mindfulness appears to reduce reactivity to emotional stimuli and events. Thus, studies suggest that mindfulness plays a substantial role in effective emotion regulation.

The ways in which people regulate their emotions are thought to impact a number of behavioral outcomes. For example, a prominent model of addiction posits that the avoidance of negative affective states is a primary motive for drug use (Baker et al., 2004; Baker, Piper et al., 2004). Furthermore, nonacceptance of unpleasant emotions has been implicated in smoking and other substance use (Adams, Tull, & Gratz, 2012; Axelrod, Perepletchikova, Holtzman, & Sinha, 2011; Carmody, Vieten, & Astin, 2007). Emerging evidence links trait mindfulness and mindfulness training (which explicitly involve increased awareness and acceptance of emotions) to reductions in substance use and better cessation outcomes (e.g., Heppner et al., 2015; Witkiewitz & Marlatt, 2004; Chap. 14), for additional discussion of mindfulness and addiction). Therefore, more effective emotion regulation provides a theoretical mechanism for the effects of mindfulness on substance use and cessation outcomes. In this section we illustrate the mechanistic role of mindful emotion regulation for the self-regulation of behavior by reviewing evidence linking mindfulness to substance use disorders, including smoking, alcohol, and other drugs, and how emotion regulation mediates these relationships.

Substance abuse and dependence represent significant public health problems. Smoking is responsible for an estimated 443,000 deaths a year (CDC, 2008) and is linked to approximately 30 % of all cancers (Mokdad, Marks, Stroup, & Gerberding, 2004) and 90 % of lung cancers (U.S. Department of Health and Human Services, 2004). Abuse of tobacco, alcohol, and other drugs costs our nation more than $484 billion per year (ONDCP, 2001). Unfortunately, drug addiction is considered a chronic relapsing condition (Connors, Maisto, & Donovan, 1996) and relapse rates are high following treatment (McLellan, Lewis, O'Brien, & Kleber, 2000).

Mindfulness may assist in cessation from smoking, alcohol or other drugs. Enhanced attention to thoughts and feelings allows for the early identification of problematic thoughts and feelings, and promotes adaptive, flexible responding to these feelings (Roemer & Orsillo, 2003; Teasdale, Segal, & Williams, 1995) rather than automatized or reactive responses. Furthermore, observation, exposure, and openness to experience are core components of mindfulness (Baer et al., 2006; Bishop et al., 2004; Shapiro et al., 2006). In stark contrast to this notion, prominent models of addiction implicate the avoidance of negative affective states as a primary motive for drug use (Baker, Brandon, & Chassin, 2004; Baker, Piper et al., 2004). A highly mindful individual may be more aware and accepting of unpleasant sensations (e.g., negative affect, craving), and thus less likely to respond impulsively via substance use (Groves & Farmer, 1994).

Emerging evidence links trait mindfulness, brief mindfulness exercises, and more intensive mindfulness-based interventions to lower addiction and enhanced cessation. One study with smokers at the time of enrollment in a smoking cessation treatment program demonstrated that individuals high in trait mindfulness were less dependent on cigarettes and demonstrated less affective withdrawal severity and a greater sense of agency for their upcoming quit attempt (Vidrine et al., 2009). High levels of trait mindfulness have also been linked to less use of alcohol and alcohol-related problems in samples not dependent on alcohol (Fernandez, Wood, Stein, & Rossi, 2010; Smith et al., 2011).

In addition to evidence with trait mindfulness, more controlled studies link mindfulness exercises and training to lower substance use. An experimental investigation of a brief mindfulness exercise (body scan) with smokers demonstrated that compared to a control group, participants in the body scan condition reported significantly lower desire to smoke for up to 5 min after the intervention (May, Andrade, Willoughby, & Brown, 2011). In one randomized controlled pilot trial of mindfulness training for smoking cessation (Brewer et al., 2011), individuals in the eight-session mindfulness training group were more likely to be abstinent from smoking at a 17-week follow up when compared to a standard treatment control group (Freedom From Smoking). Similarly, Bowen et al. (2009) evaluated MBRP as an aftercare program for individuals who had completed intensive treatment for substance use disorders (alcohol and other drugs) and found that those in the MBRP group decreased drug use to a greater extent than those in treatment as usual at 2 months post intervention (although this effect had decayed by 4 months post intervention).

The burgeoning literature on mindfulness, addiction, and substance use also illustrates the role of emotion regulation in cessation. Negative affect is consistently implicated in relapse to substance use (e.g., Baker, Piper et al., 2004; Cooney, Litt, Morse, Bauer, & Gaupp, 1997; Hodgins, El-Guebaly, & Armstrong, 1995; Witkiewitz & Villarroel, 2009). Given the preponderance of evidence linking mindfulness to lower levels of negative affect, it follows that mindfulness may aid in cessation from smoking/substance use through its effects on emotion regulation. Figure 9.1 (adapted from Adams, Benitez et al., 2012; Adams, Cano et al., 2012) illustrates potential emotional pathways through which mindfulness may aid in cessation. First, mindfulness reduces negative affect, which aids cessation and reduces relapse. Second, mindfulness also appears to attenuate the link between negative affect and substance craving/use. Researchers (e.g., Adams, Benitez et al., 2012; Adams, Cano et al., 2012; Witkiewitz & Bowen, 2010) have described these as mediation and moderation pathways that may occur simultaneously. Evidence for each pathway is reviewed in turn below.

First, mindfulness may influence substance use and cessation by reducing negative affect. In a sample of smokers attempting to quit, individuals high in trait mindfulness were more likely to

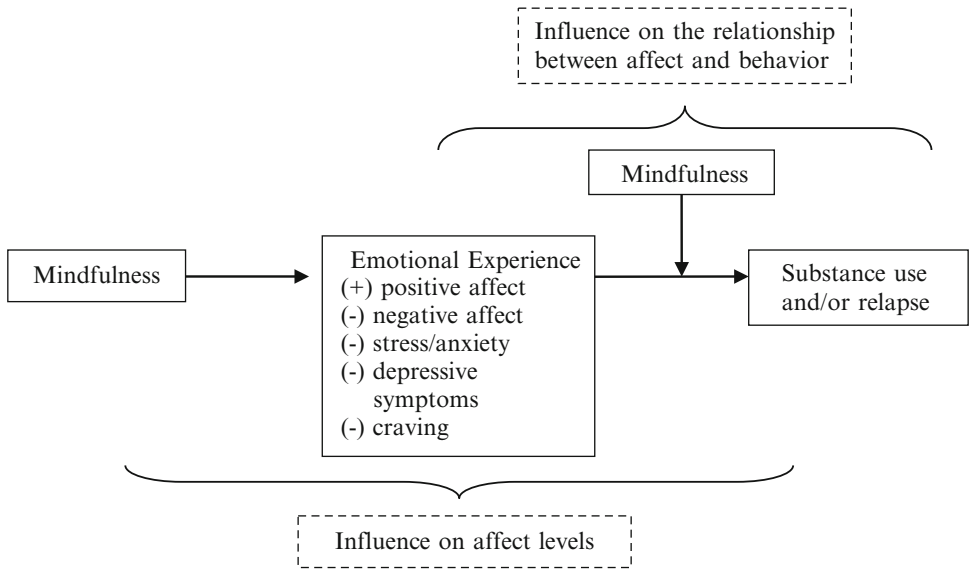

Fig. 9.1 Conceptual model of the role of mindfulness and emotion regulation in substance use and/or relapse

be abstinent over time, examined at follow-up time points of 3 days, 31 days, and 26 weeks post-quit (Heppner et al., 2013). For early smoking abstinence (i.e., 3 days post-quit), reduced negative affect—depressive symptoms, sadness, and anger—mediated the relation between mindfulness and early smoking abstinence. In other words, highly mindful individuals had lower levels of negative affect which translated into greater likelihood of smoking abstinence at day 3 of their quit attempt.

Other studies are consistent with the notion that mindfulness reduces negative affect and associated substance cravings and substance use. For example, May et al. (2011) found that a mindfulness exercise (the body scan) reduced irritability, tension, restlessness, and smoking urges. In another laboratory-based study, participants using both a suppression-based and a mindfulness-based strategy for coping with cigarette cravings showed reduced smoking at 7-day follow-up; however, only participants in the mindfulness condition also showed reductions in negative affect and depressive symptoms (Rogojanski, Vettese, & Antony, 2011). Thus, the mindfulness-based strategy appeared to target emotion regulation specifically whereas the (here, equally effective) suppression strategy did not operate via an emotional pathway. In a pilot study of an intensive mindfulness meditation-based intervention, "Mindfulness Training for Smokers," results demonstrated that highly compliant meditators achieved 100 % abstinence at 6 weeks post-quit (Davis, Fleming, Bonus, & Baker, 2007). Highly compliant meditators also showed a concomitant decrease in perceived stress from baseline to 1-day post quit while moderately compliant meditators showed an increase after quitting. Similarly, symptoms of affective distress (e.g., depression, anxiety, and hostility) decreased more in the highly compliant group compared to the moderately compliant group from pre- to post-quit, although this difference was not significant in this small pilot study.

In addition to the effects of mindfulness on emotional experience, mindfulness may attenuate the link between unpleasant emotional states and substance craving/use. Negative affect often leads to craving, and craving strongly predicts relapse to drug use (for example, cigarettes; Shiffman et al., 2002). Therefore, mindfulness may operate on substance use behaviors not only by mitigating negative affect itself, but also by weakening the link between emotional states, craving/urge, and drug use. Data from this moderation perspective includes studies with trait mindfulness, short mindfulness instructions, and mindfulness-based treatment programs.

Among a sample of smokers attempting to quit, high levels of trait mindfulness were linked to less perceived stress, as well as less problematic drinking, indexed by quantity of alcohol consumed, frequency of binge drinking, and likelihood of alcohol abuse/dependence (Adams, Cano et al., 2012). Moreover, trait mindfulness moderated the relationship between perceived stress and quantity of alcohol use such that higher perceived stress predicted increased alcohol use among participants low but not high in trait mindfulness. In a sample of college students, brief mindfulness instructions given in the lab reduced cigarettes smoked per day over the 7-day follow up, but had no effect on reports of negative affect or urge to smoke (Bowen & Marlatt, 2009). However, participants given the mindfulness instructions showed a weaker relationship between negative affect and urges to smoke than those in the control group. In another laboratory study brief mindfulness instructions attenuated the association between negative affect and smoking urges (Adams, Benitez et al., 2012). Whereas negative affect was strongly linked to increased smoking urges among female smokers in a control condition, negative affect was not related to smoking urges among participants who had just listened to 20 min of mindfulness instructions. A similar effect emerged in a randomized trial of MBRP for substance use (alcohol, cocaine/crack, and methamphetamines; Witkiewitz & Bowen, 2010). MBRP participants reduced substance use 4 months post-intervention. While craving mediated the relationship between negative affect and substance use in the treatment-as-usual group, in the MBRP group, the link between negative affect and craving was mitigated.

Research on other behavioral outcomes (e.g., eating) also demonstrates burgeoning evidence that mindfulness aids in the self-regulation of behaviors through its effects on emotion regulation. For example, mindfulness-based treatment programs have been applied to food cravings and eating disorders with some positive results (see Kristeller, Baer, & Quillian-Wolever, 2006, for a review) and aspects of trait mindfulness (Nonjudging and Acting with Awareness) have been linked to fewer eating disorder symptoms (Adams et al., 2012). Given that a central feature of overeating (especially binge eating) is disturbances in affect regulation (Kristeller et al., 2006), emotion regulation may be one mechanism by which mindfulness promotes healthier eating patterns. One study of DBT adapted for Bulimia Nervosa demonstrated significant reductions in binge eating and purging and concomitant reductions in negative affect and emotional eating, although the effects on affect were not significant in this small sample (Safer, Telch, & Agras, 2001). Another pilot study of a meditation-based intervention for binge-eating disorder yielded reductions in binge eating and binge eating severity along with reductions in depression and anxiety from pre- to post-treatment (Kristeller & Hallett, 1999). Although more research is needed, it is possible that mindfulness promotes more adaptive regulation of a variety of addictive behaviors (e.g., smoking, alcohol use, eating behavior) through its effects on emotion regulation.

Conclusions

Being mindful and increasing mindfulness clearly benefits emotion regulation. Emotions and our relationships to emotions are sufficiently important to the concept of mindfulness that multiple operational definitions of mindfulness implicate emotion regulation specifically. In addition, empirical evidence overwhelmingly links mindfulness to less negative and more positive affect. Our review of the extant literature revealed that mindfulness appears to aid in emotion regulation by one of several mechanisms including (1) nonjudgmental awareness of negative states which results in increased willingness to experience negative emotions, (2) a reduced reactivity to emotional stimuli and situations, (3) a decentered perspective which dampens self-conscious emotions and self-esteem involvement, (4) an increased stability (i.e., reduced variability or volatility) in negative emotions over time, and (5) the activation (or deactivation) of consistent brain areas (e.g., amygdala) early in the time course of affective processing. Finally, the regulation of emotions is integral to the self-regulation of a number of important behaviors. The highlighted research linking mindfulness to substance use and cessation through its effects on emotion regulation demonstrates this important link. We hope research continues to explore the effects of mindfulness on health and behavior, and that research further clarifies the role of emotion regulation in these links. This avenue of future research will simultaneously refine our empirical notions of the construct of mindfulness and will inform interventions and treatment programs for other health and behavior outcomes.

References

Adams, C. E., Benitez, L., Kinsaul, J., McVay, M. A., Barbry, A., Thibodeaux, A., & Copeland, A. L. (2012). Effects of brief mindfulness instructions on reactions to body image stimuli among female smokers: An experimental study. *Nicotine & Tobacco Research, 15,* 376–384.

Adams, C. E., Cano, M. A., Heppner, W. L., Stewart, D. W., Correa-Fernandez, V., Vidrine, J. I., … Wetter, D. W. (2012). Testing a moderated mediation model of mindfulness, psychosocial stress, and alcohol use among African American smokers. *Mindfulness*, *6*(2), 315–325.

Adams, C. E., McVay, J. C., Kinsaul, J., Benitez, L., Vinci, C., Stewart, D. W., & Copeland, A. L. (2012). Unique relationships between facets of mindfulness and eating pathology among female smokers. *Eating Behaviors, 4,* 390–393.

Adams, C. E., Tull, M. T., & Gratz, K. L. (2012). The role of emotional nonacceptance in the relation between depression and recent cigarette smoking. *American Journal on Addictions, 21*, 293–301.

Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy, 44*, 1849–1858.

Arch, J. J., & Craske, M. G. (2010). Laboratory stressors in clinically anxious and non-anxious individuals: The moderating role of mindfulness. *Behaviour Research and Therapy, 48*, 495–505.

Axelrod, S. R., Perepletchikova, F., Holtzman, K., & Sinha, R. (2011). Emotion regulation and substance use frequency in women with substance dependence and borderline personality disorder receiving dialectical behavior therapy. *American Journal of Drug and Alcohol Abuse, 37*, 37–42.

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*, 125–143.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45.

Baker, T. B., Brandon, T. H., & Chassin, L. (2004). Motivational influences on cigarette smoking. *Annual Review of Psychology, 55*, 463–491.

Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction motivation reformulated: An affective processing model of negative reinforcement. *Psychological Review, 111*, 33–51.

Barrett, L. F., Williams, N. L., & Fong, G. T. (2002). Defensive verbal behavior assessment. *Personality and Social Psychology Bulletin, 28*, 776–788.

Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology, 5*(4), 323–370.

Biegel, G. M., Brown, K. W., Shapiro, S. L., & Schubert, C. M. (2009). Mindfulness-based stress reduction for the treatment of adolescent psychiatric outpatients: A randomized clinical trial. *Journal of Consulting and Clinical Psychology, 77*, 855–866.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., … Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241.

Bowen, S., Chawla, N., Collins, S. E., Witkiewitz, K., Hsu, S., Grow, J., … Marlatt, A. (2009). Mindfulness-based relapse prevention for substance use disorders: A pilot efficacy trial. *Substance Abuse, 30*, 295–305.

Bowen, S., & Marlatt, A. (2009). Surfing the urge: Brief mindfulness-based intervention for college student smokers. *Psychology of Addictive Behaviors, 23*, 666–671.

Brewer, J. A., Mallik, S., Babuscio, T. A., Nich, C., Johnson, H. E., Deleone, C. M., … Weinstein, A. J. (2011). Mindfulness training for smoking cessation: Results from a randomized controlled trial. *Drug and Alcohol Dependence, 119,* 72–80.

Britton, W. B., Shahar, B., Szepsenwol, O., & Jacobs, W. J. (2012). Mindfulness-based cognitive therapy improves emotional reactivity to social stress: Results from a randomized controlled trial. *Behavior Therapy, 43*, 365–380.

Brown, K. W., Goodman, R. J., & Inzlicht, M. (2012). Dispositional mindfulness and the attenuation of neural responses to emotional stimuli. *Social Cognitive and Affective Neuroscience, 5*, 369–377.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.

Brown, K. W., West, A. M., Loverich, T. M., & Biegel, G. M. (2011). Assessing adolescent mindfulness: Validation of an adapted Mindful Attention Awareness Scale in adolescent normative and psychiatric populations. *Psychological Assessment, 23*, 1023–1033.

Bryant, F. B., & Veroff, J. (2007). *Savoring: A new model of positive experience*. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Carmody, T. P., Vieten, C., & Astin, J. A. (2007). Negative affect, emotional acceptance, and smoking cessation. *Journal of Psychoactive Drugs, 39*, 499–508.

Catalino, L. I., & Fredrickson, B. L. (2011). A Tuesday in the life of a flourisher: The role of positive emotional reactivity in optimal mental health. *Emotion, 11*, 938–950.

CDC. (2008). Smoking-attributable mortality, years of potential life lost, and productivity losses–United States, 2000–2004. *Morbidity and Mortality Weekly Report, 57*, 1226–1228.

Connors, G. J., Maisto, S. A., & Donovan, D. M. (1996). Conceptualizations of relapse: A summary of psychological and psychobiological models. *Addiction, 9*, 5–13.

Cooney, N. L., Litt, M. D., Morse, P. A., Bauer, L. O., & Gaupp, L. (1997). Alcohol cue reactivity, negative-mood reactivity, and relapse in treated alcoholic men. *Journal of Abnormal Psychology, 106*, 243–250.

Creswell, J. D., Way, B. M., Eisenberger, N. I., & Lieberman, M. D. (2007). Neural correlates of dispositional mindfulness during affect labeling. *Psychosomatic Medicine, 69*, 560–565.

Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F., … . Sheridan, J. F. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine, 65*, 564–570.

Davis, J. M., Fleming, M. F., Bonus, K. A., & Baker, T. B. (2007). A pilot study on mindfulness based stress reduction for smokers. *BMC Complementary and Alternative Medicine, 7*, 2.

Fernandez, A. C., Wood, M. D., Stein, L., & Rossi, J. S. (2010). Measuring mindfulness and examining its relationship with alcohol use and negative consequences. *Psychology of Addictive Behaviors, 24*, 608–616.

Garland, E. L., Fredrickson, B., Kring, A. M., Johnson, D. P., Meyer, P. S., & Penn, D. L. (2010). Upward spirals of positive emotions counter downward spirals of negativity: Insights from the broaden-and-build theory and affective neuroscience on the treatment of emotion dysfunctions and deficits in psychopathology. *Clinical Psychology Review, 30*(7), 849–864.

Geschwind, N., Peeters, F., Drukker, M., van Os, J., & Wichers, M. (2011). Mindfulness training increases momentary positive emotions and reward experience in adults vulnerable to depression: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 79*(5), 618.

Greenberg, J., Solomon, S., & Pyszczynski, T. (1997). Terror management theory of self-esteem and cultural worldviews: Empirical assessments and conceptual refinements. *Advances in Experimental Social Psychology, 29*, 61–139.

Groves, P., & Farmer, R. (1994). Buddhism and addictions. *Addiction Research & Theory, 2*, 183–194.

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes, and outcomes. *Behaviour Research and Therapy, 44*, 1–25.

Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and commitment therapy: Understanding and treating human suffering*. New York, NY: Guilford.

Heppner, W. L., Spears, C. A., Correa-Fernández, V., Castro, Y., Li, Y., Reitzel, L. R., Vidrine, J. I., Mazas, C. A., Cofta-Woerpel, L., Cinciripini, P. M., Ahluwalia, J., & Wetter, D. W. (2015). Dispositional mindfulness predicts enhanced smoking cessation and smoking lapse recovery. Manuscript submitted for publication.

Heppner, W. L., Kernis, M. H., Lakey, C. E., Campbell, W. K., Goldman, B. M., Davis, P. J., & Cascio, E. V. (2008). Mindfulness as a means of reducing aggressive behavior: Dispositional and situational evidence. *Aggressive Behavior, 34*, 486–496.

Hill, C. L., & Updegraff, J. A. (2012). Mindfulness and its relationship to emotional regulation. *Emotion, 12*, 81–90.

Hodgins, D. C., El-Guebaly, N., & Armstrong, S. (1995). Prospective and retrospective reports of mood states before relapse to substance use. *Journal of Consulting and Clinical Psychology, 63*, 400–407.

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*, 33–47.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York, NY: Bantam Dell.

Kristeller, J. L., Baer, R. A., & Quillian-Wolever, R. (2006). Mindfulness-based approaches to eating disorders. In R. A. Baer (Ed.), *Mindfulness-based treatment approaches: Clinician's guide to evidence base and applications* (pp. 75–91). London: Elsevier.

Kristeller, J. L., & Hallett, C. B. (1999). An exploratory study of a meditation-based intervention for binge eating disorder. *Journal of Health Psychology, 4*, 357–364.

Lakey, C. E., Kernis, M. H., Heppner, W. L., & Lance, C. E. (2008). Individual differences in authenticity and mindfulness as predictors of verbal defensiveness. *Journal of Research in Personality, 42*, 230–238.

Leary, M. R., Adams, C. E., & Tate, E. B. (2006). Hypoegoic self-regulation: Exercising self-control by diminishing the influence of the self. *Journal of Personality, 74*, 1803–1831.

Leary, M. R., Tate, E. B., Adams, C. E., Allen, A. B., & Hancock, J. (2007). Self-compassion and reactions to unpleasant self-relevant events: The implications of treating oneself kindly. *Journal of Personality and Social Psychology, 92*, 887–904.

Leary, M. R., Twenge, J. M., & Quinlivan, E. (2006). Interpersonal rejection as a determinant of anger and aggression. *Personality and Social Psychology Review, 10*(2), 111–132.

Linehan, M. M. (1993). Dialectical behavior therapy for treatment of borderline personality disorder: Implications for the treatment of substance abuse. *NIDA Research Monograph, 137*, 201–216.

May, J., Andrade, J., Willoughby, K., & Brown, C. (2011). An attentional control task reduces intrusive thoughts about smoking. *Nicotine & Tobacco Research, 14*, 472–478.

McLellan, A. T., Lewis, D. C., O'Brien, C. P., & Kleber, H. D. (2000). Drug dependence, a chronic medical illness. *JAMA, the Journal of the American Medical Association, 284*, 1689–1695.

Modinos, G., Ormel, J., & Aleman, A. (2010). Individual differences in dispositional mindfulness and brain activity involved in reappraisal of emotion. *Social Cognitive and Affective Neuroscience, 5*, 369–377.

Mokdad, A. H., Marks, J. S., Stroup, D. F., & Gerberding, J. L. (2004). Actual causes of death in the United States, 2000. *JAMA, the Journal of the American Medical Association, 291*, 1238–1245.

Niemiec, C. P., Brown, K. W., Kashdan, T. B., Cozzolino, P. J., Breen, W. E., Levesque-Bristol, C., & Ryan, R. M. (2010). Being present in the face of existential threat: The role of trait mindfulness in reducing defensive responses to mortality salience. *Journal of Personality and Social Psychology, 99*, 344–365.

Office of National Drug Control Policy (ONDCP). (2001). The economic costs of drug abuse in the United States 1992–1998 (NCJ-190636). National Criminal Justice Reference Service. https://www.ncjrs.gov/ondcppubs/publications/pdf/economic_costs.pdf.

Raes, F., Dewulf, D., Van Heeringen, C., & Williams, J. M. (2009). Mindfulness and reduced cognitive reactivity to sad mood: Evidence from a correlational study and a non-randomized waiting list controlled study. *Behaviour Research and Therapy, 47*, 623–627.

Roemer, L., & Orsillo, S. M. (2003). Mindfulness: A promising intervention strategy in need of further study. *Clinical Psychology: Science and Practice, 10*, 172–178.

Rogojanski, J., Vettese, L. C., & Antony, M. M. (2011). Coping with cigarette cravings: Comparison of suppression versus mindfulness-based strategies. *Mindfulness, 2*, 14–26.

Safer, D. L., Telch, C. F., & Agras, W. S. (2001). Dialectical behavior therapy for bulimia nervosa. *American Journal of Psychiatry, 158*, 632–634.

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*, 373–386.

Shiffman, S., Gwaltney, C. J., Balabanis, M. H., Liu, K. S., Paty, J. A., Kassel, J. D., … Gnys, M. (2002).

Immediate antecedents of cigarette smoking: An analysis from ecological momentary assessment. *Journal of Abnormal Psychology, 111*, 531–535.

Smith, B. W., Ortiz, J. A., Steffen, L. E., Tooley, E. M., Wiggins, K. T., Yeater, E. A., … Bernard, M. L. (2011). Mindfulness is associated with fewer PTSD symptoms, depressive symptoms, physical symptoms, and alcohol problems in urban firefighters. *Journal of Consulting and Clinical Psychology, 79*, 613–617.

Speca, M., Carlson, L. E., Goodey, E., & Angen, M. (2000). A randomized, wait-list controlled clinical trial: The effect of a mindfulness meditation-based stress reduction program on mood and symptoms of stress in cancer outpatients. *Psychosomatic Medicine, 62*, 613–622.

Taylor, V. A., Grant, J., Daneault, V., Scavone, G., Breton, E., Roffe-Vidal, S., … Beauregard, M. (2011). Impact of mindfulness on the neural responses to emotional pictures in experienced and beginner meditators. *Neuroimage, 57*, 1524–1533.

Teasdale, J. D., Segal, Z. V., Williams, J. M., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68*, 615–623.

Teasdale, J. D., Segal, Z., & Williams, J. M. (1995). How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help? *Behavior Research and Therapy, 33*, 25–39.

U.S. Department of Health and Human Services. (2004). *The health consequences of smoking: A report of the Surgeon General*. Atlanta, GA: Centers for Disease Control and Prevention.

Vidrine, J. I., Businelle, M. S., Cinciripini, P., Li, Y., Marcus, M. T., Waters, A. J., … Wetter, D. W. (2009). Associations of mindfulness with nicotine dependence, withdrawal, and agency. *Substance Abuse, 30*, 318–327.

Vidrine, J.I., Spears, C.A., Heppner, W.L., Reitzel, L.R., Marcus, M.T., Cinciripini, P.M., Waters, A.J., Li, Y., Nguyen, N.T.T., Cao, Y., Tindle, H.A., Fine, M., Safranek, L.V., & Wetter, D.W. (2015). Efficacy of mindfulness based addiction treatment (MBAT) for smoking cessation: A randomized clinical trial. Manuscript submitted for publication.

Way, B. M., Creswell, J. D., Eisenberger, N. I., & Lieberman, M. D. (2010). Dispositional mindfulness and depressive symptomatology: Correlations with limbic and self-referential neural activity during rest. *Emotion, 10*, 12–24.

Wegner, D. M., Schneider, D. J., Carter, S. R., & Whit, T. L. (1987). Paradoxical effects of thought suppressing. *Journal of Personality and Social Psychology, 53*, 5–13.

Wenzlaff, R. M., & Wegner, D. M. (2000). Thought suppression. *Annual Review of Psychology, 51*, 59–91.

Witkiewitz, K., & Bowen, S. (2010). Depression, craving, and substance use following a randomized trial of mindfulness-based relapse prevention. *Journal of Consulting and Clinical Psychology, 78*, 362–374.

Witkiewitz, K., & Marlatt, G. A. (2004). Relapse prevention for alcohol and drug problems: That was Zen, this is Tao. *American Psychologist, 59*, 224–235.

Witkiewitz, K., & Villarroel, N. A. (2009). Dynamic association between negative affect and alcohol lapses following alcohol treatment. *Journal of Consulting and Clinical Psychology, 77*, 633–644.

Self-Compassion: What It Is, What It Does, and How It Relates to Mindfulness

10

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This chapter will present a conceptual account of self-compassion and review research on its benefits. It will also consider how self-compassion relates to mindfulness, given that these constructs are both drawn from Buddhist psychology (Brach, 2003; Gunaratana, 1982; Kabat-Zinn, 1990; Salzberg, 1997). It is important to understand the similar and unique features of self-compassion and mindfulness in order to understand how they each relate to wellbeing, and to consider how these states of heart and mind might best be developed.

What Is Self-Compassion?

Self-compassion has received increased research attention lately, with over 200 journal articles and dissertations examining the topic since 2003, the year that the first two articles defining and measuring self-compassion were published (Neff, 2003a, 2003b). So what is self-compassion exactly? In order to better understand what self-compassion is, it is useful to first consider what it means to feel compassion more generally. From the Buddhist point of view, compassion is given to our own as well as to others' suffering. We include ourselves in the circle of compassion because to do otherwise would construct a false sense of separate self (Salzberg, 1997).

Compassion involves sensitivity to the experience of suffering, coupled with a deep desire to alleviate that suffering (Goetz, Keltner, & Simon-Thomas, 2010). This means that in order to experience compassion, you must first acknowledge the presence of pain. Rather than rushing past that homeless woman as you are walking down the busy street, for example, you must actually stop to consider how difficult her life must be. This involves pausing, stepping out of your usual frame of reference, and viewing the world from the vantage point of another. The moment you see the woman as an actual human being who is in pain, your heart resonates with hers (compassion literally means "to suffer with"). Instead of ignoring her, you find that you are moved by her situation, and feel the urge to help in some way. And rather than looking down at the woman or believing that she is somehow separate and disconnected from yourself, you realize that all human beings suffer and are in need of compassion—"there but for fortune go I." Self-compassion is simply compassion directed inward, relating to ourselves as the object of care and concern when faced with the experience of suffering (Neff, 2003a).

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The Three Components of Self-Compassion

Drawing on the writings of various Buddhist teachers (Brach, 2003; Kornfield, 1993; Salzberg, 1997), Neff (2003b) has operationalized self-compassion as consisting of three main elements: kindness, common humanity, and mindfulness. These components combine and mutually interact to create a self-compassionate frame of mind. Self-compassion is relevant when considering personal inadequacies, mistakes, and failures, as well as when struggling with more general life situations that cause us mental, emotional, or physical pain.

Self-Kindness

Western culture places great emphasis on being kind to others, but not so much to ourselves. When we make a mistake or fail in some way, we often use harsh, critical internal language—"You're so stupid and lazy, I'm ashamed of you!" We would be unlikely to say such things to a close friend, or even a stranger for that matter. When asked directly, most people report that they are kinder to others than themselves (Neff, 2003a), and it is not unusual to encounter extremely kind and compassionate people who continually beat themselves up. And even when our problems stem from forces beyond our control, such as losing our job or getting in a car accident, we often do not give ourselves the sympathy we would give to a friend in the same situation.

With self-kindness, however, we are supportive and understanding toward ourselves. Our inner dialogs are gentle and encouraging rather than harsh and belittling. This means that instead of continually punishing ourselves for not being good enough, we kindly acknowledge that we are doing the best we can. Similarly, when external life circumstances are challenging and difficult to bear, we soothe and nurture ourselves. We are moved by our own distress so that warm feelings and the desire to ameliorate our suffering emerge.

Common Humanity

The sense of common humanity central to self-compassion involves recognizing that everyone fails, makes mistakes, and gets it wrong sometimes. We do not always get what we want and are often disappointed—either in ourselves or in our life circumstances. This is part of the human experience, a basic fact of life shared with everyone else on the planet. We are not alone in our imperfection. Rather, our imperfections are what make us card-carrying members of the human race. Often, however, we feel isolated and cut off from others when considering our struggles and failures, irrationally feeling that it is only "ME" who is having such a hard time of it. We think that somehow we are abnormal, that something has gone wrong, and we forget that falling flat on our face now and then actually *is* normal. This sort of tunnel vision makes us feel alone and isolated, making our suffering even worse (Neff, 2011). With self-compassion, however, we take the stance of a compassionate "other" toward ourselves, allowing us to take a broader perspective on ourselves and our lives. By remembering the shared human experience, we feel less isolated when we are in pain. For this reason, self-compassion is quite distinct from self-pity. Self-pity is a "woe is me" attitude in which people become immersed in their own problems and forget that others have similar problems. Self-compassion recognizes that we all suffer, and therefore fosters a connected mindset that is inclusive of others.

Mindfulness

Self-compassion entails mindful awareness of our negative thoughts and emotions so that they are approached with balance and equanimity. When we are mindful, we are experientially open to the reality of the present moment without judgment, avoidance, or repression (Bishop et al., 2004). Why is mindfulness an essential component of self-compassion? First, we must be willing to turn toward and experience our painful thoughts and emotions in order to embrace ourselves with compassion. While it might seem that our pain is blindingly obvious, many people do not acknowledge how much pain they are in, especially when that pain stems from their own inner self-critic. Or when confronted with life challenges, people often get so lost in problem-solving mode that

they do not pause to consider how hard it is in the moment. Mindfulness of our negative thoughts and feelings means that we do not become "overidentified" (Neff, 2003b) with them, getting caught up and swept away by our aversive reactions (Bishop et al., 2004). Rather than confusing our negative self-concepts with our actual selves, we can recognize that our thoughts and feelings are just that—thoughts and feelings—helping us to drop our unquestioning belief in the storyline of our inadequate, worthless selves.

Neff (2003b) proposes that the three components of self-compassion are conceptually distinct, they also overlap and tend to engender one another. For instance, the accepting stance of mindfulness helps to lessen self-judgment and provide insight needed to recognize our common humanity. Similarly, self-kindness lessens the impact of negative emotional experiences, making it easier to be mindful of them. And realizing that suffering and personal failures are shared with others lessens the degree of self-blame, while also helping to quell the process of over-identification. Thus, self-compassion is best understood as a single experience composed of interacting parts.

What Does Self-Compassion Do?

An ever-increasing body of research suggests that self-compassion enables people to suffer less while also helping them to thrive. So far, the majority of studies focusing on self-compassion have been correlational, using the Self-Compassion Scale (SCS; Neff, 2003a) to determine the association between trait self-compassion and psychological health. This 26-item self-report measure assesses the various thoughts, emotions, and behaviors that map on to the different dimensions of self-compassion—self-kindness versus self-judgment, common humanity versus isolation, and mindfulness versus over-identification. Increasingly, however, researchers are also using methods like mood inductions (e.g., Breins & Chen, 2012; Leary, Tate, Adams, Allen, & Hancock, 2007); behavioral observations (Sbarra, Smith, & Mehl, 2012) or short-term interventions (e.g., Shapira & Mongrain, 2010) as a means of examining the impact of self-compassion on wellbeing.

Self-Compassion and Emotional Wellbeing

One of the most consistent findings in the research literature is that greater self-compassion is linked to less anxiety and depression. In fact, a recent meta-analysis (MacBeth & Gumley, 2012) found a large effect size when examining the link between self-compassion and psychopathology across 20 studies. Of course, a key feature of self-compassion is the lack of self-criticism, and self-criticism is known to be an important predictor of anxiety and depression (Blatt, 1995). However, self-compassion still offers protection against anxiety and depression when controlling for self-criticism (Neff, 2003a). In a study by Neff, Kirkpatrick, and Rude (2007), participants were given a mock job interview in which they were asked to "describe their greatest weakness." Even though self-compassionate people used as many negative self-descriptors as those low in self-compassion when describing their weaknesses, they were less likely to experience anxiety as a result of the task. Self-compassionate individuals also tended to use more connected and less isolating language when writing about their weakness, using fewer first person singular pronouns such as "I," using more first person plural pronouns such as "we," and making more social references to friends, family, and other humans. This suggests that self-compassion may reduce self-evaluative anxiety because weaknesses feel less threatening when considered in the light of the shared human experience. Self-compassionate people have also been found to ruminate much less than those who lack self-compassion (Neff, 2003a), presumably because they can break the cycle of negativity by accepting their human imperfection with kindness. A study by Raes (2010) found that rumination mediated the association between self-compassion and depression and anxiety, suggesting that reduced rumination is one of the key benefits of self-compassion.

There may be physiological processes underlying the link between self-compassion, anxiety, and depression. Gilbert and Irons (2005) suggest that self-compassion deactivates the threat system (associated with feelings of insecure attachment, defensiveness and autonomic arousal) and activates the self-soothing system (associated with feelings of secure attachment, safety, and the oxytocin-opiate system). In support of this proposition, Rockliff, Gilbert, McEwan, Lightman, and Glover (2008) found that giving individuals a brief self-compassion exercise (this involved generating a visual image of an ideally compassionate figure sending oneself unconditional love and acceptance) lowered their levels of the stress hormone cortisol. It also increased heart-rate variability, which is associated with a greater ability to self-soothe when stressed (Porges, 2007).

Self-compassion has also been shown to mitigate the effect of negative life events on emotional functioning in general. For instance, a series of studies by Leary et al. (2007) investigated the way that self-compassionate people deal with negative self-relevant thoughts or life events. One study used experience-sampling techniques, asking participants to report about any difficulties they were having over a 20-day period. Individuals with higher levels of self-compassion had more perspective on their problems and were less likely to feel isolated by them, e.g., they were more likely to feel that their struggles were not any worse than what lots of other people go through. The researchers also found that priming self-compassion helped participants to take responsibility for their role in past negative events without experiencing as much negative affect as those in a control condition.

While self-compassion helps lessen the hold of negativity, it is important to remember that self-compassion does not push negative emotions away in an aversive manner. Self-compassionate individuals are less likely to suppress unwanted thoughts and emotions than those who lack self-compassion (Neff, 2003a), and more likely to acknowledge that their emotions are valid and important (Leary et al., 2007; Neff, Hseih, & Dejitthirat, 2005; Neff et al., 2007). With self-compassion, instead of replacing negative feelings with positive ones, positive emotions are generated by *embracing* the negative ones. For this reason, it is perhaps unsurprising that self-compassion is associated with positive psychological strengths. For example, self-compassion is associated with emotional intelligence, wisdom, life satisfaction, and feelings of social connectedness—important elements of a meaningful life (Neff, 2003a; Neff, Pisitsungkagarn, & Hseih, 2008). People high in trait self-compassion or who are induced to be in a self-compassionate frame of mind also tend to experience more happiness, optimism, curiosity, creativity, and positive emotions such as enthusiasm, inspiration, and excitement than those who are self-critical (Hollis-Walker & Colosimo, 2011; Neff et al., 2007). Shapira and Mongrain (2010) conducted an experiment in which individuals were asked to write a self-compassionate letter to themselves every day for 7 days, and found that the brief intervention increased happiness levels compared to a control group who wrote about early memories for the same period. Moreover, this increased happiness was maintained at 1 month, 3 months, and 6 months follow-up. By wrapping one's pain in the warm embrace of self-compassion, positive feelings are generated that help balance the negative ones, allowing for more joyous states of mind.

Self-Compassion Versus Self-Esteem

Although self-compassion generates positive emotions, it does not do so by judging the self as "good" rather than "bad." In this way, self-compassion differs markedly from self-esteem. Self-esteem refers to the degree to which we evaluate ourselves positively. It represents how much we like or value ourselves, and is often based on comparisons with others (Harter, 1999). In American culture, having high self-esteem means standing out in a crowd—being special and above average (Heine, Lehman, Markus, & Kitayama, 1999). There is general consensus that self-esteem is essential for good mental health, while the lack of self-esteem undermines wellbeing by fostering depression, anxiety, and other pathologies (Leary,

1999). There are potential problems with high self-esteem, however, not in terms of having it, but in terms of getting it (Crocker & Park, 2004). For instance, people often put others down and inflate their own sense of self-worth as a way to feel better about themselves (Tesser, 1999), and may result in narcissism, prejudice, and bullying (Aberson, Healy, & Romero, 2000; Morf & Rhodewalt, 2001; Salmivalli, Kaukiainen, Kaistaniemi, & Lagerspetz, 1999). Self-esteem also tends to be contingent on success in valued life domains (Crocker, Luhtanen, Cooper, & Bouvrette, 2003), and therefore fluctuates according to performance outcomes (Kernis, Paradise, Whitaker, Wheatman, & Goldman, 2000). As the Hollywood saying goes, you are only as good as your latest success.

In contrast, self-compassion is not based on positive judgments or evaluations—it is a way of positively relating to ourselves. People feel self-compassion because they are human beings, not because they are special or above average, so that interconnection rather than separateness is emphasized. This means that with self-compassion, you do not have to feel better than others to feel good about yourself. It also offers more emotional stability than self-esteem because it is always there for you—when you are on top of the world and when you fall flat on your face.

Leary et al. (2007) found that when considering hypothetical scenarios involving failure or embarrassment (e.g., being responsible for losing an athletic competition for their team), participants with greater self-compassion reported less negative affect (e.g., sadness or humiliation) and more emotional equanimity (e.g., remaining calm and unflustered). In contrast, global levels of trait self-esteem predicted no variance in outcomes after controlling for self-compassion levels. In another study, participants were asked to give a brief introduction of themselves on video (describing interests, future plans, etc.), and were then given positive or negative feedback about the introduction that was ostensibly made by an observer. Participants' reactions to the feedback were then assessed, including their attributions for the observer's feedback. Individuals with low self-compassion gave defensive attributions—they were more likely to attribute the observer's feedback to their own personality when the feedback was positive rather than negative. High self-compassion individuals, however, were equally likely to attribute the feedback to their personality regardless of whether the feedback was positive or negative. An opposite pattern was found for self-esteem. Low self-esteem individuals were equally likely to attribute the feedback to their personality when feedback was positive or negative, but high self-esteem participants were more likely to attribute the feedback to their own personality when the feedback was positive rather than negative. This suggests that self-compassion enables people to admit and accept that there are negative as well as positive aspects of their personality. The maintenance of high self-esteem is more dependent on positive self-evaluations, and therefore may lead to cognitive distortions in order to preserve positive self-views (Swann, 1997).

In a survey involving a large community sample in the Netherlands, self-compassion was shown to be a stronger predictor of healthy functioning than self-esteem (Neff & Vonk, 2009). Self-compassion was associated with more stability in state feelings of self-worth over an 8-month period (assessed 12 different times) than trait self-esteem. This may be related to the fact that self-compassion was also found to be less contingent on things like physical attractiveness or successful performances than self-esteem. Results indicated that self-compassion was associated with lower levels of social comparison, public self-consciousness, self-rumination, anger, and need for cognitive closure, than self-esteem. Also, self-esteem had a robust association with narcissism while self-compassion had no association with narcissism. These findings suggest that in contrast to those with high self-esteem, self-compassionate people are less focused on evaluating themselves, feeling superior to others, worrying about whether or not others are evaluating them, defending their viewpoints, or angrily reacting against those who disagree with them. In sum, self-compassion is a healthier way of feeling good about oneself than self-esteem that is based on the need to feel better than others.

Self-Compassion and Motivation

Many people criticize themselves in the belief that it will help motivate them to achieve their goals. While the adage "spare the rod spoil the child" is rarely used in modern parenting, it seems to persist when relating to ourselves. To the extent that self-criticism does work as a motivator, it is because we are driven to succeed in order to avoid self-judgment when we fail. But if we know that failure will be met with a barrage of self-criticism, sometimes it can be too frightening to even try. With self-compassion, we strive to achieve for a very different reason—because we care. If we truly want to be kind to ourselves and do not want to suffer, we will do things to help us be happy, such as taking on challenging new projects or learning new skills. And because self-compassion gives us the safety needed to acknowledge our weaknesses, we are in a better position to change them for the better.

Research supports this idea. In a series of four experimental studies, Breines and Chen (2012) used mood inductions to engender feelings of self-compassion for personal weaknesses, failures, and past moral transgressions. When compared to a self-esteem induction (e.g., "think about your positive qualities") or a positive mood distractor (e.g., "think about a hobby you enjoy"), self-compassion resulted in more motivation to change for the better, try harder to learn, and avoid repeating past mistakes. Other research has shown self-compassion to be linked to personal initiative, perceived self-efficacy, and intrinsic motivation (Neff et al., 2005, 2007). Self-compassionate people have less fear of failure, but when they do fail they are more likely to try again (Neely, Schallert, Mohammed, Roberts, & Chen, 2009). Self-compassion also promotes health-related behaviors such as sticking to one's diet (Adams & Leary, 2007), reducing smoking (Kelly, Zuroff, Foa, & Gilbert, 2009), seeking medical treatment when needed (Terry & Leary, 2011) and exercising (Magnus, Kowalski, & McHugh, 2010).

Self-Compassion and Coping

Self-compassion can be seen as an effective way to cope with difficult emotional experiences. For instance, Sbarra et al. (2012) found that self-compassion was key in helping people adjust after divorce. Researchers asked divorcing adults to complete a 4-min stream-of-consciousness recording about their separation experience, and independent judges rated how self-compassionate their dialogs were. Those who displayed greater self-compassion when talking about their break-up not only evidenced better psychological adjustment at the time, but this effect persisted over 9 months. Findings were significant even after accounting for a number of competing predictors such as self-esteem. Research also indicates that self-compassion helps people cope with early childhood traumas. In a youth sample, Vettese, Dyer, Li, and Wekerle (2011) found that self-reported levels of self-compassion mediated the link between childhood maltreatment and later emotional dysregulation. This suggests that people with trauma histories who have compassion for themselves are better able to deal with upsetting events in a productive manner. Self-compassion also appears to help people cope with chronic physical pain (Costa & Pinto-Gouveia, 2011).

Self-Compassion and Interpersonal Relationships

In addition to intrapersonal benefits, self-compassion appears to enhance interpersonal functioning. Neff and Beretvas (2012) found that self-compassionate individuals were described by their partners as being more emotionally connected, accepting, and autonomy-supporting while being less detached, controlling, and verbally or physically aggressive than those lacking self-compassion. Similarly, a study of relationships between college roommates (Crocker & Canevello, 2008) found that self-compassionate students provided more social support and encouraged interpersonal trust with roommates compared to those lacking in self-compassion.

An interesting question concerns whether self-compassionate people are also more compassionate toward others. There is some evidence that self-compassion stimulates parts of the brain associated with compassion in general. Using fMRI technology, Longe et al. (2009) found that instructing individuals to be self-compassionate was associated with neuronal activity similar to what occurs when feelings of empathy for others are evoked. This would suggest that the tendency to respond to suffering with caring concern is a broad process applied to both self and others. While research focused directly on this topic is new, findings suggest that the link between self-compassion and other-compassion exists but is somewhat complex.

Neff and Pommier (2012) examined the link between self-compassion and compassion for others, empathetic concern, altruism, personal distress, and forgiveness. Participants included college undergraduates, an older community sample, and individuals practicing Buddhist meditation. In all three groups, self-compassionate people were less likely to experience personal distress, meaning they were more able to confront others' suffering without being overwhelmed. In addition, self-compassion was significantly associated with forgiveness. Forgiving others requires understanding the vast web of causes and conditions that lead people to act as they do. The ability to forgive and accept one's flawed humanity, therefore, appears to also apply to others. Self-compassion was significantly but weakly linked to compassion for others, empathetic concern, and altruism among the community and Buddhist samples. This association is probably not as robust as might be expected because of the fact that most people report being much kinder to others than themselves (Neff, 2003a), attenuating the association.

Interestingly, there was no link found between self-compassion and other-focused concern (i.e., compassion, empathetic concern, and altruism) among undergraduates. This may be because young adults often struggle to recognize the shared aspects of their life experience, overestimating their distinctiveness from others (Lapsley, FitzGerald, Rice, & Jackson, 1989). Their schemas for why they are deserving of care and why others are deserving of care are therefore likely to be poorly integrated. The link between self-compassion and other-focused concern was strongest among meditators, which may be the result of practices like loving-kindness meditation that are designed to intentionally cultivate compassion for both self and others (Hofmann, Grossman, & Hinton, 2011).

The Origins of Self-Compassion

Gilbert (2009) argues that self-compassion is an evolved capacity that emerges from behavioral systems involving attachment and affiliation. Seeking proximity and soothing from caregivers in order to provide a secure base for operation in the world is a mammalian behavior. For mammals, survival depends on the "tend and befriend" instinct (Taylor, 2002). In times of threat or stress, animals that are protective of their offspring and live within cooperative groups are more likely to pass their genes successfully on to the next generation. Among humans, the sense of secure attachment and belonging that emerges from the caregiving system creates feelings of safety, of being worthy of love and care, increased happiness, and reduced anxiety and depression (Mikulincer & Shaver, 2007).

For this reason, individuals who are raised in safe, secure environments and who experience supportive and validating relationships with caregivers should be more able to relate to themselves in a caring and compassionate manner. In contrast, individuals who are raised in insecure, stressful, or threatening environments are likely to have an insufficiently developed self-soothing system and few internalized models of compassion to draw upon (Gilbert & Procter, 2006). Research supports the notion that self-compassion is related to the caregiving system and early childhood interactions. People who lack self-compassion are more likely to have critical mothers, for instance, come from families in which there was a lot of conflict, and display insecure attachment patterns, while the opposite is true for those with higher levels of self-compassion (Neff & McGeehee, 2010; Wei, Liao, Ku, & Shaffer, 2011).

Teaching Self-Compassion

While pre-existing trait levels of self-compassion have their origins, at least in part, in early childhood experiences, skills of self-compassion can also be taught. Paul Gilbert has developed a group-based therapy intervention for clinical populations called Compassionate Mind Training (CMT). CMT is designed to help people develop skills of self-compassion, especially when their more habitual form of self-to-self relating involves self-attack. In a pilot study of CMT involving hospital day patients with intense shame and self-criticism, significant decreases in depression, self-attacking, shame, and feelings of inferiority were reported after participation in the CMT program (Gilbert & Procter, 2006). Moreover, almost all of the participants felt ready to be discharged from their hospital program at the end of the study.

Chris Germer and Kristin Neff have developed a training program designed to teach self-compassion skills to the general populace called Mindful Self-Compassion (MSC; Neff & Germer, 2012). The structure of MSC is modeled on Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1982), with participants meeting for 2½ h once a week over the course of the 8 weeks, and also meeting for a half-day "mini retreat." Formal meditation practices are taught such as loving-kindness meditation (LKM), an ancient Buddhist practice designed to increase good will for oneself and others in a general fashion by repeating a series of phrases such as "May I be safe, may I be peaceful, may I be healthy, and may I live with ease" (Grossman, Niemann, Schmidt, & Walach, 2004). A variant of the practice is also taught that focuses on generating self-compassion—calling to mind an emotionally difficult situation in one's life and repeating phrases such as "May I feel safe, may I feel peaceful, may I be kind to myself, may I accept myself as I am." Informal practices are taught such as placing one's hands on one's heart in times of stress, or repeating a set of memorized self-compassion phrases for use in daily life. Throughout the program, interpersonal exercises are used to help generate feelings of common humanity. Home practices are assigned at the end of each session such as writing a compassionate letter to oneself. Participants are asked to do 40 min of self-compassion practice each day, which can be a combination of formal and informal practices.

Neff and Germer (2012) recently conducted a randomized controlled study of the MSC program that compared outcomes for a treatment group ($N=24$; 78 % female; M age = 51.21) to those who were randomized to a waitlist control group ($N=27$; 82 % female; M age = 49.11). The large majority of participants (76 %) reported having prior experience with mindfulness meditation. Compared to controls, MSC participants demonstrated a significant increase in their self-compassion levels (43 %), with a large effect size indicated ($d=1.67$; Cohen, 1988). Participants also significantly increased in mindfulness (19 %), compassion for others (7 %) and life satisfaction (24 %), while decreasing in depression (24 %), anxiety (20 %), stress (10 %), and emotional avoidance (16 %). All significant gains in study outcomes were maintained at 6 months and 1-year follow-up. In fact, life satisfaction actually increased significantly from the time of program completion to the 1-year follow-up, suggesting that the continued practice of self-compassion continues to enhance one's quality of life over time (Figs. 10.1 and 10.2).

Results indicated that the more MSC participants practiced formal meditation, the more they increased their self-compassion levels. Similarly, the degree that participants practiced informal self-compassion techniques in daily life also predicted gains in self-compassion. This implies that self-compassion is teachable skill that is "dose-dependent." The more you practice it the more you learn it. The study was limited by the lack of an active control group, a shortcoming that will need to be addressed in future research. Also, given that most participants had prior mindfulness meditation experience, it might be that practices taught in the program are only effective for those who already know how to meditate. On the other hand, the fact that MSC participants increased in wellbeing even though most had prior meditation experience suggests that MSC

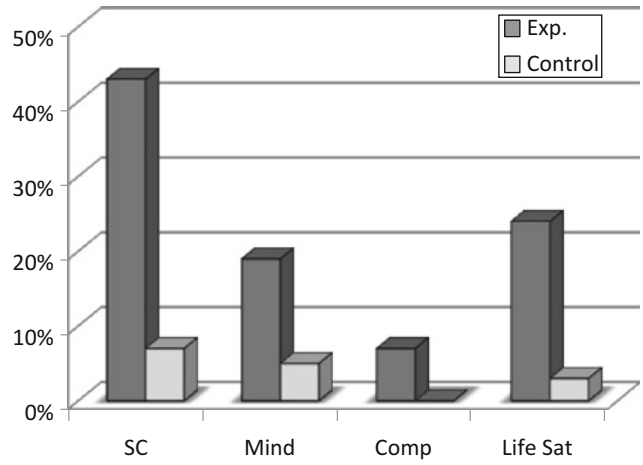

Fig. 10.1 Percent increase in self-compassion, mindfulness, compassion, and life satisfaction

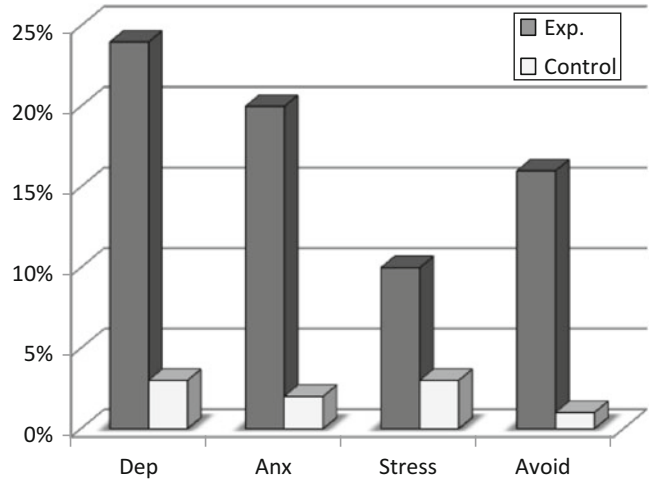

Fig. 10.2 Percent decrease in depression, anxiety, stress, and emotional avoidance

offers tangible benefits over and above mindfulness meditation alone.

The term "Mindful" is included in the name of the program because it also teaches basic mindfulness skills, which—as discussed above—are crucial to the ability to give oneself compassion. However, MSC mainly focuses on teaching self-compassion skills and includes mindfulness as a secondary emphasis (only one session in the 8-week course is explicitly devoted to mindfulness). Because the distinction between mindfulness and self-compassion is a complex one, the issue of how mindfulness and self-compassion relate to one another will be considered in some detail.

How Does Self-Compassion Relate to Mindfulness?

As discussed elsewhere in this volume, mindfulness entails being aware of present moment experience in a clear and balanced manner (Brown & Ryan, 2003). It is a metacognitive skill involving

self-regulation of attention that cultivates a quality of relating to one's experience with a curious, accepting stance. Acceptance involves being "experientially open" to whatever thoughts, emotions, and sensations arise in awareness with an attitude of non-judgment and non-resistance (Bishop et al., 2004). Both mindfulness and self-compassion are notions drawn from Buddhist psychology, and mindfulness is a core component of self-compassion. One might ask, therefore, what are the areas of overlap and distinctiveness between these constructs, and do they have unique implications for human functioning?

There are many ways in which mindfulness, as defined above, is operationally similar to self-compassion. Both involve turning toward painful experiences with an accepting stance so that destructive processes of reactivity are lessened, as evidenced by the large research literatures linking both mindfulness and self-compassion to wellbeing (Keng, Smoski, & Robins, 2011; MacBeth & Gumley, 2012). There are some distinctions worth noting, however.

First, the type of mindfulness that is part of self-compassion is narrower in scope than mindfulness more generally. The mindfulness component of self-compassion refers to balanced awareness of *negative* thoughts and feelings. For instance, a sample item from the mindfulness subscale of the SCS (Neff, 2003a) is "When something upsets me I try to keep my emotions in balance." Mindfulness in general refers to the ability to pay attention to any experience—positive, negative, or neutral—with equanimity. While it is possible to be mindful of eating a raisin, an exercise commonly used to teach mindfulness (Kabat-Zinn, 1990), it would not make sense to give oneself compassion for eating a raisin (unless perhaps you had a traumatic raisin-eating experience in childhood!)

Self-compassion as a total construct is also broader in scope than mindfulness because it includes the additional elements of self-kindness and common humanity: actively soothing and comforting oneself when painful experiences arise, and remembering that such experiences are part of being human. These are not qualities that are inherently part of mindfulness per se (Bishop et al., 2004). Feelings of self-kindness and common humanity may often accompany mindfulness of painful experiences, of course, so that self-compassion may automatically co-arise with mindfulness itself. The two do not *always* co-arise, however. It is possible to be mindfully aware of painful thoughts and feelings without actively soothing and comforting oneself, or remembering that these feelings are part of the shared human experience. Sometimes it takes an extra intentional effort to be compassionate toward our own suffering, especially when our painful thoughts and emotions involve self-judgments and feelings of inadequacy.

Another distinction between mindfulness and self-compassion lies in their respective targets. Whereas mindfulness is a way relating to internal experience, self-compassion is a way of relating to the *experiencer* who is suffering (Germer, 2009). Mindfulness non-judgmentally accepts the thoughts, emotions and sensations that arise in present moment awareness. Compassion entails the desire for sentient beings to be happy and free from suffering (Salzberg, 1997). If I am mindful of a stabbing sensation in my knee, for instance, it means I am aware of the hot pulsating sensation without judgment or resistance, allowing mental space for the sensation to "be" as it is. When self-compassion also arises in response to that pain, feelings of care and concern for the fact that I am experiencing this pain are conveyed, along with the motivation to soothe and comfort myself to the extent possible. Self-compassion involves a bit of a paradox, therefore. At the same time that one's present moment experience is mindfully accepted without resistance, the wish for the experiencer to be free of suffering in future moments—the motivation that lies at the heart of compassion—is also present.

One slogan of the MSC program is that "we give ourselves compassion not to feel better, but because we feel bad." In other words, we learn to fully accept our present moment experience as it is without resistance, while still holding our pain in the warm embrace of compassion. Mindfulness is necessary to insure that compassion does not become a slick new form of resistance (I will be

kind to myself to make the pain go away), while compassion provides the emotional safety needed to fully feel and open to one's pain. Thus, mindfulness and self-compassion mutually enhance one another.

Ultimately, the answer to the question of how mindfulness and self-compassion are related is an empirical one. It is likely that self-compassion taps into differently evolved physiological systems than mindfulness (Gilbert, 2009). Mindfulness is a form of metacognition and attention regulation that has been associated with increased activity in the middle prefrontal regions of the brain, and is a relatively recent evolutionary achievement (Siegel, 2007). Compassion has been linked to the older mammalian caregiving system, which involves oxytocin and other hormones related to feelings of secure attachment (Goetz et al., 2010), as well as specific neuronal networks associated with love and affiliation (Klimecki, Leiberg, Lamm, & Singer, 2013). These systems are likely to be differentially recruited when one is being mindful of one's present-moment experience versus being compassionate toward oneself. (It is unlikely that the attachment system is activated when mindfully eating a raisin, for example.)

While comparisons of the physiology of mindfulness versus compassion are sparse, there is a growing research literature comparing the psychological correlates of mindfulness and self-compassion using self-report methodologies. First, it is important to note that measures of mindfulness and self-compassion are significantly correlated, ranging from a low of 0.28 (Birnie, Speca, & Carlson, 2010) using the Mindful Awareness and Attention Scale (MAAS; Brown & Ryan, 2003) to a high of 0.69 (Hollis-Walker & Colosimo, 2011) using the Five Factor Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). This link is not surprising given that mindfulness is a foundational element of self-compassion, and that the three elements of self-kindness, common humanity, and mindfulness help to mutually engender one another. Still, it appears that for some outcomes, self-compassion is a stronger predictor of wellbeing than mindfulness alone.

Van Dam, Sheppard, Forsyth, and Earleywine (2011) examined the link between self-compassion (using the SCS), mindfulness (using the MAAS), and various wellbeing measures in a large sample of people with moderate to severe anxiety and/or depression. Results indicated that individual differences in trait self-compassion, as compared to trait mindfulness, explained significantly more variance in terms of anxiety, worry, depression, and quality of life. Similarly, Baer, Lykins, and Peters (2012) compared the relative predictive utility of self-compassion (using the SCS) and mindfulness (using the FFMQ) for psychological wellbeing. Wellbeing was assessed in terms of self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth (Ryff & Keyes, 1995). The study found that self-compassion was almost twice as strong a predictor of wellbeing than mindfulness, though both were significant predictors.

Another study (Neff, in preparation) examined the relative association of self-compassion (using the SCS) and mindfulness (using the MAAS) with anxiety, depression, happiness and life-satisfaction in a non-clinical community sample ($N=338$), as well as a sample of individuals practicing Buddhist meditation ($N=174$). Among the community sample, anxiety was more powerfully predicted by mindfulness ($B=-0.36$) than self-compassion ($B=-0.19$), and depression was more powerfully predicted by self-compassion ($B=-0.48$) than mindfulness ($B=-0.25$), though both were still significant predictors. Self-compassion was the only significant predictor of happiness ($B=0.65$) and life satisfaction ($B=0.49$). Among meditators, anxiety was predicted more powerfully by self-compassion ($B=-0.35$) than mindfulness ($B=-0.15$), with both predictors being significant. However, self-compassion was the only significant predictor of depression ($B=-0.59$), happiness ($B=0.63$), and life satisfaction ($B=0.41$).

Overall, research findings so far suggest that self-compassion may be a stronger predictor of depression, happiness, life satisfaction, and psychological wellbeing than mindfulness alone. If

so, it may be because these sorts of wellbeing outcomes are more strongly impacted by the soothing qualities of self-kindness and the emotional safety generated by feelings of common humanity (Pauley & McPherson, 2010). Findings with anxiety appear to be more mixed, and may depend on characteristics of the populations being examined such as clinical symptomology or meditation experience. A great deal of further research will be needed to gain a more solid understanding of when, how, and for whom the beneficial aspects of mindfulness and self-compassion are realized, but results so far suggest that the benefits are not identical. This also holds true when considering interventions aimed at developing skills of mindfulness and/or self-compassion.

Mindfulness-Based Interventions and Self-Compassion

Mindfulness-based interventions are widespread, the most common being the 8-week Mindfulness-Based Stress Reduction program (MBSR; Kabat-Zinn, 1982). Mindfulness-Based Cognitive Therapy (MBCT) is another popular form of MBSR that has been adapted for clinical use, particularly for the treatment of depressive relapse (Segal, Williams, & Teasdale, 2012). Both of these programs use meditation techniques such as the body scan, breath awareness, and yoga to teach mindfulness skills. There is also evidence that participation in MBSR and MBCT increases self-compassion (e.g., Birnie et al., 2010; Kuyken et al., 2010; Rimes & Wingrove, 2011; Shapiro, Brown, & Biegel, 2007). Although self-compassion is not an explicit skill taught in MBSR and MBCT, leaders of these programs often convey implicit messages about the importance of being kind and gentle with oneself. Also, leaders of MBSR have the option of teaching loving-kindness meditation (LKM) on a 1-day meditation retreat (Santorelli & Kabat-Zinn, 2004). While LKM is designed to foster general feelings of friendliness and benevolence toward self and others, rather than compassion for personal experiences of suffering in particular, cultivating this loving mindset is likely to translate into greater self-compassion. And of course, given that mindfulness is a foundational element of self-compassion, it makes sense that being mindful of negative thoughts and emotions also increases one's ability to be self-compassionate.

Some researchers have proposed that the increased self-compassion associated with MBSR and MBCT may be a key mechanism by which these interventions improve wellbeing (Baer, 2010; Hölzel et al., 2011). In support of this idea, Shapiro, Astin, Bishop, and Cordova (2005) found that healthcare professionals who took an MBSR program reported significantly increased self-compassion and reduced stress compared to a waitlist control group, and that self-compassion mediated the reductions in stress associated with the program. Similarly, Kuyken et al. (2010) examined the effect of MBCT compared to maintenance antidepressants on relapse in depression, and found that increases in mindfulness and self-compassion both mediated the link between MBCT and depressive symptoms at 15-month follow-up. They also found that MBCT reduced the link between cognitive reactivity and depressive relapse, and that increased self-compassion—but not mindfulness—mediated this association, again suggesting that self-compassion may be a more powerful predictor of depression than mindfulness alone.

Interestingly, although self-compassion may be a key mechanism of action in MBCT, the updated second edition of the MBCT training manual (Segal et al., 2012) argues that MBCT instructors should not explicitly discuss or teach self-compassion in the program. Rather, they suggest that participants can learn principles of self-compassion just as effectively if leaders implicitly embody kindness and compassion in the quality of their presence, their guidance of meditation practice, and their responses to participants' questions or comments. The authors also advise against explicitly teaching self-compassion skills to clinically depressed individuals because it could reinforce their feelings of being unloved and unlovable. Research will be needed to determine if the explicit teaching of self-compassion in programs such as MBCT is

beneficial or not. It seems likely, however, that self-compassion can be raised to a much greater extent through explicit rather than implicit methods. Also, if programs rely on teacher warmth to convey the importance of self-compassion, it is unclear how long this effect will last when individuals have finished their program and are facing difficult situations in their personal lives. This is especially true given that the larger culture does not support the practice of self-compassion, and instead tends to undermine it.

For instance, many people in the West struggle with being compassionate to themselves because our culture teaches us that self-compassion is weak and passive, or that it will undermine our motivation (Gilbert, McEwan, Matos, & Rivis, 2011). Western culture also tends to confuse self-compassion with self-pity, self-indulgence, and the abdication of personal responsibility. MSC directly addresses these misconceptions in the first session of the course and provides a brief overview of research on self-compassion supporting its mental health benefits. This allows for conceptual "buy-in" that facilitates the learning and use of self-compassion. The self-compassion exercises taught in the program are also designed to help people bring self-compassion to actual situations with which they are currently struggling. For instance, MSC teaches something called the "self-compassion break," which involves intentionally calling to mind a current life struggle, finding a soothing physical expression of compassion such as putting both hands over one's heart, then silently repeating words that convey the main elements of self-compassion ("This is a moment of suffering, suffering is part of life, may I be kind to myself in this moment, may I give myself the compassion I need.") These types of concrete tools are likely to help people learn to use self-compassion in their lives with greater efficacy.

Although no studies have yet directly compared MSC with MBSR or MBCT, studies examining the outcomes of each program independently suggest that explicitly teaching self-compassion does make a difference. Neff and Germer (2012) found that the MSC program raised participants' self-compassion levels as measured by the SCS (Neff, 2003a) by 43 %, and that gains in self-compassion were maintained at least 1 year later. In comparison, a review of the literature revealed that five MBSR studies yielded an average increase of 19 % (range: 16–23 %) on the SCS (Birnie et al., 2010; Robins, Keng, Ekblad, & Brantley, 2012; Shapiro et al., 2005, 2007; Shapiro, Brown, Thoresen, & Plante, 2011), while three MBCT studies yielded an average increase of 9 % (range: 7–12 %) on the SCS (Kuyken et al., 2010; Lee & Bang, 2010; Rimes & Wingrove, 2011). Only two of these studies examined whether gains in self-compassion were maintained over time. Robins et al. (2012) found that increases in self-compassion were maintained for 2 months after completing MBSR. Shapiro et al. (2011) examined self-compassion levels both 2 months and 1 year after completing MBSR, but did not find that program participation significantly increased self-compassion levels in the first place.

Research that directly compares the relative impact of MBSR, MBCT, and MSC will be needed before understanding the overlapping and unique benefits of each. While MSC appears to raise self-compassion more than mindfulness-based interventions, it is likely that MSC raises mindfulness levels to a lesser extent than MBSR or MBCT, given that teaching mindfulness is only a secondary emphasis of the program. MBSR and MBCT are also more likely to have a stronger impact on phenomena related to mindful awareness such as attenuating reactivity to emotional stimuli, decreasing emotional avoidance, as well as enhancing cognitive flexibility, attentional functioning, and interoception (Keng et al., 2011) than MSC. This suggests that the MSC program is complementary to MBSR or MBCT, and that it may be an effective supplement to these MBIs, especially for those who are self-critical.

An important area for future research will be to determine whether individual difference variables play a role in the relative impact of each type of program on wellbeing. MBSR and MBCT might be more effective in improving wellbeing for those who have low pre-existing levels of mindfulness, for instance, while MSC may be more effective for those with lower levels of self-

compassion. Research might also fruitfully explore whether wellbeing is maximized when both types of programs are taken, and if so, in what order. Intuitively, it would seem optimal to learn mindfulness before self-compassion given that mindfulness is needed for compassion. However, for people suffering from severe shame or self-criticism, they might need to first cultivate self-compassion in order to have the sense of emotional safety needed to fully turn toward their pain with mindfulness.

While this last section of this chapter has emphasized the differential benefits of mindfulness and self-compassion, this should not be taken to mean that it is possible to say one is "better" than the other. This would be like trying to argue whether food is better than water, an especially fruitless task given that water is needed for food to grow (just like mindfulness is needed for self-compassion to grow). In the Buddhist tradition mindfulness and compassion are considered to be two wings of a bird (Kraus & Sears, 2009), and both are necessary to fly.

Conclusion

Research increasingly shows that treating oneself with care and compassion is a powerful way to enhance intrapersonal and interpersonal wellbeing. When we are mindful of our suffering and respond with kindness, remembering that suffering is part of the shared human condition, we are able to cope with life's struggles with greater ease. We create a loving, connected, and balanced state of mind and heart that helps to reduce psychopathology while simultaneously enhancing joy and meaning in life. Self-compassion is a portable source of friendship and support that is available when we need it most—when we fail, make mistakes, or struggle in life. Unlike self-esteem, which tends to be a fair-weather friend, self-compassion is an available resource in good times and bad. And by combining mindful acceptance of our present moment experience with the compassionate desire to be happy and free from suffering, we maximize our ability to heal and reach our full potential. Fortunately, skills of self-compassion can be learned and maintained over time. This suggests that psychological interventions aimed at enhancing wellbeing should include an explicit focus on developing self-compassion. Future research should explore how to best accomplish this goal in a way that meets a variety of individual needs.

References

Aberson, C. L., Healy, M., & Romero, V. (2000). Ingroup bias and self-esteem: A meta-analysis. *Personality & Social Psychology Review, 4*, 157–173.

Adams, C. E., & Leary, M. R. (2007). Promoting self-compassionate attitudes toward eating among restrictive and guilty eaters. *Journal of Social and Clinical Psychology, 26*, 1120–1144.

Baer, R. A. (2010). Self-compassion as a mechanism of change in mindfulness- and acceptance-based treatments. In R. A. Baer (Ed.), *Assessing mindfulness & acceptance processes in clients* (pp. 135–154). Oakland, CA: New Harbinger.

Baer, R. A., Lykins, L. B., & Peters, J. R. (2012). Mindfulness and self-compassion as predictors of psychological wellbeing in long-term meditators and matched nonmeditators. *The Journal of Positive Psychology, 7*, 230–238.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45.

Birnie, K., Speca, M., & Carlson, L. E. (2010). Exploring self-compassion and empathy in the context of Mindfulness-based Stress Reduction (MBSR). *Stress and Health, 26*, 359–371.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 191–206.

Blatt, S. J. (1995). Representational structures in psychopathology. In D. Cicchetti & S. Toth (Eds.), *Rochester symposium on developmental psychopathology: Emotion, cognition, and representation* (Vol. 6, pp. 1–34). Rochester, NY: University of Rochester Press.

Brach, T. (2003). *Radical acceptance*. New York, NY: Bantam Books.

Breins, J. G., & Chen, S. (2012). Self-compassion increases achievement motivation. *Personality and Social Psychology Bulletin*. doi:10.1177/0146167212445599.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Costa, J., & Pinto-Gouveia, J. (2011). Acceptance of pain, self-compassion and psychopathology: Using the

chronic pain acceptance questionnaire to identify patients' subgroups. *Clinical Psychology and Psychotherapy, 18*, 292–302.

Crocker, J., & Canevello, A. (2008). Creating and undermining social support in communal relationships: The role of compassionate and self-image goals. *Journal of Personality and Social Psychology, 95*, 555–575.

Crocker, J., Luhtanen, R. K., Cooper, M. L., & Bouvrette, S. (2003). Contingencies of self-worth in college students: Theory and measurement. *Journal of Personality and Social Psychology, 85*, 894–908.

Crocker, J., & Park, L. E. (2004). The costly pursuit of self-esteem. *Psychological Bulletin, 130*, 392–414.

Germer, C. K. (2009). *The mindful path to self-compassion*. New York, NY: Guilford Press.

Gilbert, P. (2009). *The compassionate mind*. London: Constable.

Gilbert, P., & Irons, C. (2005). Focused therapies and compassionate mind training for shame and self-attacking. In P. Gilbert (Ed.), *Compassion: Conceptualisations, research and use in psychotherapy* (pp. 263–325). London: Routledge.

Gilbert, P., McEwan, K., Matos, M., & Rivis, A. (2011). Fears of compassion: Development of three self-report measures. *Psychology and Psychotherapy: Theory, Research and Practice, 84*, 239–255.

Gilbert, P., & Procter, S. (2006). Compassionate mind training for people with high shame and self-criticism: Overview and pilot study of a group therapy approach. *Clinical Psychology and Psychotherapy, 13*, 353–379.

Goetz, J. L., Keltner, D., & Simon-Thomas, E. (2010). Compassion: An evolutionary analysis and empirical review. *Psychological Bulletin, 136*, 351–374.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*, 35–43.

Gunaratana, B. (1982). *Mindfulness in plain English*. Somerville, MA: Wisdom Publications.

Harter, S. (1999). *The construction of the self: A developmental perspective*. New York, NY: Guilford Press.

Heine, S. H., Lehman, D. R., Markus, H. R., & Kitayama, S. (1999). Is there a universal need for positive self-regard? *Psychological Review, 106*, 766–794.

Hofmann, S. G., Grossman, P., & Hinton, D. E. (2011). Loving-kindness and compassion meditation: Potential for psychological interventions. *Clinical Psychology Review, 31*, 1126–1132.

Hollis-Walker, L., & Colosimo, K. (2011). Mindfulness, self-compassion, and happiness in non-meditators: A theoretical and empirical examination. *Personality and Individual Differences, 50*, 222–227.

Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science, 6*, 537–559.

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*, 33–42.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York, NY: Delacorte.

Kelly, A. C., Zuroff, D. C., Foa, C. L., & Gilbert, P. (2009). Who benefits from training in self-compassionate self-regulation? A study of smoking reduction. *Journal of Social and Clinical Psychology, 29*, 727–755.

Keng, S. L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review, 31*, 1041–1056.

Kernis, M. H., Paradise, A. W., Whitaker, D. J., Wheatman, S. R., & Goldman, B. N. (2000). Master of one's psychological domain? Not likely if one's self-esteem is unstable. *Personality and Social Psychology Bulletin, 26*, 1297–1305.

Klimecki, O. M., Leiberg, S., Lamm, C., & Singer, T. (2013). Functional neural plasticity and associated changes in positive affect after compassion training. *Cerebral Cortex, 23*(7), 1552–1561.

Kornfield, J. (1993). *A path with heart*. New York, NY: Bantam Books.

Kraus, S., & Sears, S. (2009). Measuring the immeasurables: Development and initial validation of the Self-Other Four Immeasurables (SOFI) scale based on Buddhist teachings on loving kindness, compassion, joy, and equanimity. *Social Indicators Research, 92*, 169–181.

Kuyken, W., Watkins, E., Holden, E., White, K., Taylor, R. S., Byford, S., et al. (2010). How does mindfulness-based cognitive therapy work? *Behavior Research and Therapy, 48*, 1105–1112.

Lapsley, D. K., FitzGerald, D. P., Rice, K. G., & Jackson, S. (1989). Separation-individuation and the 'New Look' at the imaginary audience and personal fable: A test of an integrative model. *Journal of Adolescent Research, 4*, 483–505.

Leary, M. R. (1999). Making sense of self-esteem. *Current Directions in Psychological Science, 8*, 32–35.

Leary, M. R., Tate, E. B., Adams, C. E., Allen, A. B., & Hancock, J. (2007). Self-compassion and reactions to unpleasant self-relevant events: The implications of treating oneself kindly. *Journal of Personality and Social Psychology, 92*, 887–904.

Lee, W. K., & Bang, H. L. (2010). The effects of mindfulness-based group intervention on the mental health of middle-aged Korean women in community. *Stress and Health, 26*, 341–348.

Longe, O., Maratos, F. A., Gilbert, P., Evans, G., Volker, F., Rockliff, H., et al. (2009). Having a word with yourself: Neural correlates of self-criticism and self-reassurance. *NeuroImage, 49*, 1849–1856.

MacBeth, A., & Gumley, A. (2012). Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. *Clinical Psychology Review, 32*, 545–552.

Magnus, C., Kowalski, K., & McHugh, T. (2010). The role of self-compassion in women's self-determined motives to exercise and exercise-related outcomes. *Self and Identity, 9*, 363–382.

Mikulincer, M., & Shaver, P. R. (2007). Boosting attachment security to promote mental health, prosocial values, and inter-group tolerance. *Psychological Inquiry, 18*, 139–156.

Morf, C. C., & Rhodewalt, F. (2001). Unraveling the paradoxes of narcissism: A dynamic self-regulatory processing model. *Psychological Inquiry, 12*, 177–196.

Neely, M. E., Schallert, D. L., Mohammed, S. S., Roberts, R. M., & Chen, Y. (2009). Self-kindness when facing stress: The role of self-compassion, goal regulation, and support in college students' well-being. *Motivation and Emotion, 33*, 88–97.

Neff, K. D. (2003a). Development and validation of a scale to measure self-compassion. *Self and Identity, 2*, 223–250.

Neff, K. D. (2003b). Self-compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and Identity, 2*, 85–102.

Neff, K. D. (2011). *Self-compassion*. New York, NY: William Morrow.

Neff, K. D., & Beretvas, S. N. (2012). The role of self-compassion in romantic relationships. *Self and Identity*. doi:10.1080/15298868.2011.639548.

Neff, K. D., & Germer, C. K. (2012). A pilot study and randomized controlled trial of the Mindful Self-Compassion Program. *Journal of Clinical Psychology*. doi:10.1002/jclp.21923.

Neff, K. D., Hseih, Y., & Dejitthirat, K. (2005). Self-compassion, achievement goals, and coping with academic failure. *Self and Identity, 4*, 263–287.

Neff, K. D., Kirkpatrick, K., & Rude, S. S. (2007). Self-compassion and its link to adaptive psychological functioning. *Journal of Research in Personality, 41*, 139–154.

Neff, K. D., & McGeehee, P. (2010). Self-compassion and psychological resilience among adolescents and young adults. *Self and Identity, 9*, 225–240.

Neff, K. D., Pisitsungkagarn, K., & Hseih, Y. (2008). Self-compassion and self-construal in the United States, Thailand, and Taiwan. *Journal of Cross-Cultural Psychology, 39*, 267–285.

Neff, K. D., & Pommier, E. (2012). The relationship between self-compassion and other-focused concern among college undergraduates, community adults, and practicing meditators. *Self and Identity*. doi:10.1080/15298868.2011.649546.

Neff, K. D., & Vonk, R. (2009). Self-compassion versus global self-esteem: Two different ways of relating to oneself. *Journal of Personality, 77*, 23–50.

Pauley, G., & McPherson, S. (2010). The experience and meaning of compassion and self-compassion for individuals with depression or anxiety. *Psychology and Psychotherapy: Theory, Research and Practice, 83*, 129–143.

Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology, 74*, 116–143.

Raes, F. (2010). Rumination and worry as mediators of the relationship between self-compassion and depression and anxiety. *Personality and Individual Differences, 48*, 757–761.

Rimes, K. A., & Wingrove, J. (2011). Pilot study of Mindfulness-Based Cognitive Therapy for trainee clinical psychologists. *Behavioural and Cognitive Psychotherapy, 39*, 235–241.

Robins, C. J., Keng, S., Ekblad, A. G., & Brantley, J. G. (2012). Effects of mindfulness-based stress reduction on emotional experience and expression: A randomized controlled trial. *Journal of Clinical Psychology, 68*, 117–131.

Rockliff, H., Gilbert, P., McEwan, K., Lightman, S., & Glover, D. (2008). A pilot exploration of heart rate variability and salivary cortisol responses to compassion-focused imagery. *Clinical Neuropsychiatry, 5*, 132–139.

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology, 69*, 719–727.

Salmivalli, C., Kaukiainen, A., Kaistaniemi, L., & Lagerspetz, K. M. J. (1999). Self-evaluated self-esteem, peer-evaluated self-esteem, and defensive egotism as predictors of adolescents' participation in bullying situations. *Personality and Social Psychology Bulletin, 25*, 1268–1278.

Salzberg, S. (1997). *Lovingkindness: The revolutionary art of happiness*. Boston, MA: Shambhala.

Santorelli, S., & Kabat-Zinn, J. (Eds.). (2004). *Mindfulness-based stress reduction professional education and training: MBSR curriculum and supporting materials*. Unpublished manuscript, University of Massachusetts Medical School.

Sbarra, D. A., Smith, H. L., & Mehl, M. R. (2012). When leaving your Ex, love yourself: Observational ratings of self-compassion predict the course of emotional recovery following marital separation. *Psychological Science, 23*, 261–269.

Segal, Z., Williams, J., & Teasdale, J. (2012). *Mindfulness based cognitive therapy for depression: A new approach to preventing relapse* (2nd ed.). New York, NY: Guildford Press.

Shapira, L. B., & Mongrain, M. (2010). The benefits of self-compassion and optimism exercises for individuals vulnerable to depression. *The Journal of Positive Psychology, 5*, 377–389.

Shapiro, S. L., Astin, J. A., Bishop, S. R., & Cordova, M. (2005). Mindfulness-Based Stress Reduction for health care professionals: Results from a randomized trial. *International Journal of Stress Management, 12*, 164–176.

Shapiro, S. L., Brown, K., Thoresen, C., & Plante, T. G. (2011). The moderation of mindfulness-based stress reduction effects by trait mindfulness: Results from a randomized controlled trial. *Journal of Clinical Psychology, 67*, 267–277.

Shapiro, S. L., Brown, K. W., & Biegel, G. M. (2007). Teaching self-care to caregivers: Effects of mindfulness-based stress reduction on the mental

health of therapists in training. *Training and Education in Professional Psychology, 1*, 105–115.

Siegel, D. (2007). *The mindful brain*. New York, NY: Norton.

Swann, W. B. (1997). The trouble with change: Self-verification and allegiance to the self. *Psychological Science, 8*(3), 177–180.

Taylor, S. E. (2002). *The tending instinct: How nurturing is essential to who we are and how we live*. New York, NY: Holt.

Terry, M. L., & Leary, M. R. (2011). Self-compassion, self-regulation, and health. *Self and Identity, 10*, 352–362.

Tesser, A. (1999). Toward a self-evaluation maintenance model of social behavior. In R. F. Baumeister (Ed.), *The self in social psychology* (pp. 446–460). New York, NY: Psychology Press.

Van Dam, N. T., Sheppard, S. C., Forsyth, J. P., & Earleywine, M. (2011). Self-compassion is a better predictor than mindfulness of symptom severity and quality of life in mixed anxiety and depression. *Journal of Anxiety Disorders, 25*, 123–130.

Vettese, L. C., Dyer, C. E., Li, W. L., & Wekerle, C. (2011). Does self-compassion mitigate the association between childhood maltreatment and later emotional regulation difficulties? A preliminary investigation. *International Journal of Mental Health and Addiction, 9*, 480–491.

Wei, M., Liao, K., Ku, T., & Shaffer, P. A. (2011). Attachment, self-compassion, empathy, and subjective well-being among college students and community adults. *Journal of Personality, 79*, 191–221.

Section 3

Clinical Perspectives

Mindfulness as a Key Construct in Modern Psychotherapy

11

Patricia Bach, Steven C. Hayes, and Michael Levin

Throughout the history of modern psychotherapy, therapists from traditions as disparate as behavior modification (De Silva, 1984) and psychoanalysis (Fromm, Suzuki, & De Martino, 1960) have looked to the mindfulness traditions for guidance and inspiration. Some have argued that mindfulness processes are inherent to virtually any approach to psychotherapy that considers human suffering in depth (e.g., Deikman, 1982). But it is only more recently, however, that the concepts and methods of mindfulness in clinical practice have become both central and empirical.

As this very book attests, in the last decade contemplative practice and other mindfulness methods have become common therapeutic interventions in their own right. There are a number of obvious reasons. There is an ample and growing database of support for the benefits of acceptance and mindfulness-based methods for improving health; health behaviors; mental health problems such as anxiety, depression, and substance abuse; learning and concentration; as well as one's overall sense of well-being (Baer, 2003; Greeson, 2009; Hofmann, Grossman, & Hinton, 2011; Hofmann, Sawyer, Witt, & Oh, 2010; Ostafin & Marlatt, 2008). Mindfulness methods appear to have preventative benefits as well. Mindfulness skills are relatively easy and inexpensive to teach in individual and group formats (Bishop, 2002), and are now widely available through a growing number of spiritual and self-help books, lectures, websites, podcasts, phone apps, retreats, centers, and courses. All these developments have worked in synergy to facilitate the advancement of mindfulness as a central focus of attention from clinical practitioners, clinical researchers, and indeed the public at large. With that increase in attention has come a similar increase in attempts to define mindfulness concepts, to refine their understanding, to measure them through self-report and neurobiological means, to understand the processes that account for their impact, and to learn how to modify those processes.

In this chapter, we consider some of the views of mindfulness that seem to apply most directly to psychotherapy and examine some of the more predominant clinical approaches that attempt to alter mindfulness processes. We briefly review

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the data bearing on these methods. These methods and definitions are examined in more detail elsewhere in this volume, so our review will be brief since our purpose is to set up a more unique focus: *why* is mindfulness a key construct in modern psychotherapy *now*? We examine several reasons and argue that the rise of mindfulness as a focus is based on the modern cultural encouragement of unhealthy processes that are directly antithetical to mindfulness processes. Said more directly, mindfulness is becoming more central in psychotherapy now, because it is more central to what people need from psychotherapy now. Finally we note features of mindfulness that our analysis suggests are central to experiencing their full benefit in the context of the current social and psychological needs of people.

Clinical Definitions of Mindfulness

Mindfulness is notoriously difficult to define in a psychologically precise way. That is not surprising given its deep roots in the spiritual and religious aspects of lay culture. There are almost no examples in psychology of terms that arise from everyday use later achieving widely agreed-upon technical precision—as terms such as thought, emotion, self, or personality will readily attest. Prescientific lay terms are universally "fuzzy sets."

Given that, it is a fool's errand to try to reach agreement on what mindfulness *is* and it is especially useless to hold up progress until such an agreement is obtained. Definitions of "mindfulness" need instead to be linked to the practical task of orienting practitioners and researchers to an area or a domain in which various technical accounts can then be explored and tested. Even at the gross level of domain, however, the term has conflicting uses (Shapiro, Brown, & Biegel, 2007). The term "mindfulness is treated sometimes as a technique, sometimes as a more general method or collection of techniques, sometimes as a psychological process that can produce outcomes, and sometimes as an outcome in and of itself" (Hayes & Wilson, 2003, p. 161).

Our purpose is to try to understand mindfulness as a central issue in psychotherapy. In that context one of the least informative uses of the term is to use it to refer to techniques and sets of techniques, disconnected from a formal process of change or specific outcomes. It is common to see people talking of "mindfulness techniques" as either techniques that are directly rationalized using the term or those that look similar to those methods. For example, contemplative practices in Eastern religious traditions are "mindfulness techniques" and only things that look like them belong in the set. The problem is that such a use is based on appearances, accidents of history, or vagaries of self-description. In the absence of information about the processes they engage, such terms quickly become scientifically meaningless once hard questions are asked. If Vipassana style contemplative practice is agreed to be a mindfulness technique on that basis, what about yoga, progressive muscle relaxation, chanting, or just sitting in silence at the kitchen table? There seems to be no place to draw the line.

A more defensible approach is to delineate the targeted processes or the outcomes of such methods in broad terms. The definition offered by Kabat-Zinn is the most ubiquitous one of that kind: "the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment" (2003, p. 145). Note that this defines mindfulness both as an outcome (a type of awareness) and as a process (that arises by paying attention in a particular way). Marlatt and Kristeller took a more purely process focus by referring simply to "bringing one's complete attention to the present experience on a moment-to-moment basis" (1999, p. 68). Ellen Langer took a very different approach by considering response flexibility and effectiveness while addressing the inverse of mindfulness: "mindless in the sense that attention is not paid precisely to those substantive elements that are relevant for the successful resolution of the situation. It has all the external earmarks of mindful action, but new information actually is not being processed. Instead, prior scripts, written when similar infor-

mation really was once new, are stereotypically reenacted" (1978, p. 636).

If you look across the many definitions of that kind that are available, several features stand out as part of the "fuzzy set" (Fletcher & Hayes, 2005). We will note five. First, mindfulness methods attempt to teach people to purposefully direct one's attention to the present in a flexible, fluid, and voluntary way. Many definitions speak of mindfulness this way, for example, as "the self-regulation of attention" (Bishop et al., 2004), "paying attention in a particular way …" (Kabat-Zinn, 1994), and being "actively engaged in the present" (Langer, 2000). Second, these methods are designed to help people take a nonjudgmental approach of "observing, describing, and participating" (Dimidjian & Linehan, 2003) or decentering (Segal, Williams, & Teasdale, 2002) from psychological content. The third quality is well described by Bishop et al. (2004): an orientation toward experience "that is characterized by curiosity, openness, and acceptance." The fourth is a quality of effectiveness (Dimidjian & Linehan, 2003) or flexibility (Langer, 2000). And finally there is the fostering of a transcendent or interconnected quality of consciousness and perspective taking as is referred to by such terms as the observing self (Deikman, 1982), or big mind (Merzel, 2007). We will take all five of these features as an orienting set: *mindfulness involves deliberate, nonjudgmental, and accepting attention to what is present, so as to foster more conscious, interconnected, flexible, and effective styles of interacting with the internal and external world.*

The Modern Clinical History of Mindfulness

A focus on mindfulness is thousands of years old and from the beginning of psychotherapy, major leaders in psychotherapy have discussed the relationship of psychotherapy to mindfulness methods (Dryden & Still, 2006). For example, Carl Jung, in a preface to D. T. Suzuki's *Introduction to Zen Buddhism*, described psychotherapy as the primary aspect of Western culture that shared Buddhism's aspiration to enlightenment (Suzuki, 1948). Eric Fromm said that "knowledge of Zen, and a concern with it, can have a most fertile and clarifying influence on the theory and technique of psychoanalysis" (1960, p. 140). In a somewhat similar way, popular writers about eastern topics such as Alan Watts argued that meditation practices and psychotherapy have a common goal, releasing the individual from attachment to the ego and its resulting sense of isolation from others (1961), and persons who would later have a large influence on psychotherapy such as Daniel Goleman (1977) wrote extensively on mediation practices. None of these developments, however, profoundly altered psychotherapy itself.

The widespread integration of mindfulness practices into evidence-based psychotherapy is a much more recent phenomenon. The penetration of mindfulness has been in part empirically driven, but that too in not a fully adequate explanation. Research work on transcendental meditation (TM), beginning in the 1970s, never penetrated mainstream clinical perspectives; that may be because TM never achieved adequate scientific explanation (Ospina et al., 2007), but a larger reason is revealed by work that did begin to penetrate the behavioral health professions.

In the mid-1970s, Herbert Benson and colleagues (1974) demystified the focused meditation of TM into a method he termed the "relaxation response." Benson's simple meditation method was applied to the treatment of a variety of behavioral health problems (e.g., hypertensive patients) with good effects, similar to those achieved with other relaxation approaches (Kerr, 2000). Benson himself was an early advocate of the integration of psychotherapy with other forms of mindfulness meditation (Kutz, Borysenko, & Benson, 1985). Benson's method penetrated psychotherapy because he systematized the methods, stripped them of unnecessary spiritual and religious trappings, spoke about them in a largely naturalistic fashion, and subjected them to empirical test.

In the late 1970s, Jon Kabat-Zinn (1982) and his colleagues established Mindfulness-Based

Stress Reduction (MBSR) for medical patients with chronic pain, and stress and lifestyle-related health problems. As with Benson, his work helped simplify existing meditation traditions. MBSR participants were asked to attend a series of short classes and a retreat (Kabat-Zinn, 1990) and to commit to 45–60 min of daily structured meditation or meditation and yoga (Klatt, Beckworth, & Malarky, 2009). Kabat-Zinn also carefully systematized his methods, and removed spiritual trappings. Even the name included terms ("stress reduction") that were humble and common sense, and he subjected the methods to empirical test.

In a separate line of inquiry beginning in the 1980s, social scientist Ellen Langer was studying the applications of her flexibility-based view of mindfulness to changing human behavior in areas as diverse as education (Langer & Weinman, 1981), gerontology (Perlmuter & Langer, 1983), and decreasing prejudice and discrimination (Langer, Bashner, & Chanowitz, 1985) and other social behaviors. Langer's work impacted the social sciences more broadly, rather than psychotherapy per se, but her focus on flexibility remains a key influence in mindfulness-based psychotherapy methods.

None of these methods were forms of psychotherapy per se, but the decision to systematize them, move them out of a religious context, and test them opened the door for additional steps in integration. That did not happen immediately—but it did happen, and the modern wave of mindfulness in psychotherapy emerged in the 1980s and 1990s. The trend can in part be traced to the emergence and impact of dialectical behavior therapy (DBT), mindfulness-based cognitive therapy (MBCT), and acceptance and commitment therapy (ACT).

DBT was first described in written form by Marsha Linehan in 1987. She herself studied with Buddhist teachers and has acknowledged how radical the incorporation of mindfulness into therapy once seemed, joking that she had been tempted to call her treatment "Zen Behavior Therapy" and decided on DBT because the former sounded so unscientific (Linehan, 1993). Linehan believed that mindfulness practice could be helpful in facilitating emotion regulation in persons with borderline personality disorder (Dryden & Still, 2006), but DBT encompassed a far wider set of methods, with extensive emphasis on skills training.

Linehan's early outcome trials (e.g., Linehan, Armstrong, Suarez, & Allmon, 1991) captured the attention of cognitive behavior therapy researchers around the world. Interested in finding a better approach to deal with relapse in depression, John Teasdale, Zindal Segal, and Mark Williams initially explored DBT as a possible approach but were directed to Jon Zabat-Zinn and MBSR. The result was MBCT (Segal et al., 2002). In MBCT, the hope was that mindfulness practice would facilitate patients' ability to decenter—to step back from thoughts and feelings that lead to the relapse spiral (Dryden & Still, 2006).

ACT (Hayes, Strosahl, & Wilson, 1999, 2011) was first written about conceptually by Hayes in 1984, and technologically 3 years later (Hayes, 1987). The use of guided meditations and contemplative exercises (e.g., body scans; watching thoughts with an open focus) was extensive in the early protocols, but the methods were not discussed using mindfulness as a term until the actual research on ACT began to appear several years later.

In the 2000s, mindfulness virtually exploded in psychotherapy. At the beginning of the decade a search of the psychology databases showed a couple of dozen articles a year on the topic. As integrative texts began to appear such as *Mindfulness and acceptance: Expanding the cognitive behavioral tradition* (Hayes, Follette, & Linehan, 2004) or *Mindfulness and psychotherapy* (Germer, Siegel, & Fulton, 2005) that number was up three times. By the end of the decade, dozen of *books* on these topics were appearing each year and the number of articles was up more than tenfold (see Fig. 11.1). Hardly a psychotherapy convention could be held without numerous sessions on mindfulness and acceptance, many of them overflowing with attendees.

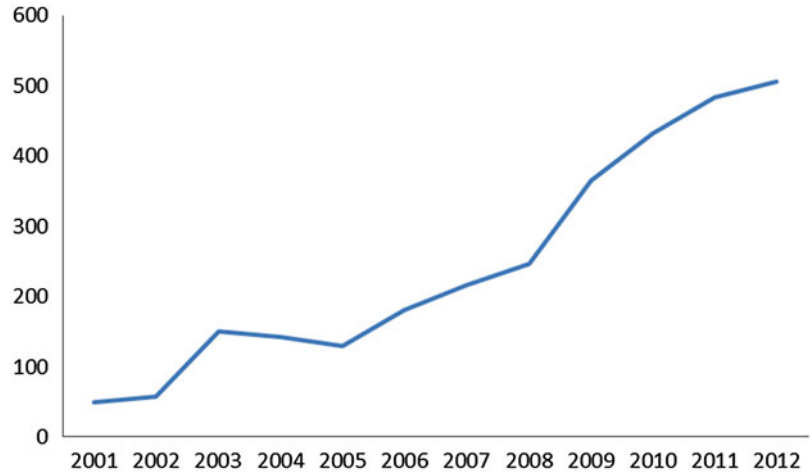

Fig. 11.1 Number of publications with the word "mindfulness" or "meditation" in the abstract in the years 2001–2012 in peer-reviewed journals in psycINFO database

Why Now?

Given the long history of mindfulness as an issue in psychotherapy, why has it exploded over the last decade? Some of these reasons have already been covered, but we think that this question is key to understanding the relationship of mindfulness and modern psychotherapy itself.

Research Developments

One major reason we have already alluded to is the emergence of significant research on mindfulness processes and methods. The key decision by early developers such as Kabat-Zinn and Benson to manualize their procedures and to eliminate religious trappings, combined with an interest in research, set the stage for this process. The advent of major empirically based psychotherapies such as MBCT, DBT, and ACT on the stage completed that process. Both DBT and ACT are listed as "evidence-based" by Division 12 of the American Psychological Association (www.Div12.org/PsychologicalTreatments/index.html) and by the National Registry of Evidence-based Programs and Procedures maintained by the US Substance Abuse and Mental Health Services Administration (www.nrepp.samhsa.gov/), and there is a substantial body of evidence, both outcome and process, for the importance of mindfulness methods.

These research developments in mindfulness as an important process in psychotherapy occurred simultaneously with empirical difficulties elsewhere in psychotherapy research. For instance, the effect sizes for psychotherapy do not appear to be increasing (Wampold, 2001); the processes of change and active components of mainstream evidence-based methods often suggest that the underlying theories require work (Hayes, 2004; Longmore & Worrell, 2007); the syndromal approach championed by the DSM has failed to yet identify diseases with distinct etiologies and methods of intervention (Kupfer, First, & Regier, 2002) and the attempts to deal with that fact seem to be creating greater chaos (Frances, 2010); and the adoption of evidence-based methods by practicing clinicians has been somewhat limited (Sanderson, 2002). Thus, the field is ripe for the emergence of new approaches such as mindfulness.

Strategic Changes

In part in response to the empirical problems listed above, there is a growing emphasis on

transdiagnostic models of psychopathology (e.g., Barlow, Allen, & Choate, 2004; Harvey, Watkins, Mansell, & Shafran, 2004). Perhaps no goad has been greater in that process than rapid decline in support for a syndromal approach to knowledge development. The report of the American Psychiatric Association planning committee for the fifth version of the Diagnostic and Statistical Manual (Kupfer et al., 2002) shows that there is a lack of support for a syndromal approach. The authors point out the lack of laboratory markers for specific syndromes, high comorbidities, and a tendency to pathologize ordinary human experience. They conclude that the practice of regarding DSM-IV diagnostic categories as equivalent to diseases may hinder research on etiology.

As alternatives to syndromal classification have been sought, one of the more dominant ideas is to identify pathological processes that broadly inform treatment decisions across a wide range of difficulties (Harvey et al., 2004). Mindfulness-based processes are among the most important set of such processes. For instance, Baer and colleagues (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) reported that measures of mindfulness are negatively correlated with measures of psychological variables associated with a number of psychological problems including neuroticism, thought suppression, alexithymia, dissociation, and psychological symptoms. Further, mindfulness is positively associated with variables associated with psychological health such as openness to experience and self-compassion. Findings such as these suggest that mindfulness processes may be broadly applicable to the treatment of psychological suffering.

Cohort Effects

There is a joke among evidence-based therapy researchers that the reason mindfulness is now taking center stage is that the hippies have grown up. Although this is said in jest, there is a grain of truth to it. The late 1960s and 1970s were a time of cultural upheaval. The hippie movement was associated with a rejection of traditional middle-class values, and embraced a present moment focus. Many in the movement were drawn to mysticism, cosmology, and the occult (Levin & Spates, 1970) and to associated mindfulness practices. Current academics in their late 50s and 60s both grew up in that era and are now the senior leaders of our field including popular mindfulness authors and in addition to those developing treatment methods, editors, leaders in grant funding organizations, magazine writers, television producers, and so on. Few of these persons would today recommend much of what they experimented with as youth (no one in evidence-based psychotherapy would today embrace "tune in, turn on, drop out" as a healthy principle of living) but mindfulness methods and concepts capture much of what seemed truly useful.

Technology and Cultural Changes

Perhaps the biggest change that may explain the rise of mindfulness methods, however, is social need. Human cultural changes sometimes occur slowly, but sometimes they occur very rapidly. The current era is clearly a time of rapid change due to the technological changes that have occurred in communications technology. These include all of the following.

The Rise of the Exposure to Words and Images

People today are exposed to orders of magnitude more words and images than were their forbearers. It has been reported that a person can easily view nearly half a million words upon viewing 200 web pages—thousands more than the 460,000 words in *War and Peace* (Bunz, 2009). The human mind did not evolve in such a context and it has happened so fast that cultural practices have barely had a chance to respond to whatever effects it has produced. At the very least it seems likely to have produced a busier, more intensely verbal human mind.

The Rise of Graphic Exposure to Negative Content

If anything truly disturbing occurs anywhere in the world you can know about it almost instantly via the Internet. Even 30 years ago there were

restrictions against placing graphic images of death and violence in the newspaper, never mind television. Today such images occur live on television and computer screens.

As communications media have fractionated into smaller and more discrete sectors it is easier to present material in a more and more evaluative context. Xenophobia and "flame wars" are rampant on the Internet. While social cliques and modern newspapers often took particular points of view, today it is possible to be exposed to a virtually constant diet of judgmental material. Since it is hard to control the target of human judgment this loose verbal cannon may also be increasing judgment of oneself, and a greater sense of shame and self-stigma.

Decrease in Physical Community

Changes in physical mobility, the centrality of neighborhoods, and cultural values and shriveled physical social institutions have occurred over the last few decades in America and around the world (Putnam, 2000). This is true in almost every area imaginable, from Sunday picnics to the Lion's club, from church attendance to the League of Women Voters. Extended families have become nuclear families that have become single-parent families. Neighbors can live next to each other for years and literally never speak. At the very least these changes seem likely to have produced a decrease in social support and reduced a sense of cooperation and shared sacrifice.

Increase in Virtual Community

Technology has also led, however, to the rise of virtual communities. There is now a virtual "we" that can be experienced on the Internet or on social networking sites. This may act as a counterbalance to the decrease in physical community, but it may also support more "us versus them" thinking which can fractionate social groups at a larger scale. While there are clear benefits to new technology, too much use of the Internet is associated with internet addictions, disruptions to social networks, neglect of work or school, and with decreased social skills and lower likability (Iacovelli & Valenti, 2009).

Why Now: The Bottom Line

We are arguing that the rise of mindfulness methods has to do with an increased interest in transdiagnostic processes, the weakening of alternative empirical approaches, cohort effects, and greater empirical support on the one hand, and cultural changes on the other. These cultural changes can be summarized as a simple possibility: mindfulness methods may be more central in psychotherapy today, because the human need for mindfulness is greater today. People are dealing with less compassion and social support, and greater encouragement of a busy, entangled, judgmental, and avoidant mode of mind. These engage processes that are known to increase human suffering; they also engage processes that mindfulness can help alter.

In a recent chapter (Hayes, Villatte, Levin, & Hildebrandt, 2011) we argued that modern mindfulness and acceptance methods (what we termed "contextual CBT") emphasize some or all of the three clusters of processes and methods. One cluster we termed "openness." This refers to a concern with acceptance, non-attachment, metacognition, defusion, emotional regulation, and the like. All mindfulness methods include procedures designed to reduce the automatic behavioral impact thoughts, feelings, memories, and bodily sensations, but without necessarily changing what they look like, or how often and where they occur. A second cluster we termed "awareness." This refers to attentional control, attention to the now, perspective-taking skills, increased compassion, greater sense of pure awareness, and the like. All mindfulness methods include procedures designed to increase awareness, contact with present, and an extended sense of consciousness. The third cluster we term "engagement." This refers to the enhancement of more flexible, pro-social, effective, compassionate, or values-based behavior, and a greater sense of connection with meaning and purpose. This aspect is perhaps most emphasized definitionally by Langer's view of mindfulness, but it is present in several of the current mindfulness methods in psychotherapy. Indeed, issues of "right action"

have always been emphasized in the spiritual roots of mindfulness practices.

Hayes et al. (2011) argued that "Like the legs of a stool, when a person is open, aware, and active, a steady foundation is created for more flexible thinking, feeling, and behaving. Metaphorically, it is as if there is greater life space in which the person can experiment and grow, and can be moved by experiences." Thus, all mindfulness methods seem to be "designed to increase the 'psychological flexibility' of participants by fostering a more open, aware, and active approach to living" (p. 160). This approach simplifies and summarizes the broader "orientation to the domain" summary we developed earlier: "mindfulness involves deliberate, nonjudgmental and accepting attention to what is present, so as to foster more conscious, interconnected, flexible and effective styles of interacting with the internal and external world."

Integration of Mindfulness into Contemporary Clinical Practice

With that simplified model in mind, we will briefly review a few forms of mindfulness-based interventions that have captured substantial empirical and conceptual attention. In each case we will summarize the interventions with an eye toward these processes of openness, awareness, and engagement.

MBSR, MBCT, MBRP

The grandfather of many mindfulness-based therapies, including MBCT and Mindfulness-Based Relapse Prevention (MBRP: Witkiewitz, Marlatt, & Walker, 2005), is MBSR (Kabat-Zinn, 1990). As other methods have emerged that are fairly direct translations of contemplative traditions, such as loving-kindness meditation (e.g., Carson, Keefe, Lynch, Carson, & Goli, 2005), Lojong meditation (Pace, Negi, Adame, Cole, & Sivilli, 2009), and Compassionate Mind Therapy (Gilbert, 2009), they have tended to follow the MBSR formula in broad terms: establishment of structured series of experiences that establish mindfulness skills.

MBSR consists of a group program (generally 8 weeks) that teaches contemplative practice skills. The methods include sitting meditation, body scans, and use of mindfulness during everyday activities. There are also group discussions, psychoeducation, yoga, and intensive out-of-session practice (Kabat-Zinn, 1982). Longer MBSR meditation retreats are available and are included in some programs.

The focus of these methods is on creating a focused, purposeful awareness of the present moment and relating to private experiences in an open, nonjudgmental, and accepting manner (Baer et al., 2006; Kabat-Zinn, 1994). In present terms, there is a great emphasis on openness and awareness. For example, present moment awareness and attentional control are used in the body scans, yoga, and contemplative practice sessions, so as to undermine processes such as rumination, worry, and self-criticism.

MBCT bears a strong resemblance to MBSR, but the psychoeducational elements and the content and focus of exercises are more specifically psychotherapeutic. As originally developed, MBCT targeted in particular the negative thinking patterns that are reactivated by and that support entanglement with dysphoric moods, such as self-criticism and rumination. A key practice in MBCT is decentering, which is observing thoughts and feelings as temporary cognitive events that are not necessarily true about the self (Fresco et al., 2007). Decentering from difficult thinking patterns was argued to produce less automatic reactivity and behavioral compliance. Throughout each element, participants are taught to notice difficult thoughts, feelings, and sensations in a nonjudgmental and open manner

Evidence

MBSR, MBCT, and related methods produce medium to large within-group effect sizes on anxiety and depression that persist through follow-up (for a recent meta-analysis of 1,140 patients from 39 studies see Hofmann et al., 2010).

Similar effects are seen in a wide variety of other problem areas including pain, coping with

health problems, and substance-use disorders (Grossman, Niemann, Schmid, & Walach, 2004; Zgierska et al., 2009). An analysis by Greeson (2009) found evidence for efficacy for improving well-being and quality of life and reducing mood and stress symptoms in persons with stress-related illnesses including psoriasis, type 2 diabetes, fibromyalgia, rheumatoid arthritis, and chronic low-back pain. Some of the newer specific varieties have less support as of yet, but the evidence so far is similar (e.g., see Bowen et al., 2009). There is some evidence that these methods are more helpful with more chronic problems (Ma & Teasdale, 2004; Teasdale et al., 2000) although it is not yet known why. These methods increase self-reported decentering and present moment awareness, and reduce judgmental thinking (e.g., Carmody, Baer, Lykins, & Olendzki, 2009) which relates to outcomes (e.g., Shapiro et al., 2007; 2008, Shapiro, Oman, Thoresen, Plante, & Flinders, 2008). Perhaps as a result, depressed mood evokes fewer depressive thoughts (Raes, Dewulf, Heeringen, & Williams, 2009). There are theoretical oddities in the literature however. For example, the amount of training or at-home meditation does not seem to explain outcomes (Carmody & Baer, 2009; Vettese, Toneatto, Stea, Nguyen, & Wang, 2009).

Dialectical Behavior Therapy

DBT was originally developed for borderline personality disorder (BPD), but it has gradually become a method for a variety of disorders involving emotion dysregulation. The term "dialectical" refers to the opposing forces that exist in clinical cases and that need to be managed in treatment. For example, mindfulness, acceptance, and validation strategies promote acceptance, but they need to be balanced with behavior change strategies that promote change. Several modes of intervention are included: group skills training, individual psychotherapy, phone coaching, and group consultation for the therapist.

The heart and soul of DBT consist of training specific skills, especially as part of the group processes, including mindfulness, distress tolerance, emotion regulation, and interpersonal effectiveness skills. Mindfulness is trained through specific exercises and commonly includes homework practice. DBT includes components that explicitly target greater openness, awareness, and engagement.

Evidence

The empirical support for DBT is considerable, particularly in BPD (Lynch, Trost, Salsman, & Linehan, 2007) on outcomes such as suicidality, hospitalizations, and depression. It has also produced positive outcomes in the areas of eating disorders, substance use, and depression in older adults among several other areas (Lynch et al., 2007). Skills training appears to be a particularly important aspect of DBT (Soler, Pascual, Tiana, Cebria, & Barrachina, 2009) and use of these skills, including mindfulness skills, relates to improvements in BPD symptoms (e.g., Stepp, Epler, Jahng, & Trull, 2008). DBT is also known to reduce experiential avoidance, which in turn predicts later outcome changes (Berking, Neacsiu, Comtois, & Linehan, 2009).

Acceptance and Commitment Therapy

ACT (Hayes et al., 1999) uses acceptance and mindfulness techniques, and commitment and behavioral activation techniques, to produce psychological flexibility. It is one of the more broadly focused of the mindfulness methods in part because it was not developed with a specific disorder in mind, and in part because it has emphasized more flexible, values-based behavior, in addition to greater openness and awareness.

Psychological flexibility is the applied model that underlies ACT. It refers to the ability to contact the present moment, externally and internally, more fully and without needless defense, and based on what the situation affords, to persist or change in behavior in the service of chosen values. Six processes are argued to account for psychological flexibility: acceptance, defusion, flexible attention to the present moment, a transcendent sense of self, values, and committed

action. The first two are openness processes; the next two are awareness processes; the last two are engagement processes. These processes are taught to clients by means of experiential exercises, homework, metaphors, exploration of paradox, and use of the therapeutic relationship. Cognitive defusion might be facilitated by exercises that encourage viewing thoughts from afar, as if they are moving vehicles on a roadway (Hayes & Smith, 2005). Exercises to improve contact with the present are commonly used to train flexible attention to the moment. Exercises are used to establish more flexible perspective taking and to decrease attachment to the conceptualized self. Values, which in ACT are chosen life directions that establish reinforcers in the present that are intrinsic to patterns of action, are addressed in detail and all of the rest of therapy is linked to these values. Committed action consists of traditional behavioral activation and skill development techniques but the goal is to increase behavioral flexibility linked to values in the presence of previously repertoire-narrowing stimuli.

Evidence

As this chapter is being written there are exactly 116 randomized controlled trials published with ACT, over half of them in the last 3 years. Reviews show medium- to large-group effect sizes (see Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Öst, 2008; Powers, Vörding, & Emmelkamp, 2009; & Ruiz, 2010). What is most surprising is the range of phenomena addressed: depression, coping with psychosis, substance use, chronic pain, epilepsy, obsessive-compulsive disorder, diabetes management, reduction of prejudice toward people with psychological problems, helping drug and alcohol counselors learn and apply evidence-based pharmacotherapy, worksite stress, smoking cessation, obesity, adjusting to college, eating pathology, and other problems. The process evidence suggests that ACT alters psychological flexibility and its components, such as experiential avoidance, fusion, and values (Hayes et al., 2006). About two-thirds of the published randomized controlled trials have included mediational analyses which have suggested that flexibility and mindfulness processes are functionally important in producing outcomes (e.g., Gaudiano, Herbert, & Hayes, 2010; Wicksell, Olsson, & Hayes, 2010; Zettle, Rains, & Hayes, 2011). Behavioral in-session measures of psychological flexibility processes as early as session two have been successful in predicting positive outcomes in ACT (Hesser, Westin, Hayes, & Andersson, 2009). In several of these cases, more traditional cognitive measures have also been tested for mediation, and in all cases mindfulness and flexibility processes have proven more powerful (e.g., Wicksell et al., 2010; Zettle et al., 2011).

Summary

Even though mindfulness-based therapies are relatively new, the benefits of mindfulness practice are being widely studied in both clinical and non-clinical samples and in disciplines outside of behavioral health. Outcome research is supportive of the methods we have covered here, but the evidence is even more supportive when looking broadly at methods that target mindfulness processes (Hayes, Villatte et al., 2011). Mindfulness allows for openness to experience and supports acceptance and change efforts (Hofmann & Asmundson, 2008). Mindfulness methods help overcome the literal evaluative functions of language—our tendency to judge things we encounter and to take those judgments as literal truths about the world (Hayes & Wilson, 2003). These methods are highly acceptable to patients (Finucane & Mercer, 2006) and they produce good outcomes not just in traditional mental health areas but also in behavioral medicine and dealing with chronic disease (e.g., Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007; Vowles & McCracken, 2008). They can also be applied to more subclinical problems of stress (Chiesa & Serretti, 2009; Shapiro et al., 2008), including workplace stress (Bond & Bunce, 2000; 2003; Klatt et al., 2009; cf., Langer & Moldoveanu, 2000).

One striking feature of mindfulness-based treatments is that clinicians are encouraged or even required to themselves adopt mindfulness

practices. This is unlike any other treatment approach except perhaps psychoanalysis. In MBSR clinicians must follow strict training procedures; DBT and ACT encouraged clinicians to adopt mindfulness practices of their own and to apply these practices to themselves. In addition to perhaps facilitating skill in delivering treatment, there is a growing body of research that suggests that mindfulness practice is beneficial to the well-being and psychological flexibility of treatment providers. Krasner and colleagues (2009) found that participation in a mindful communication program was beneficial to primary care physicians in increasing mindfulness, empathy, and conscientiousness while decreasing burnout and mood disturbance. Counseling trainees reported improvements in stress management and greater consciousness of themselves and their clients after taking a course that emphasized mindfulness training (Christopher, Christopher, Dunnagan, & Schure, 2006). There is even evidence that mindfulness methods help clinicians learn other evidence-based methods (Varra, Hayes, Roget, & Fisher, 2008). Turner (2009) nicely summarizes the usefulness of cultivating mindfulness for clinicians: "Mindfulness skills training builds the clinicians qualities or skills of attention, affect regulation, attunement, and empathy" (p. 97).

The Future of Mindfulness and Psychotherapy

The very flexibility of mindfulness-based treatment approaches virtually guarantees that new developments will appear between the time this chapter is written and the time it appears in print. Given the ease with which mindfulness techniques can be delivered to clinicians and clients they will remain an appealing approach. And given the broad applicability to decreasing suffering and increasing desirable outcomes mindfulness-based approaches are likely to continue to flourish. However, many questions still remain. There are attempts to determine the best "dose" of mindfulness to determine how much or how little practice is needed for beneficial effects. Component analyses are needed to determine the relative importance of mindfulness practice in multicomponent treatments. Biological research on mechanisms of mindfulness, while relatively new, is growing in the search to find a neurobiological basis of the effects of mindfulness practice. Ultimately, empirical outcomes should lead to greater precision in defining mindfulness and related constructs and refining techniques to maximize treatment effectiveness.

References

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*, 125–143.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45.

Barlow, D. H., Allen, L. B., & Choate, M. L. (2004). Toward a unified treatment for emotional disorders. *Behaviour Therapy, 35*, 205–230.

Benson, H., Beary, J. F., & Carol, M. P. (1974). The relaxation response. *Psychiatry, 37*(1), 37–46.

Berking, M., Neacsiu, A. D., Comtois, K., & Linehan, M. M. (2009). The impact of experiential avoidance on the reduction of depression in treatment for Borderline Personality Disorder. *Behaviour Research and Therapy, 47*, 663–670.

Bishop, S. R. (2002). What do we really know about Mindfulness-Based Stress Reduction? *Psychosomatic Medicine, 64*, 71–83.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson Carmody, N. D. J., et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241.

Bond, F. W., & Bunce, D. (2000). Mediators of change in emotion-focused and problem-focused worksite stress management interventions. *Journal of Occupational Health Psychology, 5*, 156–163.

Bond, F. W., & Bunce, D. (2003). The role of acceptance and job control in mental health, job satisfaction, and work performance. *Journal of applied psychology, 88*(6), 1057.

Bowen, S., Chawla, N., Collins, S. E., Witkiewitz, K., Hsu, S., Grow, J., et al. (2009). Mindfulness-based relapse prevention for substance use disorders: A pilot efficacy trial. *Substance Abuse, 30*, 295–305.

Bunz, M. (2009). Is the link economy of UK new sites managing or making abundance? *The Guardian*. Retrieved from http://www.guardian.co.uk/media/pda/2009/nov/02/digital-media-news-sites-information-overload.

Carmody, J., & Baer, R. A. (2009). How long does a mindfulness-based stress reduction program need to be? A

review of class contact hours and effect sizes for psychological distress. *Journal of Clinical Psychology, 65*, 627–638.

Carmody, J., Baer, R. A., Lykins, E. L. B., & Olendzki, N. (2009). An empirical study of the mechanisms of mindfulness in a mindfulness-based stress reduction program. *Journal of Clinical Psychology, 65*, 613–626.

Carson, J. W., Keefe, F. J., Lynch, T. R., Carson, K. M., & Goli, V. (2005). Loving-kindness meditation for chronic low back pain: Results from a pilot trial. *Journal of Holistic Nursing, 23*, 287–304.

Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: a review and meta-analysis. *The journal of alternative and complementary medicine, 15*(5), 593–600.

Christopher, J. C., Christopher, S. E., Dunnagan, T., & Schure, M. (2006). Teaching self-care through mindfulness practices: The application of yoga, meditation, and qigong to counselor training. *Journal of Humanistic Psychology, 46*(4), 494–509.

De Silva, P. (1984). Buddhism and behaviour modification. *Behaviour Research and Therapy, 22*, 661–678.

Deikman, A. J. (1982). *The observing self: Mysticism and psychotherapy*. Boston, MA: Beacon.

Dimidjian, S., & Linehan, M. M. (2003). Defining an agenda for future research on the clinical application of mindfulness practice. *Clinical Psychology: Science and Practice, 10*, 166–171.

Dryden, W., & Still, A. (2006). Historical aspects of mindfulness and self-acceptance in psychotherapy. *Journal of Rational-Emotive and Cognitive Behavior Therapy, 24*, 3–28.

Finucane, A., & Mercer, S. W. (2006). An exploratory mixed method study of the acceptability and effectiveness of mindfulness-based cognitive therapy for patients with active depression and anxiety in primary care. *BMC Psychiatry, 6*, 14.

Fletcher, L., & Hayes, S. C. (2005). Relational frame theory, acceptance and commitment therapy, and a functional analytic definition of mindfulness. *Journal of Rational-Emotive and Cognitive Behavioral Therapy, 23*, 315–336.

Frances, A. (2010). DSM in philosophyland: Curiouser and curiouser. *Bulletin of the Association for the Advancement of Philosophy and Psychiatry, 17*(2), 3–7.

Fresco, D. M., Moore, M. T., Van Dulman, M. H. M., Segal, Z. V., Ma, S. H., Teasdale, J. D., et al. (2007). Initial psychometric properties of the experience questionnaire: validation of a self-report measure of decentering. *Behaviour Therapy, 38*, 234–246.

Fromm, E., Suzuki, D. T., & De Martino, R. (1960). *Zen Buddhism and psychoanalysis* (viiith ed., p. 180). Oxford, England: Harper.

Gaudiano, B. A., Herbert, J. D., & Hayes, S. C. (2010). Is it the symptom or the relation to it? Investigating potential mediators of change in acceptance and commitment therapy for psychosis. *Behaviour Therapy, 41*, 543–554.

Germer, C. K., Siegel, R. D., & Fulton, P. R. (2005). *Mindfulness and psychotherapy*. New York, NY: The Guilford Press.

Gilbert, P. (2009). *The compassionate mind: A new approach to life's challenges*. London, UK: Constable-Robinson.

Goleman, D. (1977). *The varieties of the meditative experience*. New York, NY: Irvington Publishers.

Greeson, J. M. (2009). Mindfulness research update: 2008. *Journal of Evidence-Based Complementary and Alternative Medicine, 14*, 10–18.

Gregg, J. A., Callaghan, G. M., Hayes, S. C., & Glenn-Lawson, J. L. (2007). Improving diabetes self-management through acceptance, mindfulness, and values: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 75*(2), 336–343.

Grossman, P., Niemann, L., Schmid, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*, 35–43.

Harvey, A. G., Watkins, E., Mansell, W., & Shafran, R. (2004). *Cognitive behavioural processes across psychological disorders: A transdiagnostic approach to research and treatment*. Oxford, U.K.: Oxford University Press.

Hayes, S. C. (1984). Making sense of spirituality. *Behaviorism, 12*, 99–110.

Hayes, S. C. (1987). A contextual approach to therapeutic change. In N. Jacobson (Ed.), *Psychotherapists in clinical practice: Cognitive and behavioral perspectives* (pp. 327–387). New York, NY: Guilford.

Hayes, S. C. (2004). Acceptance and commitment therapy, relational frame theory, and the third wave of behavior therapy. *Behaviour Therapy, 35*, 639–665.

Hayes, S. C., Follette, V. M., & Linehan, M. M. (Eds.). (2004). *Mindfulness and acceptance: Expanding the cognitive behavioral tradition*. New York, NY: Guilford Press.

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behavior Research and Therapy, 44*, 1–25.

Hayes, S. C., & Smith, S. (2005). *Get out of your mind and into your life*. Oakland, CA: New Harbinger.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York, NY: Guilford Press.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2011). *Acceptance and commitment therapy: The process and practice of mindful change* (2nd ed.). New York, NY: The Guilford Press.

Hayes, S. C., Villatte, M., Levin, M., & Hildebrandt, M. (2011). Open, aware, and active: Contextual approaches as an emerging trend in the behavioral and cognitive therapies. *Annual Review of Clinical Psychology, 7*, 141–168.

Hayes, S. C., & Wilson, K. G. (2003). Mindfulness: Method and process. *Clinical Psychology: Science and Practice, 10*, 161–165.

Hesser, H., Westin, V., Hayes, S. C., & Andersson, G. (2009). Clients' in-session acceptance and cognitive defusion behaviors in acceptance-based treatment of tinnitus distress. *Behaviour Research and Therapy, 47*, 523–528.

Hofmann, S. G., & Asmundson, G. J. G. (2008). Acceptance and mindfulness-based therapy: New wave or old hat? *Clinical Psychology Review, 28*, 1–16.

Hofmann, S. G., Grossman, P., & Hinton, D. E. (2011). Loving-kindness and compassion meditation: Potential for psychological interventions. *Clinical Psychology Review, 31*, 1126–1132.

Hofmann, S. G., Sawyer, A. T., Witt, Q. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169–183.

Iacovelli, A., & Valenti, S. (2009). Internet addiction's effect on likeability and rapport. *Computers in human behavior, 25*, 439–443.

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness mediation: theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*, 33–47.

Kabat-Zinn, J. (1990). *Full catastrophe living*. New York, NY: Delacorte Press.

Kabat-Zinn, J. (1994). *Wherever you go there you are*. New York, NY: Hyperion.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: past present and future. *Clinical Psychology: Science and Practice, 10*, 144–156.

Kerr, K. (2000). Relaxation techniques: A critical review. *Critical Reviews in Physical and Rehabilitation Medicine, 12*, 51–89.

Klatt, M. D., Beckworth, J., & Malarky, W. B. (2009). Effects of lose-dose Mindfulness-Based Stress Reduction (MBSR-ld) on working adults. *Health Education & Behavior, 36*, 601–614.

Krasner, M. S., Epstein, R. M., Beckman, H., Suchman, A. L., Chapman, B., Mooney, C. J., et al. (2009). Association of an educational program in mindful communication with burnout, empathy, and attitudes among primary care physicians. *Journal of the American Medical Association, 302*, 1284–1293.

Kupfer, D. J., First, M. B., & Regier, D. A. (Eds.). (2002). *A research agenda for DSM-V*. Washington, DC: American Psychiatric Association.

Kutz, I., Borysenko, J. Z., & Benson, H. (1985). Meditation and psychotherapy: a rationale for the integration of dynamic psychotherapy, the relaxation response, and mindfulness meditation. *American Journal of Psychiatry, 142*, 1–8.

Langer, E. J. (2000). Mindful learning. *Current Directions in Psychological Science, 9*, 220–223.

Langer, E. J., Bashner, R. S., & Chanowitz, B. (1985). Decreasing prejudice by increasing discrimination. *Journal of Personality and Social Psychology, 49*, 113–120.

Langer, E., Blank, A., & Chanowitz. (1978). The mindlessness of ostensibly thoughtful action. *Journal of Personality and Social Psychology, 36*, 635–642.

Langer, E. J., & Moldoveanu, M. C. (2000). Mindfulness research and the future. *Journal of Social Issues, 56*, 129–139.

Langer, E. J., & Weinman, C. (1981). When thinking disrupts intellectual performance: mindfulness on an overlearned task. *Personality and Social Psychology Bulletin, 7*, 240–243.

Levin, J., & Spates, J. L. (1970). Hippie values: an analysis of the underground press. *Youth Society, 2*, 59–73.

Linehan, M. M. (1987). Dialectical behavior therapy for borderline personality disorder: Theory and method. *Bulletin of the Menninger Clinic, 51*, 261–276.

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: The Guilford Press.

Linehan, M. M., Armstrong, H. E., Suarez, A., & Allmon, D. (1991). Cognitive behavioral treatment of chronically parasuicidal borderline patients. *Archives of General Psychiatry, 48*, 1060–1064.

Longmore, R. J., & Worrell, M. (2007). Do we need to challenge thoughts in cognitive behavior therapy? *Clinical Psychology Review, 27*, 173–187.

Lynch, T. R., Trost, W. T., Salsman, N., & Linehan, M. M. (2007). Dialectical behavior therapy for borderline personality disorder. *Annual Review of Clinical Psychology, 3*, 181–205.

Ma, S. H., & Teasdale, J. D. (2004). Mindfulness-based cognitive therapy for depression: Replication and exploration of differential relapse prevention effects. *Journal of Consulting and Clinical Psychology, 72*, 31–40.

Marlatt, G. A., & Kristeller, J. L. (1999). Mindfulness and meditation. In W. R. Miller (Ed.), *Integrating spirituality into treatment* (pp. 67–84). Washington, DC: American Psychological Association.

Merzel, D. G. (2007). *Big mind big heart: Finding your way*. Salt Lake City: Big Mind Publishing.

Ospina, M. B., Bond, K., Karkhaneh, M., Tjosvold, L., Vandermeer, B., Liang, Y., et al. (2007). Meditation practices for health: state of the research. *Evidence Reports: Technology Assessments, 155*, 1–263.

Öst, L. G. (2008). Efficacy of the third wave of behavioral therapies: A systematic review and meta-analysis. *Behaviour Research and Therapy, 46*, 296–321.

Ostafin, B. D., & Marlatt, G. A. (2008). Surfing the urge: Experiential acceptance moderates the relation between automatic alcohol motivation and hazardous drinking. *Journal of Social and Clinical Psychology, 27*, 404–418.

Pace, T. W. W., Negi, L. T., Adame, D. D., Cole, S. P., & Sivilli, T. I. (2009). Effect of compassion meditation on neuroendocrine, innate immune and behavioral responses to psychosocial stress. *Psychoneuroendocrinology, 34*, 87–98.

Perlmuter, L. C., & Langer, E. J. (1983). The effects of behavioral monitoring on the perception of control. *Clinical Gerontologist, 1*(2), 37–43.

Powers, M. B., Vörding, M. B. Z. S., & Emmelkamp, P. M. G. (2009). Acceptance and commitment therapy: A meta-analytic review. *Psychotherapy and Psychosomatics, 78*, 73–80.

Putnam, R. D. (2000). *Bowling alone: The collapse and revival of american community*. New York, NY: Simon & Schuster.

Raes, F., Dewulf, D., Heeringen, C. V., & Williams, J. M. G. (2009). Mindfulness and reduced cognitive reactivity to sad mood: Evidence from a correlational study and a non-randomized waiting list controlled study. *Behaviour Research and Therapy, 47*, 623–627.

Ruiz, F. J. (2010). A review of Acceptance and Commitment Therapy (ACT) empirical evidence: Correlational, experimental psychopathology, component and outcome studies. *International Journal of Psychology and Psychological Therapy, 10*, 125–162.

Sanderson, W. C. (2002). Are evidenced-based psychological interventions practiced by Clinicians in the field? *Medscape Mental Health, 7*, 1–3.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York, NY: Guilford Press.

Shapiro, S. L., Brown, K., & Biegel, G. (2007). Teaching self-care to caregivers: Effects of mindfulness-based stress reduction on the mental health of therapists in training. *Training and Education in Professional Psychology, 1*, 105–115.

Shapiro, S. L., Oman, D., Thoresen, C. E., Plante, T. G., & Flinders, T. (2008). Cultivating mindfulness: Effects on well-being. *Journal of Clinical Psychology, 64*, 840–862.

Soler, J., Pascual, J. C., Tiana, T., Cebria, A., & Barrachina, J. (2009). Dialectical behavior therapy skills training compared to standard group therapy in borderline personality disorder: A 3-month randomized controlled clinical trial. *Behaviour Research and Therapy, 47*, 353–358.

Stepp, S. D., Epler, A. J., Jahng, S., & Trull, T. J. (2008). The effect of dialectical behavior therapy skills use on borderline personality disorder features. *Journal of Personality Disorders, 22*, 549–563.

Suzuki, D. T. (1948). *An Introduction to Zen Buddhism*. New York, NY: Grove.

Teasdale, J. D., Segal, Z. V., Williams, J. M. G., Ridgeway, V., Soulsby, J., & Lau, M. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68*, 615–623.

Turner, K. (2009). Mindfulness: the present moment in clinical social work. *Clinical Social Work Journal, 37*, 95–103.

Varra, A. A., Hayes, S. C., Roget, N., & Fisher, G. (2008). A randomized control trial examining the effect of acceptance and commitment training on clinician willingness to use evidence-based pharmacotherapy. *Journal of Consulting and Clinical Psychology, 76*, 449–458.

Vettese, L. C., Toneatto, T., Stea, J. N., Nguyen, L., & Wang, J. J. (2009). Do mindfulness meditation participants do their homework? And does it make a difference? A review of the empirical evidence. *Journal of Cognitive Psychotherapy, 23*, 198–225.

Vowles, K. E., & McCracken, L. M. (2008). Acceptance and values-based action in chronic pain: A study of effectiveness and treatment process. *Journal of Clinical and Consulting Psychology, 76*, 397–407.

Wampold, B. E. (2001). *The great psychotherapy debate: models, methods, and findings*. Mahwah, NJ: Lawrence Erlbaum.

Watts, A. W. (1961). *Psychotherapy east and west*. New York, NY: Pantheon Books.

Wicksell, R. K., Olsson, G. L., & Hayes, S. C. (2010). Psychological flexibility as a mediator of improvement in acceptance and commitment therapy for patients with chronic pain following whiplash. *European Journal of Pain, 14*(10), 1059–e1.

Witkiewitz, K., Marlatt, G. A., & Walker, D. D. (2005). Mindfulness-based relapse prevention for alcohol use disorders: The meditative tortoise wins the race. *Journal of Cognitive Psychotherapy, 19*, 211–228.

Zettle, R. D., Rains, J. C., & Hayes, S. C. (2011). Do acceptance and commitment therapy and cognitive therapy for depression work via the same process: A reanalysis of Zettle and Rains, 1989. *Behavior Modification, 35*, 265–283.

Zgierska, A., Rabago, D., Chawla, N., Kushner, L., Koegler, R., & Marlatt, A. (2009). Mindfulness meditation for substance use disorders: A systematic review. *Substance Abuse, 30*, 266–294.

How Do Mindfulness-Based Interventions Work? Strategies for Studying Mechanisms of Change in Clinical Research

12

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Over the past 20 years, mindfulness-based interventions (MBIs) have taken hold in clinical psychology. Many MBIs now boast a foundation of empirical support and have garnered enthusiasm from psychotherapists looking for novel, flexible treatment tools to augment more traditional cognitive, behavioral, and interpersonal approaches. Randomized controlled trials (RCTs) of MBIs generally demonstrate positive effects of treatment; however, these results do not answer the question of whether changes in mindfulness and related constructs are responsible for positive responses to treatment (Keng, Smoski, & Robins, 2011).

There are several general approaches to investigating mechanisms of change in MBIs. Among the most rigorous are treatment outcome studies in which levels of mindfulness and other potential mediators are assessed at several time points. This approach allows examination of whether participants learn mindfulness and related skills and whether these skills are associated with or responsible for the observed therapeutic outcomes. Evidence for mediation is most convincing when change in the proposed mediator (e.g., mindfulness skills) precedes change in the dependent variable (e.g., psychological symptoms; Kraemer, Wilson, Fairburn, & Agras, 2002). Such studies require at least three measurement points: pretreatment, posttreatment, and follow-up, or pre-, mid-, and posttreatment. These studies, while very informative, are difficult and time consuming to conduct and therefore relatively uncommon.

In cross-sectional studies, dispositional mindfulness (the general tendency to be mindful in daily life) and other variables of clinical interest are measured and relationships between them are examined. Such studies sometimes compare individuals with and without a history of meditation practice, noting if the presence or duration of practice is related to outcomes of interest and if level of mindfulness statistically explains the effects of meditation experience. These studies are not true tests of mediation, because all data are collected at the same time, making it impossible to draw conclusions about the direction of effects. However, it is often useful to examine whether the cross-sectional relationship between two variables (e.g., meditation experience and well-being) can be statistically accounted

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for by another variable (e.g., mindfulness skills). In this way, tests of mediational models in cross-sectional studies can inform the treatment literature by providing hypotheses to be tested in longitudinal studies.

Another important approach to the study of mechanisms of change is to manipulate mindfulness in laboratory experiments by guiding participants through a brief exercise intended to induce a mindful state. Effects on outcomes of interest, such as responses to emotional stimuli or performance on various tasks, are examined. Mindfulness inductions are often compared to alternative activities such as relaxation, rumination, or distraction. Laboratory studies of mindfulness inductions usually involve only a single session with nontreatment-seeking participants; therefore, they cannot demonstrate the efficacy of clinical interventions. However, they can illuminate processes of change by isolating treatment components in ways that are not feasible in treatment outcome studies.

Overview of This Chapter

Most approaches to the study of processes of change in MBIs require assessment of mindfulness and other proposed mediators. Indeed, the importance of studying mechanisms of change in MBIs has been a primary impetus for the recent development of instruments designed to assess mindfulness and related constructs (Baer, 2011). Mindfulness measures allow researchers to test important assumptions about active ingredients in MBIs. Although laboratory studies that manipulate mindfulness with inductions often do not include measures of mindfulness, it has been argued that such studies should assess whether the induction produced a mindful state in participants (Levin, Hildebrandt, Lillis, & Hayes, 2012). Valid assessment of mindfulness is therefore critical to the study of mechanisms of change in MBIs, regardless of research methodology. This chapter discusses design and psychometric considerations important to such studies, with a strong emphasis on assessment of mindfulness and related constructs. We include statistical recommendations for testing mediation and a brief review of treatment-based mediational studies. Laboratory-based studies of mindfulness inductions have been reviewed recently (Levin et al., 2012); therefore, we consider them more briefly.

Design of Clinical Mindfulness Research

In this section, we discuss major issues in planning and conducting studies of how mindfulness influences mental health, including the importance of theory, selection of study design and participant sample, and measurement of mindfulness.

Theoretical Considerations

Hypotheses about the effects of mindfulness training should be rooted in theory about how mindfulness relates to other constructs or behaviors of interest. Especially critical are theory-based hypotheses about mediators—i.e., the "pathway" variables through which dispositional mindfulness, a mindfulness induction, or mindfulness training is hypothesized to impact the outcome of interest.

The most basic theoretical assumption about the effects of MBIs is that participation in these interventions cultivates mindfulness skills, or the ability to respond mindfully to the experiences of daily life (cognitions, emotions, sensations, etc.), and that mindfulness skills lead in turn to improvements in functioning. Several studies, reviewed later, support this general model. If the development of mindfulness skills leads to improved mental health, then an additional mediational question is via what mechanisms these mindfulness skills exert their effects. Recently, several authors have recognized the need for greater theoretical organization in clinical mindfulness research on the latter question, offering a variety of theories about the mechanisms through which increased mindfulness may relate to outcomes of interest. In a recent review, Hölzel and colleagues (2011) argue that most theories posit mediational roles for attention regulation,

body awareness, emotion regulation (through reappraisal or exposure, extinction, and reconsolidation), or change in perspectives on the self. Similarly, Vago and Silbersweig (2012) advance an integrative framework for studying several central psychological and neurobiological processes in both mindfulness practice and dispositional mindfulness, especially those processes associated with the development of Self-Awareness, -Regulation, and -Transcendence (S-ART). Rooting research efforts in such theories may lead to richer studies, more ability to compare results across studies, and faster, more coherent accumulation of information about the way or ways in which mindfulness improves functioning.

Design Considerations

Depending on the nature of the hypothesis to be tested, one of several study designs may be most appropriate.

Longitudinal Treatment-Outcome Studies

The most rigorous methods for investigating the nature of within-person change over time in MBIs are longitudinal studies in which independent variables are manipulated. Participants are randomized to an MBI condition or a comparison group (an active/alternative treatment or a waitlist control group) while dependent variables are measured at two or more time points (preferably at least three; see later discussion of statistical recommendations). Several types of longitudinal studies are possible; we refer here to treatment outcome studies examining effects of a mindfulness-based treatment on symptoms over time on both potential mediators and therapeutic outcomes. Longitudinal designs allow the researcher to determine whether participation in an MBI is associated with positive changes over time, and whether changes in mindfulness and related constructs mediate treatment-related improvements.

The selection of an appropriate control group is an important step in designing a longitudinal intervention study and should depend on the type of comparison one wishes to make. In the early stages of treatment development, waitlist control groups are often used to determine whether the new treatment is more effective than no treatment. If it is, later studies often compare the new treatment to an alternative treatment. If the alternative treatment is well established, then a finding that the new treatment performs equally well or better is encouraging.

For clarifying mechanisms of change, comparing full treatment packages to interventions from which a critical element is omitted can be very informative. For example, MacCoon et al. (2011) developed and validated the Health Enhancement Program (HEP), an active control group designed for use in longitudinal studies of mindfulness-based stress reduction (MBSR). The HEP provides training in the same skills as MBSR but does not use mindfulness meditation, allowing examination of whether MBSR confers truly unique positive effects.

The primary strength of longitudinal studies is the ability to determine directional links between the intervention, changes in mindfulness, and changes in outcomes of interest. Weaknesses of the longitudinal treatment-outcome approach are few, but include trade-offs in terms of the time and resources required. Finally, while studies including only two assessment points (generally pre- and posttreatment) are informative, the inclusion of three or more assessment points allows for the use of multilevel growth modeling and other advanced statistical approaches that may lead to richer information about mechanisms of action in MBIs. Longitudinal studies allowing for the use of such statistical approaches may prove particularly informative with regard to the study of individual-difference moderators of the effects of MBIs.

Laboratory Experiments

Laboratory experiments are often used to isolate key components and identify mechanisms of MBIs. Mindfulness is generally manipulated across two or more conditions by varying the instructions given to participants performing laboratory tasks. Other variables are held constant,

and the participant's response on an outcome of interest is measured. This type of study aims to provide information about the mechanisms of mindfulness across a shorter time course. For example, Broderick (2005) conducted a laboratory study in which undergraduate students completed a dysphoric mood induction (they listened to sad music for several minutes while reading depressive sentences) and then were randomly assigned to 8 min of rumination, distraction, or mindfulness. The mindfulness group listened to a recording that guided them in mindful awareness of breathing, whereas the rumination group was guided in thinking about how they were feeling and the distraction group was asked to imagine neutral images. Compared to the rumination and distraction conditions, the mindfulness condition showed significantly less negative mood after the 8-min period, suggesting that mindfulness may be effective in reducing negative emotions.

As with longitudinal studies, the selection of an appropriate control group strengthens the conclusions that can be drawn from significant findings. Laboratory studies have compared the effects of various mindfulness inductions to a range of control conditions, such as allowing the mind to wander freely (Arch & Craske, 2006), listening to educational excerpts and completing a word search puzzle (Erisman & Roemer, 2010), and thinking about neutral, externally focused thoughts (Broderick, 2005; Kuehner, Huffziger, & Liebsch, 2009). While these comparisons are important and informative, additional research is warranted using comparison groups that control for potential nonspecific effects of mindfulness inductions, such as relaxation. These more stringent controls would allow researchers to make stronger conclusions that observed effects are due specifically to mindfulness.

Strengths of the laboratory experiment approach include the potential to gain greater in-the-moment information about the way mindfulness processes unfold and the relative ease and low cost of data collection compared to treatment-outcome research. The primary weakness of this approach concerns the potentially limited external validity of findings; it is not clear how well mindfulness inductions in the laboratory approximate the kinds of mindful states achieved as a function of mindfulness-based interventions. Therefore, another important consideration specific to laboratory experiments is the selection of a mindfulness induction. Most studies have used guided periods of mindful breathing, usually of 8–15 min; however, little information is available about the degree to which such inductions actually result in a mindful state.

This last point highlights one particularly important area for methodological improvement in laboratory studies: Most mindfulness induction studies have not included or reported manipulation checks that assess the extent to which participants *complied* with instructions during the mindfulness induction or *achieved* a mindful state. Studies addressing this methodological problem by validating the brief mindfulness inductions used in the laboratory are sorely needed, and reporting of manipulation check outcomes should be the norm as it is in many other experimental paradigms. Several relevant, validated state-level scales exist that may be used as manipulation checks to test for the presence of both compliance with instructions and achievement of a mindful state; these are discussed more thoroughly in the assessment consideration section below. Ideally, future research would use these or other validated measures to establish that changes in mindfulness as a result of inductions are responsible for mindfulness induction effects. Changes in affect, relaxation, and other states potentially related to both mindfulness and the outcomes of interest should also be monitored, as it is important to establish that any effects of mindfulness inductions are not merely the result of changes in affect or other states that may be related but not equivalent to mindfulness.

Cross-Sectional Studies

Although cross-sectional correlational studies are not well suited to investigation of treatment effects, they can provide a broad understanding of associations between mindfulness and clinically relevant variables. This information can inform more specific hypotheses about the pathways through which mindfulness training may improve psychological functioning. Cross-sectional studies

are more economical than laboratory experiments and treatment outcome studies, but they have major weaknesses. The information gathered is correlational and cross sectional; therefore it is impossible to draw firm conclusions about the direction of the relationship between mindfulness and the other variables of interest. For example, in a cross-sectional study of experienced meditators and a comparison group of demographically similar nonmeditators, Baer, Lykins, and Peters (2012) found that the relationship between years of meditation experience and psychological well-being was statistically accounted for by indirect effects via dispositional mindfulness and self-compassion. These findings are consistent with the hypothesis that long-term practice of mindfulness meditation leads to increased mindfulness and self-compassion, which in turn improves well-being; however, all variables were measured at the same time, and alternative models are possible. Such studies can provide only preliminary support for theories about mechanisms of change.

Sample Considerations

Once a theory and corresponding hypotheses have been outlined, a participant population suited to testing the empirical questions at hand must be selected. Although much research on mindfulness—and, indeed, on psychological processes in general—has been conducted using college students, such samples may not resemble populations likely to seek out mindfulness-based treatments or to take up the practice of meditation. On the other hand, mindfulness is often conceptualized as a dispositional quality that varies in nonmeditating and nontreatment-seeking populations. Student samples can yield useful information about dispositional mindfulness and about responses to mindfulness inductions in nonmeditators.

Sample choice is particularly important in treatment-outcome studies, where the sample used determines the clinical populations to which findings can be generalized. Therefore, samples should be selected on the basis of a theory that dictates for whom the treatment is expected to be beneficial. When particular clinical populations are of interest, well-validated instruments (e.g., the Center for Epidemiological Studies—Depression scale; Radloff, 1977) or structured diagnostic interviews (e.g., the Structured Clinical Interview for DSM-IV Axis I Disorders; SCID-I; First, Spitzer, Gibbon, & Williams, 1996) should be used to quantify symptom levels or verify diagnoses. Such participant screening improves the clarity and replicability of the findings by making the nature of the sample as explicit as possible.

Assessment Considerations: Measuring Mindfulness

Assessment of mindfulness is essential for investigating whether participants in MBIs learn mindfulness skills and whether these skills contribute to therapeutic outcomes. To date, mindfulness has been assessed almost exclusively with self-report questionnaires. Concerns about the utility of such measures have led to an extensive published discussion of their strengths and weaknesses (e.g., Brown, Ryan, Loverich, Biegel, & West, 2011; Eisenlohr-Moul, Walsh, Charnigo, Lynam, & Baer, 2012; Grossman, 2011; Van Dam, Hobkirk, Danoff-Burg, & Earleywine, 2012). Some of the issues that have been raised, such as the potential for deliberate or unconscious response biases, apply to virtually all self-report instruments. Other concerns are more specific to mindfulness questionnaires. For example, people with no mindfulness training may find it difficult to report accurately on their own tendencies to be mindful. Additionally, experienced meditators may interpret some items differently than nonmeditators (Van Dam, Earleywine, & Danoff-Burg, 2009), though such issues may be remedied by using appropriate sample matching procedures (Baer, Samuel, & Lykins, 2011). Inconsistencies between Buddhist conceptions of mindfulness and the way mindfulness is operationalized in psychological questionnaires are another source of concern (e.g., Grossman & Van Dam, 2011). A detailed review of these issues is beyond the scope of this chapter (see Baer, 2011, for a comprehensive discussion).

Despite these concerns, the empirical literature on mindfulness questionnaires suggests that their psychometric properties are reasonably sound and that they make important contributions to the understanding of mindfulness as a psychological construct, its relationships with other variables, and the changes that occur with mindfulness training. Furthermore, it seems likely that recent scrutiny will result in developments and improvements that could promote greater reliability and validity in self-report mindfulness measurement.

Many self-report measures of mindfulness have been developed in recent years. Most are questionnaires that assess the general tendency to engage in mindful behavior in daily life. Choosing an appropriate measure for a particular study depends on multiple factors. First, measures should have strong psychometric properties. High internal consistency, high test-retest reliability, and a reliable factor structure in relevant samples are desirable, because these qualities demonstrate the capacity of a scale to relate to other variables of interest (Clark & Watson, 1995; Rust & Golombok, 2009). The number of items in a particular scale directly influences reliability (with longer scales yielding higher reliability); therefore, short-form scales should be developed and used with careful attention to the potential trade-offs between reliability and validity (see Smith, Combs, & Pearson, 2012, for discussion). Second, indicators of scale validity (content, criterion, convergent, and discriminant validity) are important to establish that the scale fully captures the construct of interest, rather than related but distinct constructs (see Clark & Watson, 1995; Rust & Golombok, 2009; and Smith, Fischer, & Fister, 2003 for more detailed discussion).

The multidimensional nature of mindfulness presents particular challenges to the validity of self-report measures. Some of the mindfulness measures presented below focus narrowly on one component of mindfulness, such as present-centered attention, whereas others have multiple subscales, each assessing a single component of the multidimensional construct. Matching the content of the measure to the theory examined is key—if the theory focuses on a specific component of mindfulness, one of the narrower measures or subscales may be appropriate, but if the study examines mindfulness more generally, using a narrow measure may produce insignificant or misleading results due to insufficient content coverage. Measures with a unidimensional structure that yield a single total score often have stronger psychometric properties but may not adequately capture the complex construct of mindfulness (Grossman & Van Dam, 2011). The use of global scores from multifactor scales may also be problematic, at times obscuring significant relationships between outcomes of interest and specific components of mindfulness (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Smith et al., 2003). Another important consideration is whether a measure has been validated for use in the relevant sample type; for instance, when conducting research on mindfulness in nonmeditators, a measure that has been validated using meditating individuals may not perform as expected. In the following paragraphs we provide a brief overview of available mindfulness measures.

Freiburg Mindfulness Inventory

Developed with participants in intensive meditation retreats, the 30-item Freiburg Mindfulness Inventory (FMI) (Buchheld, Grossman, & Walach, 2001) is designed to assess openness to and nonjudgmental observation of present-moment stimuli in experienced meditators. It provides a total score only, although two studies using student samples have conducted factor analyses (see Leigh & Neighbors, 2009). Items include "I notice how my feelings express themselves through my body," and "I accept myself as I am." In the development sample, the FMI demonstrated high internal consistency in experienced meditators (alpha = 0.93). Additionally, participants in meditation retreats demonstrated significant increases in FMI scores from pre- to post-retreat.

Walach, Buchheld, Buttenmuller, Kleinknecht, and Schmidt (2006) developed a shorter form of the FMI for use in nonmeditating samples. The authors reported adequate to good internal consistency; they also found differences in the expected directions between meditators, nonmeditators, and clinical groups. As expected, both forms of the

FMI were positively correlated with private self-awareness and self-knowledge and negatively correlated with dissociation and psychological distress in meditating and general adult samples. The authors recommend the longer form for participant samples with experience with mindfulness or Buddhist concepts and the shorter form for other populations (e.g., novice meditators).

Mindful Attention Awareness Scale

The Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003) is a 15-item, single-factor measure assessing the general tendency to engage in present-oriented attention and awareness. Items are all reverse scored and describe the state of being preoccupied or inattentive and functioning on automatic pilot. Examples include "I could be experiencing some emotion and not be conscious of it until some time later," and "It seems I'm 'running on automatic' without much awareness of what I'm doing." The MAAS demonstrates good internal consistencies in undergraduate and general adult samples (Brown & Ryan, 2003; alphas = 0.82 and 0.87, respectively). Zen Buddhist meditators reported higher MAAS scores than matched community controls. In the validation sample, convergent validity was evidenced by positive correlations with openness to experience, emotional intelligence, and well-being, and negative correlations with rumination and social anxiety. A nonsignificant relationship to self-monitoring provided evidence for discriminant validity. In another validation sample, daily fluctuations in a state version of the MAAS were predictive of concurrent feelings of autonomy as well as general levels of positive and negative affect in expected directions (Brown & Ryan, 2003). Since then, many studies have shown theory-consistent relationships between MAAS scores and a wide range of other variables (see Brown et al., 2011, for a brief review).

Kentucky Inventory of Mindfulness Skills

The Kentucky Inventory of Mindfulness Skills (KIMS) (Baer, Smith, & Allen, 2004) is based largely on the Dialectical Behavior Therapy (DBT) conceptualization of mindfulness skills. It provides separate scores for four facets of mindful behavior: observing, describing, acting with awareness, and accepting without judgment. Items include "I notice when my moods begin to change" (observing); "I'm good at finding words to describe my feelings" (describing); "When I do things, my mind wanders and I am easily distracted" (acting with awareness, reverse scored); and "I tell myself I shouldn't be feeling the way I'm feeling" (accepting without judgment, reverse scored). Exploratory and confirmatory analyses supported this four-factor structure. The authors report internal consistencies ranging from 0.76 to 0.91 for the four subscales. Convergent and discriminant validity were supported by positive associations with openness to experience and emotional intelligence and negative associations with experiential avoidance. Since its development, several additional studies have provided support for its psychometric properties (e.g., Baum et al., 2010).

Cognitive and Affective Mindfulness Scale-Revised

The Cognitive and Affective Mindfulness Scale-Revised (CAMS-R) (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007) is a 12-item measure of present-focus, attention, awareness, and acceptance of thoughts and feelings in daily experience. Items include "It is easy for me to concentrate on what I am doing" and "I try to notice my thoughts without judging them." A total score is calculated. In validation samples, internal consistencies ranged from 0.74 to 0.77, and confirmatory factor analyses supported a single-factor model. The CAMS-R demonstrates positive correlations with the FMI and MAAS and with well-being, adaptive emotion regulation, cognitive flexibility, problem analysis, and plan rehearsal, and negative correlations with symptoms of distress, worry, rumination, brooding, thought suppression, and experiential avoidance (Feldman et al., 2007).

Southampton Mindfulness Questionnaire

The Southampton Mindfulness Questionnaire (SMQ) (Chadwick, Hember, Mead, Lilley, & Dagnan, 2008) is a 16-item instrument that

assesses the tendency to respond mindfully to distressing images and thoughts. The items describe several aspects of mindfulness (mindful observation, non-aversion, nonjudgment, and letting go); however, the authors advise the use of a single total score. All items begin with "Usually when I have distressing thoughts or images" and continue with a statement representing a mindfulness-related response, such as "I am able to just notice them without reacting" or "they take over my mind for quite a while afterward." The measure has demonstrated good internal consistency (alpha = 0.89) and a significant positive correlation with the MAAS ($r = 0.57$). Scores were positively correlated with pleasant mood ratings, and scores increased significantly following participation in MBSR (Kabat-Zinn, 1990). In addition, regular meditators scored significantly higher on this scale than nonmeditators.

Philadelphia Mindfulness Scale

The Philadelphia Mindfulness Scale (PHLMS) (Cardaciatto, Herbert, Forman, Moitra, & Farrow, 2007) is a 20-item measure assessing two separately scored elements of mindfulness. The first factor, awareness, assesses the monitoring and awareness of internal and external experience (e.g., "I'm aware of thoughts I'm having when my mood changes"). The second factor, acceptance, measures a nonjudgmental attitude and openness to experience, which includes refraining from attempts to avoid or escape one's experience (e.g., "I try to distract myself when I feel unpleasant emotions," reverse scored). Good internal consistency (alphas ranging from .75 to .91) has been established in clinical and nonclinical samples, and most correlations with other constructs were significant in expected directions. In addition, clinical samples generally produced lower scores than nonclinical samples.

Five-Facet Mindfulness Questionnaire

In 2006, Baer, Smith, Hopkins, Krietemeyer, and Toney conducted exploratory factor analyses of combined item pools from five of the mindfulness questionnaires just summarized (all but the PHLMS, which was not yet available). These analyses supported a five-factor solution: *Observing* measures the ability to observe one's inner experiences and responses to stimuli, *describing* assesses the ability to use words to describe one's thoughts and feelings, *acting with awareness* measures the tendency to attend to ongoing activity and avoid automatic pilot, *nonjudging of inner experiences* measures the tendency to accept one's inner state rather than judging thoughts and emotions as good or bad, and *nonreactivity to inner experiences* assesses the tendency to allow provocative stimuli to come and go without necessarily reacting to them. The 39 items each has their highest loadings on their respective factors and low loadings on all other factors. In the validation samples, factors demonstrated adequate to excellent internal consistency (alphas ranging from 0.75 to 0.91). Correlations between facet scales and other variables were consistent with predictions. Most facet scores have been shown to be higher in meditators than in nonmeditators, and several mediated the cross-sectional relationship between meditation experience and psychological well-being (Baer et al., 2008). These findings provided preliminary support for the commonly held but relatively untested assumption that meditation cultivates a variety of mindfulness skills, which in turn contribute to healthy psychological functioning. Findings also suggest that a multifaceted approach to the assessment of mindfulness is useful, as it may help to clarify which aspects of mindfulness are most strongly related to other psychological variables and to the effects of mindfulness training.

Mindfulness Process Questionnaire

The 7-item Mindfulness Process Questionnaire (MPQ) (Erisman & Roemer, 2012) is designed to capture the extent to which mindfulness is intentionally practiced or attempted, and the tendency to bring compassionate awareness to one's experience upon noticing that the mind has wandered or that one's awareness is judgmental. Respondents are asked to indicate how much each item is characteristic of them on a scale from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). Items include "I try to be open to whatever happens, as it's happening, instead of having my mind wander to other things," and "If I notice that

I'm being critical of my thoughts or feelings, I try to be more accepting of them instead." Internal consistency is acceptable (alpha = 0.71). In the first validation study, scores on the MPQ were found to be uniquely predictive of greater concurrent well-being and less psychopathology after controlling for either the MAAS or the Five-Facet Mindfulness Questionnaire (FFMQ). In the second validation study, changes in the MPQ as a function of participation in an MBI were associated with improvements in psychological symptoms and well-being.

Toronto Mindfulness Scale

Most of the instruments discussed in this chapter measure mindfulness as a trait-like tendency in daily life. However, mindfulness can also be conceptualized as a state-like quality that occurs when attention is intentionally directed to present sensations, thoughts, and emotions, with an attitude of openness, curiosity, and acceptance (Bishop et al., 2004). The TMS (Lau et al., 2006) measures mindfulness in this way, assessing the degree to which the respondent attains a mindful state during an immediately preceding meditation session. The TMS is designed to be completed following an exercise; in the development article, participants were asked to sit quietly for 15 min and "pay attention to your breathing and anything else that might arise in your experience" (Lau et al., 2006; p. 1450). After the exercise, participants rate the extent to which they were aware and accepting of their experiences during the exercise. The TMS comprises two factors: *curiosity* and *decentering*. The *curiosity* factor assesses interest in and curiosity about one's inner experience, including items such as "I was curious about my reactions to things." The *decentering* factor assesses awareness of experiences without identifying with them or being carried away with them and includes items such as "I was more concerned with being open to my experiences than controlling or changing them." Both factors have demonstrated good internal consistency (alpha = .86-.87) and significant correlations with measures of self-awareness have been reported.

A trait version of the TMS has recently been developed (Davis, Lau, & Cairns, 2009) by changing the wording of items so that individuals report on how they generally relate to their thoughts and feelings rather than on how they did so during a particular exercise. This version also demonstrated good internal consistency (alphas = .85, .91) and positive correlations with other measures of dispositional mindfulness; notably, such correlations were higher for the decentering factor than for the curiosity factor. Scores on the decentering factor were significantly higher in meditators than in nonmeditators.

Comprehensive Inventory of Mindfulness Experiences Beta

The Comprehensive Inventory of Mindfulness Experiences Beta (CHIME-β) (Bergomi, Tschacher, & Kupper, 2013) has 32 items designed to capture a range of constructs thought to be central to mindfulness. In two samples of German adults, a four-factor structure emerged: (1) accepting, nonreactive, and insightful orientation; (2) present-awareness; (3) describing of experiences; and (4) open, nonavoidant orientation. Convergent and discriminant validity were excellent, and the factor structure remained invariant across samples of novices and meditators. However, factors were more highly correlated with one another in the meditation-trained individuals. In both samples, internal consistency was acceptable (alphas ≥ .85, except for factor 4: alpha = .65). Additional work on this scale is needed to further establish its factor structure, reliability, and validity, particularly in samples of English-speaking adults.

Assessment Considerations: Measuring Constructs Closely Related to Mindfulness

Several recently developed instruments are designed to measure constructs that are (1) highly related to mindfulness, (2) often presented to patients alongside mindfulness training in the context of MBIs, and (3) often considered as mechanisms through which mindfulness may effect change. They are reviewed below.

Acceptance and Action Questionnaire

The Acceptance and Action Questionnaire (AAQ) emerged from the literature on ACT (Hayes, Strosahl, & Wilson, 1999) and is available in several versions. The most widely used version has nine items (Hayes et al., 2004) and assesses elements of experiential avoidance, including negative evaluation of and tendency to avoid aversive internal stimuli (thoughts, feelings, etc.) and inability to take constructive action while experiencing these stimuli. When reverse scored, it serves as a measure of experiential acceptance. It has adequate internal consistency (alpha = 0.70). Experiential avoidance is positively correlated with psychopathology and has been shown to mediate the relationship between participation in ACT and improved well-being (Dalrymple & Herbert, 2007; Forman, Herbert, Moitra, Yeomans, & Geller, 2007). A 16-item version (Bond & Bunce, 2000) includes two subscales: willingness and action. The willingness subscale measures openness to experiencing negative thoughts and feelings, including items such as "I try to suppress thoughts and feelings that I don't like by just not thinking about them" (reverse scored). The action subscale reflects ability to behave consistently with one's values even when experiencing unpleasant thoughts and feelings and includes items such as "Despite doubts, I feel as though I can set a course in my life and then stick to it." The most recent version (AAQ-II; Bond et al., 2011) has seven items and is conceptualized as a measure of psychological flexibility, the central construct in recent descriptions of ACT. Psychological flexibility includes awareness and acceptance of the present moment, including thoughts and feelings, while either changing behavior or persisting in ongoing behavior, depending on what is required to pursue important goals and values (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Preliminary findings suggest that the AAQ-II has good internal consistency (alphas ranging from .81 to .87), a single-factor structure, and significant correlations with measures of mental health.

Self-Compassion Scale

The Self-Compassion Scale (SCS; Neff, 2003) is a 26-item instrument measuring six aspects of self-compassion: s*elf-kindness* (the tendency to extend kindness and understanding toward oneself when feeling emotional pain or stress); *self-judgment* (the tendency to be self-critical, disapproving, and intolerant toward one's own flaws and difficult experiences); *common humanity* (the recognition that feelings of inadequacy, emotional pain, and failure are universal human experiences); *isolation* (feelings of aloneness, separation, and disconnection from others at times of failure or distress); *mindfulness* (holding negative thoughts and emotions in balanced awareness, with an open and accepting stance toward difficult feelings and situations); and *overidentification* (the tendency to become excessively immersed or consumed by negative feelings). Evidence supports this factor structure, and the SCS has shown adequate to good internal consistency (alphas ranging from .77 to .81). The SCS is positively correlated with social connectedness, life satisfaction, and emotional intelligence, and negatively correlated with self-criticism, neurotic perfectionism, anxiety, and depression. Experienced meditators have been shown to score higher than nonmeditators (Neff, 2003). In addition, most SCS subscales have demonstrated significant positive correlations with components of mindfulness, as assessed by the FFMQ (Baer et al., 2012).

Experiences Questionnaire

The Experiences Questionnaire (EQ; Fresco et al., 2007) measures decentering, or the ability to observe thoughts and feelings as temporary mental events rather than reflections of the self or reality ("I can observe unpleasant feelings without being drawn into them"). The EQ has shown strong internal consistency (alpha = .85) and significant correlations in the expected directions with variables such as rumination, emotion, and depression. Depressed persons who showed higher decentering scores after treatment were less likely to experience a relapse during an 18-month follow-up period, suggesting that

decentering skills contribute to sustained recovery from depression.

Measure of Awareness and Coping in Autobiographical Memory

The MACAM (Moore, Hayhurst, & Teasdale, 1996) is a vignette-based semi-structured interview. Respondents are asked to imagine themselves in several mildly distressing situations and to describe their feelings and responses in similar situations they have experienced. Trained coders rate the responses for decentering, or awareness of thoughts and feelings as separate from the self. Research shows that the MACAM can be scored reliably and that scores are related to recovery from depression and likelihood of experiencing a future episode. Scores also have been shown to change with participation in a mindfulness program (Hargus, Crane, Barnhofer, & Williams, 2010). Although the MACAM has good psychometric properties, it is difficult and time consuming to use.

Statistical Recommendations for Testing Mediation

In the literature on MBIs, some of the most informative studies use statistical tools to test for the presence of significant indirect effects of MBIs on symptoms over time via one or more potential mediators. For example, the association between participation in an MBI and reductions in psychopathology over time may occur via increases in mindfulness, self-compassion, or other variables that change over time as a function of mindfulness training. Current discussions of mediation emphasize the importance of temporal precedence of change in the mediator; that is, evidence for mediation is most convincing when change in the proposed mediator precedes change in the dependent variable (e.g., Kraemer et al., 2002).

One major advantage to using regression-based approaches (e.g., multiple linear regression, multilevel growth modeling, and structural equation modeling) over ANOVA-based approaches (e.g., repeated measures ANOVA or ANCOVA) when analyzing data in these types of studies is the ability to use a set of rapidly developing techniques explicitly designed for testing mediation. A traditional but somewhat outmoded method of testing mediation involves observing the change in the magnitude of the effect of the independent variable on the dependent variable after the addition of the mediator to the model; in this paradigm, if the effect is significantly reduced when the mediator is added to the model (usually in a subsequent regression step), this is taken as evidence for mediation (Baron & Kenny, 1986; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). More modern statistical techniques instead examine the *indirect effect*, or the effect of the independent variable on the dependent variable that occurs via the mediator. This is equal to the product of the effect of the independent variable on the mediator and the effect of the mediator on the dependent variable. The significance of this effect can be estimated with the Sobel test (Preacher & Hayes, 2004; Sobel, 1982); however, due to the nonnormality of the standard errors of the Sobel test statistic, this may result in underestimating findings.

The current state-of-the-science technique for mediation is called *bootstrapping*, a technique that involves resampling from one's dataset many times (e.g., 2,000) to create a large number of datasets. The indirect effect is estimated in each resampled dataset, creating a 95 % confidence interval for the estimated effect (Preacher & Hayes, 2008). Online utilities and a variety of macros for statistical programs are available for conducting these analyses (e.g., Hayes, 2012; Preacher & Hayes, 2008; for macros and guides, see http://afhayes.com/spss-sas-and-mplus-macros-and-code.html). Bootstrapping and similar procedures for assessing the significance of the indirect effect (Bauer, Preacher, & Gil, 2006; Preacher & Selig, 2012; Tofighi & MacKinnon, 2011) can also be used to test mediation in the context of structural equation modeling (SEM), which involves the creation and use of measurement-error-free latent variables (see Kline, 2010) and multilevel modeling (MLM), which is generally the most powerful and flexible

statistical technique for the analysis of longitudinal treatment-outcome data (see Tasca & Gallop, 2009 and Tasca, Illing, Joyce, & Ogrodniczuk, 2009). Additional techniques that allow for both mediation of moderated relationships and moderation of mediational models, as well as mediation in the context of multilevel SEM models, are also available (see Marsh et al., 2009; Edwards & Lambert, 2007; Muller, Judd, & Yzerbyt, 2005; Preacher, Zhang, & Zyphur, 2011).

Review of Studies Demonstrating Statistical Mediation of Change in MBIs

Though there is a large body of work demonstrating beneficial treatment effects for MBIs, fewer studies have provided evidence about the mediators of such effects. In this section we describe several examples of such studies. This brief review is intended to be illustrative rather than comprehensive and focuses on studies in which mindfulness and related constructs were measured as outcomes in mindfulness-based intervention studies.

Several studies have identified mediators of the effects of mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002) on depressive symptoms. In an RCT comparing MBCT to antidepressant medication for the treatment of depressive relapse, Kuyken et al. (2010) used regression-based methods to demonstrate that increases in mindfulness (measured using the KIMS) and self-compassion accounted for the effect of treatment on depressive symptoms at a 15-month follow-up. In an RCT comparing MBCT to a waitlist control group, bootstrapping showed significant indirect effects of MBCT on depressive symptoms through changes in both mindfulness (measured using the MAAS) and rumination (Shahar, Britton, Sbarra, Figueredo, & Bootzin, 2010). Another RCT comparing MBCT to a waitlist control group found a significant indirect effect of MBCT on cognitive reactivity to sad mood through changes in mindfulness (measured using the KIMS; Raes, Ewulf, Van Heeringen, & Williams, 2009). In a randomized trial of MBCT versus antidepressant medication or placebo, Bieling and colleagues (2012) found that decentering skills, as measured by the EQ, mediated the effects of MBCT on depressive relapse.

Other studies have identified mediators of the effects of MBSR and other meditation programs on positive outcomes. In several RCTs comparing MBSR to a waitlist control group, regression-based methods have demonstrated that changes in self-reported mindfulness (measured using the MAAS, KIMS, or FFMQ) account for treatment-related improvements in perceived stress and rumination (Shapiro, Oman, Thoresen, Plante, & Flinders, 2008), perceived stress and quality of life (Nyklíček & Kuijpers, 2008), and perceived stress, posttraumatic avoidance symptoms, and positive mental states in cancer patients (Bränström, Kvillemo, Brandberg, & Moskowitz, 2010). In an RCT comparing relaxation and meditation training to a waitlist control group, Jain et al. (2007) used regression analyses to demonstrate that decreased rumination accounts for treatment-related decreases in distress. In a controlled but not randomized study of intensive meditation training in prison inmates, Bowen, Witkiewitz, Dillworth, and Marlatt (2007) found that reduced thought suppression mediated the effect of mindfulness training on alcohol use at 3-month follow-up.

Additionally, two studies have used regression analyses to test mediators of the effect of at-home practice time on positive outcomes. Carmody and Baer (2008) reported that increases in self-reported mindfulness skills (measured using the FFMQ) accounted for the links between formal practice time over the course of MBSR and improvements in psychological symptoms, perceived stress, and psychological well-being. In a study of the effects of a mindfulness training program on working memory capacity in members of the military, Jha, Stanley, Kiyonaga, Wong, and Gelfand (2010) found that treatment-related preservation or improvement of working memory capacity accounted for the link between mindfulness practice time over the 8-week training and negative affect.

Finally, several RCTs have found evidence that psychological flexibility and experiential

acceptance, which are closely related to mindfulness, mediate the effects of ACT on a variety of therapeutic outcomes including chronic pain, depression, and smoking cessation (see Hayes, Villatte, Levin, & Hildebrandt, 2011, for a review).

Not all of these studies include clear evidence that the mediating variable changes before the outcome variables, although some do, and many do not use the most recently developed statistical methods for testing mediation. In addition, the small number of studies in which mindfulness and related constructs are investigated as mediators suggest that greater attention to testing and refining newly developed integrative theories—especially in the context of MBI studies—may lead to greater cohesion in the field. Notably, if mindfulness and related constructs do not mediate the positive effects of MBIs, reporting such null findings may be an important part of refining both assessment methodology and mindfulness-based interventions. Despite these limitations, the findings presented here are consistent with the theory that mindfulness and closely related constructs are at least partially responsible for the salutary effects of MBIs.

Conclusion

MBIs have proven effective for a variety of disorders (Keng et al., 2011); however, evidence regarding the mechanisms by which MBIs lead to positive functioning remains somewhat sparse. As researchers continue to investigate the mechanisms of change in MBIs, care should be taken to plan and implement methodologically rigorous, theory-driven studies. As an area of study, greater focus on the testing and refinement of recently developed integrative theoretical models of mindfulness processes (e.g., Hölzel et al., 2011, Vago & Silbersweig, 2012) may lead to a more rapid and coherent accumulation of knowledge. Further, our review of existing mediational studies reveals that future studies may benefit from greater attention to the use of recent statistical advances in testing mediation of change over time as a result of treatment (e.g., the use of newer methods for estimating indirect effects, especially in the context of SEM or multilevel growth models). By utilizing these recommendations, researchers can contribute to this growing literature and thus advance the ways MBIs can be used to effect change.

References

Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy, 44*, 1849–1858.

Baer, R. A. (2011). Measuring mindfulness. *Contemporary Buddhism, 12*, 241–261.

Baer, R. A., Lykins, E. L. B., & Peters, J. R. (2012). Mindfulness and self-compassion as predictors of psychological well-being. *Journal of Positive Psychology, 7*, 230–238.

Baer, R. A., Samuel, D. B., & Lykins, E. L. (2011). Differential item functioning on the Five Facet Mindfulness Questionnaire is minimal in demographically matched meditators and nonmeditators. *Assessment, 18*(1), 3–10.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45.

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S. E., et al. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment, 15*, 329–342.

Baer, R. A., Smith, G. T., & Allen, K. B. (2004). Assessment of mindfulness by self-report: The Kentucky Inventory of Mindfulness Skills. *Assessment, 11*, 191–206.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.

Bauer, D. J., Preacher, K. J., & Gil, K. M. (2006). Conceptualizing and testing random indirect effects and moderated mediation in multilevel models: New procedures and recommendations. *Psychological Methods, 11*, 142–163.

Baum, C., Kuyken, W., Bohus, M., Heidenreich, T., Michalak, J., & Steil, R. (2010). The psychometric properties of the Kentucky Inventory of Mindfulness Skills in clinical populations. *Assessment, 17*, 220–229.

Bergomi, C., Tschacher, W., & Kupper, Z. (2013). Measuring mindfulness: First steps towards the development of a comprehensive mindfulness scale. *Mindfulness, 4*, 18–32.

Bieling, P., Hawley, L., Bloch, R., Corcoran, K., Levitan, R., Young, L., et al. (2012). Treatment-specific changes in decentering following mindfulness-based cognitive therapy versus antidepressant medication of placebo for prevention of depressive relapse. *Journal of Consulting and Clinical Psychology, 80*, 365–372.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. C., Carmody, J., et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241.

Bond, F., & Bunce, D. (2000). Mediators of change in emotion-focused and problem focused worksite stress management interventions. *Journal of Occupational Health Psychology, 5*, 156–163.

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., et al. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire - II: A revised measure of psychological flexibility and experiential avoidance. *Behavior Therapy, 42*, 676–688.

Bowen, S., Witkiewitz, K., Dillworth, T., & Marlatt, G. A. (2007). The role of thought suppression in the relationship between mindfulness meditation and alcohol use. *Addictive Behaviors, 32*, 2324–2328.

Bränström, R., Kvillemo, P., Brandberg, Y., & Moskowitz, J. T. (2010). Self-report mindfulness as a mediator of psychological well-being in a stress reduction intervention for cancer patients: A randomized study. *Annals of Behavioral Medicine, 39*, 151–161.

Broderick, P. C. (2005). Mindfulness and coping with dysphoric mood: Contrasts with rumination and distraction. *Cognitive Therapy and Research, 29*, 501–510.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being in the present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.

Brown, K. W., Ryan, R. M., Loverich, T. M., Biegel, G. M., & West, A. M. (2011). Out of the armchair and into the streets: Measuring mindfulness advances knowledge and improves interventions: Reply to Grossman (2011). *Psychological Assessment, 23*(4), 1041–1046.

Buchheld, N., Grossman, P., & Walach, H. (2001). Measuring mindfulness in insight meditation and meditation-based psychotherapy: The development of the Freiburg Mindfulness Inventory (FMI). *Journal for Meditation and Meditation Research, 1*, 11–34.

Cardaciatto, L., Herbert, J. D., Forman, E. M., Moitra, E., & Farrow, V. (2007). The assessment of present-moment awareness and acceptance: The Philadelphia Mindfulness Scale. *Assessment, 15*, 204–223.

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine, 31*, 23–33.

Chadwick, P., Hember, M., Mead, S., Lilley, B., & Dagnan, D. (2008). Responding mindfully to unpleasant thoughts and images: Reliability and validity of the Southampton Mindfulness Questionnaire. *British Journal of Clinical Psychology, 47*, 451–455.

Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment, 7*, 309–319.

Dalrymple, K. L., & Herbert, J. D. (2007). Acceptance and commitment therapy for generalized social anxiety disorder: A pilot study. *Behavior Modification, 31*, 543–568.

Davis, K. M., Lau, M. A., & Cairns, D. R. (2009). Development and preliminary validation of a trait version of the Toronto Mindfulness Scale. *Journal of Cognitive Psychotherapy, 23*, 185–197.

Edwards, J. R., & Lambert, L. S. (2007). Methods for integrating moderation and mediation: A general analytic framework using moderated path analysis. *Psychological Methods, 12*, 1–22.

Eisenlohr-Moul, T. A., Walsh, E. C., Charnigo, R. J., Lynam, D. R., & Baer, R. A. (2012). The "what" and the "how" of dispositional mindfulness: Using interactions among subscales of the Five Facet Mindfulness Questionnaire to understand its relation to substance use. *Assessment, 19*(3), 276–286.

Erisman, S. M., & Roemer, L. (2010). A preliminary investigation of the effects of experimentally induced mindfulness on emotional responding to film clips. *Emotion, 10*(1), 72.

Erisman, S. M., & Roemer, L. (2012). A preliminary investigation of the process of mindfulness. *Mindfulness, 3*, 30–43.

Feldman, G. C., Hayes, A. M., Kumar, S. M., Greeson, J. G., & Laurenceau, J. P. (2007). Mindfulness and emotion regulation: The development and initial validation of the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R). *Journal of Psychopathology and Behavioral Assessment, 29*, 177–190.

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1996). *Structured clinical interview for DSM-IV axis I disorders, clinician version (SCID-CV)*. Washington, D.C.: American Psychiatric Press.

Forman, E. M., Herbert, J. D., Moitra, E., Yeomans, P. D., & Geller, P. A. (2007). A randomized controlled effectiveness trial of acceptance and commitment therapy and cognitive therapy for anxiety and depression. *Behavior Modification, 31*, 772–799.

Fresco, D. M., Moore, M., van Dulmen, M., Segal, Z. V., Ma, S. H., Teasdale, J. D., et al. (2007). Initial psychometric properties of the Experiences Questionnaire: Validation of a self-report measure of decentering. *Behavior Therapy, 38*, 234–246.

Grossman, P. (2011). Defining mindfulness by how poorly I think I pay attention during everyday awareness and other intractable problems for psychology's (re)invention of mindfulness: Comment on Brown et al. *Psychological Assessment, 23*(4), 1034–1040.

Grossman, P., & Van Dam, N. (2011). Mindfulness, by any other name: Trials and tribulations of sati in western psychology and science. *Contemporary Buddhism, 12*, 219–239.

Hargus, E., Crane, C., Barnhofer, T., & Williams, J. M. G. (2010). Effects of mindfulness on meta-awareness and specificity of describing prodromal symptoms in suicidal depression. *Emotion, 10*, 34–42.

Hayes, A. F. (2012). PROCESS: *A versatile computational tool for observed variable mediation, moderation, and conditional process modeling*. White paper. Retrieved from http://www.afhayes.com/public/process2012.pdf.

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, process, and outcomes. *Behavior Research and Therapy, 44*, 1–25.

Hayes, S. C., Strosahl, K., Wilson, K. G., Bissett, R. T., Pistorello, J., Toarmino, D., et al. (2004). Measuring experiential avoidance: A preliminary test of a working model. *The Psychological Record, 54*, 553–578.

Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York, NY: Guilford.

Hayes, S. C., Villatte, M., Levin, M., & Hildebrandt, M. (2011). Open, aware, and active: Contextual approaches as an emerging trend in the behavioral and cognitive therapies. *Annual Review of Clinical Psychology, 7*, 141–168.

Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science, 6*, 537–559.

Jain, S., Shapiro, S. L., Swanick, S., Roesch, S. C., Mills, P. J., Bell, I., et al. (2007). A randomized controlled trial of mindfulness meditation versus relaxation training: Effects on distress, positive states of mind, rumination, and distraction. *Annals of Behavioral Medicine, 33*, 11–21.

Jha, A. P., Stanley, E. A., Kiyonaga, A., Wong, L., & Gelfand, L. (2010). Examining the protective effects of mindfulness training on working memory capacity and affective experience. *Emotion, 10*, 54–64.

Kabat-Zinn, J. (1990). *Full catastrophe living*. New York, NY: Bantam Doubleday.

Keng, S., Smoski, J. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review, 31*, 1041–1056.

Kline, R. B. (2010). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: Guilford Press.

Kraemer, H. C., Wilson, G. T., Fairburn, C. G., & Agras, W. S. (2002). Mediators and moderators of treatment effects in randomized clinical trials. *Archives of General Psychiatry, 59*, 877–883.

Kuehner, C., Huffziger, S., & Liebsch, K. (2009). Rumination, distraction and mindful self-focus: effects on mood, dysfunctional attitudes and cortisol stress response. *Psychological Medicine, 39*(2), 219.

Kuyken, W., Watkins, E., Holden, E., White, K., Taylor, R., Byford, S., et al. (2010). How does mindfulness-based cognitive therapy work? *Behaviour Research and Therapy, 48*, 1105–1112.

Lau, M. A., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, N. D., Carlson, L., et al. (2006). The Toronto Mindfulness Scale: Development and validation. *Journal of Clinical Psychology, 62*, 1445–1467.

Leigh, J., & Neighbors, C. (2009). Enhancement motives mediate the positive association between mind/body awareness and college student drinking. *Journal of Social and Clinical Psychology, 28*, 650–669.

Levin, M. E., Hildebrandt, M. J., Lillis, J., & Hayes, S. C. (2012). The impact of treatment components suggested by the psychological flexibility model: A meta-analysis of laboratory-based component studies. *Behavior Therapy, 43*(4), 741–756.

MacCoon, D. G., Imel, Z. E., Rosenkranz, M. A., Sheftel, J. G., Weng, H. Y., Sullivan, J. C., et al. (2011). The validation of an active control intervention for Mindfulness Based Stress Reduction (MBSR). *Behaviour Research and Therapy, 50*, 3–12.

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods, 7*, 83–104.

Marsh, H. W., Lüdtke, O., Robitzsch, A., Trautwein, U., Asparouhov, T., Muthén, B. O., et al. (2009). Doubly-latent models of school contextual effects: Integrating multilevel and structural equation approaches to control measurement and sampling errors. *Multivariate Behavioral Research, 44*, 764–802.

Moore, R. G., Hayhurst, H., & Teasdale, J. D. (1996). *Measure of awareness and coping in autobiographical memory: Instruction for administering and coding*. Cambridge, UK: University of Cambridge. Unpublished manuscript.

Muller, D., Judd, C. M., & Yzerbyt, V. Y. (2005). When mediation is moderated and moderation is mediated. *Journal of Personality and Social Psychology, 89*, 852–863.

Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and Identify, 2*, 223–250.

Nyklíček, I., & Kuijpers, K. (2008). Effects of mindfulness-based stress reduction intervention on psychological well-being and quality of life: Is increased mindfulness indeed the mechanism? *Annals of Behavioral Medicine, 35*, 331–340.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers, 36*, 717–731.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879–891.

Preacher, K. J., & Selig, J. P. (2012). Advantages of Monte Carlo confidence intervals for indirect effects. *Communication Methods and Measures, 6*, 77–98.

Preacher, K. J., Zhang, Z., & Zyphur, M. J. (2011). Alternative methods for assessing mediation in multilevel data: The advantages of multilevel SEM. *Structural Equation Modeling, 18*, 161-182.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385–401.

Raes, F., Ewulf, D., Van Heeringen, C., & Williams, J. M. G. (2009). Mindfulness and reduced cognitive reactivity to sad mood: Evidence from a correlational study and a non-randomized waiting list controlled study. *Behavior Research and Therapy, 47*, 623–627.

Rust, J., & Golombok, S. (2009). *Modern psychometrics* (3rd ed.). London, UK: Routledge.

Segal, Z. V., Williams, J. M., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York, NY: Guilford.

Shahar, B., Britton, W., Sbarra, D., Figueredo, A., & Bootzin, R. (2010). Mechanisms of change of mindfulness-based cognitive therapy for depression: Preliminary evidence from a randomized controlled trial. *International Journal of Cognitive Therapy, 3*, 402–418.

Shapiro, S. L., Oman, D., Thoresen, C. E., Plante, T. G., & Flinders, T. (2008). Cultivating mindfulness: Effects on well-being. *Journal of Clinical Psychology, 64*, 840–862.

Smith, G. T., Combs, J. L., & Pearson, C. M. (2012). Brief instruments and short forms. In H. Cooper (Ed.), *The handbook of research methods in psychology* (pp. 395–409). Washington, DC: American Psychological Association.

Smith, G. T., Fischer, S., & Fister, S. M. (2003). Incremental validity principles in test construction. *Psychological Assessment, 15*, 467–477.

Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (Ed.), *Sociological methodology* (pp. 290–312). Washington, DC: American Sociological Association.

Tasca, G. A., & Gallop, R. (2009). Multilevel modeling of longitudinal data for psychotherapy researchers: I. The basics. *Psychotherapy Research, 19*, 429–437.

Tasca, G. A., Illing, V., Joyce, A. S., & Ogrodniczuk. (2009). Three-level multilevel group models for nested change data: A guide for group treatment researchers. *Psychotherapy Research, 19*, 453–461.

Tofighi, D., & MacKinnon, D. P. (2011). RMediation: An R package for mediation analysis confidence intervals. *Behavior Research Methods, 43*, 692–700.

Vago, D. R., & Silbersweig, D. A. (2012). Self-awareness, self-regulation, and self-transcendence (S-ART): A framework for understanding the neurobiological mechanisms of mindfulness. *Frontiers in Human Neuroscience, 6*, 296.

Van Dam, N. T., Earleywine, M., & Danoff-Burg, S. (2009). Differential item function across meditators and non-meditators on the Five Facet Mindfulness Questionnaire. *Personality and Individual Differences, 47*(5), 516–521.

Van Dam, N. T., Hobkirk, A. L., Danoff-Burg, S., & Earleywine, M. (2012). Mind your words positive and negative items create method effects on the five facet mindfulness questionnaire. *Assessment, 19*(2), 198–204.

Walach, H., Buchheld, N., Buttenmuller, V., Kleinknecht, N., & Schmidt, S. (2006). Measuring mindfulness—the Freiburg Mindfulness Inventory (FMI). *Personality and Individual Differences, 40*, 1543–1555.

Clinical Perspectives: Mindfulness-Based Cognitive Therapy and Mood Disorders

13

Brandilyn R. Willett and Mark A. Lau

In the last 30 years, mindfulness-based interventions (MBIs) have emerged as promising acute and preventive psychosocial treatments for mood disorders and negative mood symptoms (e.g., Hayes, Strosahl, & Wilson, 1999; Kabat-Zinn, 1982; Linehan, 1993; Segal, Williams, & Teasdale, 2002, 2013). Mindfulness-based stress reduction (MBSR) was one of the first psychosocial interventions to use intensive mindfulness training as its primary treatment agent (Kabat-Zinn, 1982, 1990). MBSR was first developed to improve the quality of life for individuals with serious medical illnesses, through the reduction of their subjective suffering via systematic training in mindfulness meditation. Since then, meta-analytic and systematic reviews generally support the clinical efficacy of MBSR in treating the psychological sequelae, including depression and anxiety, of many physical illnesses such as cancer, heart disease, fibromyalgia, epilepsy, and chronic pain (Grossman, Niemann, Schmidt, & Walach, 2004; Hoffman, Sawyer, Witt, & Oh, 2010; Keng, Smoski, & Robins, 2011).

Since MBSR was developed, several other MBIs have evolved, either from MBSR or independently, to treat psychological symptoms/disorders. MBIs, that evolved from MBSR and incorporate significant mindfulness training, include, for example, mindfulness-based cognitive therapy (MBCT; Segal et al., 2002, 2013), mindfulness-based eating awareness training (Kristeller & Hallett, 1999), and mindfulness based relapse prevention (Bowen, Chawla, & Marlatt, 2010). Other MBIs, such as acceptance and commitment therapy (Hayes et al., 1999) and dialectic behaviour therapy (DBT; Linehan, 1993), are based on mindfulness principles but do not include significant mindfulness training as part of the treatment protocol.

This chapter focuses on MBCT, an empirically supported treatment for mood disorders included in the National Institute for Clinical Excellence Guidelines (2009). We begin with an overview of the theoretical rationale underlying the development of MBCT for preventing depression relapse. We then explain how MBCT is thought to reduce the risk of depressive relapse and briefly describe the MBCT program. This is followed by a summary of the empirical support for MBCT in the prophylaxis of major depressive disorder (MDD) and for MBCT as a treatment for acute and residual depressive symptoms. The potential, and preliminary empirical support, for using MBCT to treat residual bipolar mood symptoms as well as to prevent depressive relapse in bipolar disorder (BD) is presented. We highlight unique patient factors that are

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important for clinicians to consider prior to using MBCT for mood disorders. We also discuss the role of the therapist's own personal mindfulness practice and training in delivering MBCT. Finally, we introduce the possibility of delivering MBCT in alternative formats such as individually, via an online group and by telephone.

MBCT and Recurrent Major Depression

Preventing Depressive Relapse

MBCT is a manualized, psychosocial group intervention originally designed to reduce the risk of depressive relapse for individuals with recurrent major depression (Segal, Williams, & Teasdale, 2002). The rationale for developing MBCT is based on a cognitive vulnerability model of depressive relapse. This model is designed to explain why individuals with a history of multiple depressive episodes are especially prone to depression relapses (Segal, Gemar, & Williams, 1999; Teasdale, 1988; Teasdale, Segal, & Williams, 1995). Fundamental to this model is Teasdale's differential activation hypothesis which maintains that an important factor in whether someone will experience recurrent depressive episodes is their degree of cognitive reactivity, i.e., the degree to which automatic negative thinking patterns are reactivated when in a mild dysphoric state (Teasdale, 1983, 1988). These negative thought patterns are posited to become more easily triggered and accessible with each subsequent depressive episode. Thus, with increased experience of depression, even mild dysphoric moods can trigger a sufficient degree of negative, ruminative thinking patterns that can contribute to the downward spiral of thoughts, feelings, and behaviors that culminate into a full depressive episode (Lau, Segal, & Williams, 2004).

Based on this model, Segal and colleagues (2002) designed MBCT to teach at-risk individuals to relate differently to the mood-related reactivation of automatic negative thinking patterns. Rather than engaging in ruminative, elaborative thinking about their experience, its origins, implications, or associations, the individual practices meditation to cultivate a nonjudgmental, accepting, present-moment awareness of experience including depression-related cognitions, sensations, and emotions (Linehan, 1993; Teasdale, 1999). In this way, at-risk individuals may facilitate a decentered perspective of thoughts and emotions as they arise and increase their insight into how automatic, habitual patterns of reactivity exacerbate emotional distress and can lead to depression. As a result, the individual is in a better position to choose more flexible, deliberate, and ultimately more adaptive responses at times of potential relapse, producing lasting improvements in their emotional well-being.

MBCT: The Program

MBCT, as originally developed, is an eight-session group intervention program for an average of 8–12 participants. MBCT draws on several MBSR formal meditation practices such as the body scan, mindful stretching, and mindfulness of breath/body/sounds/thoughts, but also incorporates elements of cognitive therapy (Beck, Rush, Shaw, & Emery, 1979). In addition, Segal and colleagues developed the 3-Minute Breathing Space, a new meditation practice, designed to facilitate present-moment awareness of everyday distressing situations (Segal et al., 2002). Throughout the MBCT program, participants are encouraged between group sessions to practice formal and informal meditations as well as to complete homework exercises, totalling approximately 45–60 min a day. These meditation practices and assignments are meant to assist the participants in incorporating awareness skills into their everyday lives.

The first half of the MBCT program focuses largely on developing the participants' nonjudgmental awareness of their moment-by-moment experiences. The meditation practices introduced in the first four sessions are designed to cultivate the individual's capacity to observe their physical, emotional, and cognitive experiences and the ability to deconstruct each of these into their component elements. The participants' growing

awareness is further supported by their participation in a cognitive therapy exercise designed to teach them the cognitive model. Furthermore, through psycho-education, participants are guided in the development of their specific awareness of depression-related experiences; in particular, they learn that negative automatic thoughts are part of the package of MDD as a whole. This knowledge facilitates the participants' ability to decenter from negative automatic thoughts and to identify their unique subjective indicators of potential relapse.

The second half of the program focuses on developing the participants' ability to respond more flexibly and deliberately when they detect a possible relapse. Session five explicitly demonstrates how an open, accepting, and nonjudgmental awareness has the potential to be employed as a skilful first step in relapse prevention. Session six introduces the possibility that "thoughts are not facts." This offers participants the opportunity to change their relationship to their thoughts and helps them decenter from their thinking; that is, participants may begin to relate *to* rather than *from* their thoughts and see these internal experiences simply as discrete mental events. Session six then provides participants with options as to how they can choose to respond to thoughts, such as watching their thoughts come and go, looking at them as mental events rather than facts, and/or writing these events down to further facilitate their ability to decenter (Segal et al., 2013). By encouraging this acceptance-based observational approach, MBCT differs from traditional cognitive therapy in that there are neither attempts at reality testing and answering back to thoughts, nor are there attempts to change the content of thoughts. In session seven, participants are invited to take a 3-Minute Breathing Space (which they have been practicing since session three) to become aware of their present-moment experience as a first step in preventing depressive relapse. By bringing this deliberate awareness, participants are increasingly able to choose how they will respond to the initial symptoms of depression. In this session participants also create their own unique specific action plans for times of potential relapse. The final session focuses on how participants can maintain long-term wellness through adherence to what they have learned in the program.

Empirical Support

The efficacy of MBCT for the prevention of depressive relapse has now been demonstrated in multiple randomized controlled trials and confirmed by systematic reviews and meta-analyses (e.g., Bondolfi et al., 2010; Coelho, Canter, & Ernst, 2007; Godfrin & van Heeringen, 2010; Kuyken et al., 2008; Ma & Teasdale, 2004; Piet & Hougaard, 2011; Ree & Craigie, 2007; Teasdale et al., 2000) (see Table 13.1). In the first two MBCT trials (Ma & Teasdale, 2004; Teasdale et al., 2000), individuals who had recovered from at least two major depressive episodes in the past 5 years, were symptom free, and off medication for at least 3 months before the study were randomized to receive either MBCT or to continue with treatment as usual (TAU). In both trials, there was a significant interaction between the number of previous episodes and treatment condition on the dependent variable of depressive relapse/recurrence. For participants with a history of three or more depressive episodes (comprising over 75 % of participants), MBCT reduced the risk of relapse approximately by half as compared to TAU over the 1-year follow-up period. Furthermore, the benefits of MBCT could not be accounted for by a greater use of antidepressant medication, as those in the MBCT group actually used less medication than those in the TAU condition. For individuals with a history of only two previous episodes, however, the relapse rates between the MBCT and TAU conditions were not significantly different in both studies. Despite these findings, Piet and Hougaard (2011), in their recent meta-analysis, cautioned against the premature exclusion of individuals with only two prior episodes in future studies, as further evidence is needed to determine the differential effects of MBCT for these individuals.

More recently, MBCT was compared to maintenance antidepressant treatment in preventing relapse among remitted patients in two

Table 13.1 Empirical support for clinical effects of MBCT

	Empirical evidence
MBCT and depression	
Relapse prevention	
MBCT versus TAU	Teasdale et al. (2000) Ma and Teasdale (2004) Bondolfi et al. (2010) Godfrin and van Heeringen (2010)
MBCT versus ADM	Kuyken et al. (2008) Segal et al. (2010)
Meta-analysis/review	Coelho et al. (2007) Chiesa and Serretti (2011) Keng et al. (2011) Piet and Hougaard (2011) Galante et al. (2012)
Reduced residual symptoms	
Controlled studies	Crane et al. (2008) Kuyken et al. (2008) Williams et al. (2008) Geschwind et al. (2012)
Reduced acute symptoms	
Controlled studies	Barnhofer et al. (2009) Foley et al. (2010) Van Aalderen et al. (2012)
Uncontrolled studies	Finucane and Mercer (2006) Kenny and Williams (2007) Kingston et al. (2007) (Mixed Methods) Ree and Craigie (2007) Eisendrath et al. (2008)
MBCT and bipolar disorder	
Reduced residual symptoms	
Controlled studies	Williams et al. (2008)
Uncontrolled	Miklowitz et al. (2009) Weber et al. (2010) Deckersbach et al. (2012)
Meta-analysis/review	Chiesa and Serretti (2010)

MBCT mindfulness-based cognitive therapy, *ADM* antidepressant medication, *TAU* treatment as usual

randomized controlled trials. Kuyken et al. (2008) randomized participants with a history of three or more depressive episodes and who were taking antidepressant medication, to either MBCT or maintenance antidepressant medication (M-ADM). There were no significant differences in relapse rates between the MBCT condition (47 %), where 75 % of patients withdrew from their antidepressant medication, and the M-ADM condition (60 %) over a 15-month follow-up period. Those in the MBCT group, however, reported significantly fewer residual depressive symptoms than those in the antidepressant treatment group on the Hamilton Rating Scale for Depression (Hamilton, 1960) ($M = 7.05$ vs. 8.69) and the Beck Depression Inventory-II (Beck, Steer, & Brown, 1996) ($M = 12.61$ vs. 17.02). Moreover, MBCT was shown to be more effective than maintenance pharmacotherapy in improving quality of life, with no difference in cost between these two treatments. In a more recent trial, Segal et al. (2010) treated patients with a history of recurrent MDD to remission through pharmacotherapy and then randomly assigned them to one of the three conditions: MBCT plus discontinuation of their medication; continued M-ADM; or had their active medication replaced with a placebo. Both active treatment groups had better outcomes than the placebo group in preventing relapse for formerly depressed patients, particularly for "unstable remitters," that is, individuals who experienced periods of residual depressive symptoms during the remission phase.

Overall, the conclusion of a recent meta-analysis of MBCT randomized controlled trials is that MBCT is effective for preventing depressive relapse in individuals with MDD (Piet & Hougaard, 2011). This conclusion has been supported by several other reviews and meta-analyses of both controlled and uncontrolled studies (e.g., Chiesa & Serretti, 2011; Coelho et al., 2007; Galante, Iribarren, & Pearce, 2012; Keng et al., 2011). Furthermore, recent studies have demonstrated that the benefits of MBCT appear to be maintained, even long after patients are no longer receiving treatment (Mathew, Whitney, Kenny, & Denson, 2010; Munshi, Eisendrath, & Delucchi, 2012).

MBCT: Residual and Acute Depression

A growing number of researchers have expanded on the application of the mindfulness-based cognitive vulnerability model of depressive relapse

to acute depressive symptoms. Specifically, some have posited that teaching patients mindfulness skills, which helps them distance themselves from ruminative, depressive thought patterns, may also be effective in reducing current depressive symptoms (Kenny & Williams, 2007).

Empirical Support

There is a growing body of evidence that supports the efficacy of MBCT in the treatment of residual and acute depressive symptoms. For example, three randomized controlled trials demonstrated that MBCT reduced residual depressive symptoms posttreatment for individuals with a history of at least three prior depressive episodes (Crane et al., 2008; Kuyken et al., 2008; Williams, Russell, & Russell, 2008) and a separate randomized controlled trial demonstrated reduction in residual symptoms irrespective of the number of previous episodes (Geschwind, Peeters, Huibers, van Os, & Wichers, 2012). One recent, large-scaled, randomized controlled trial showed MBCT to be efficacious in reducing depressive symptoms for patients with recurrent depression experiencing a current depressive episode (Van Aalderen et al., 2012). Another controlled trial evaluating depressed patients with a history of suicidal ideation (Barnhofer et al., 2009) and a mixed method study looking at current depressive symptoms (Kingston, Dooley, Bates, Lawlor, & Malone, 2007) demonstrated that MBCT was effective in reducing acute depressive symptoms. This was also shown in four uncontrolled studies, including individuals who failed to recover after two ADM trials (Eisendrath et al., 2008; Kenny & Williams, 2007), depression and anxiety (Finucane & Mercer, 2006), and heterogeneous psychiatric disorders (Ree & Craigie, 2007). In another study looking at current symptoms of depression and anxiety in breast cancer patients, Foley, Baillie, Huxter, Price, and Sinclair (2010) found that there was a significant reduction in depression and anxiety symptoms, post-MBCT treatment. Furthermore, those who had initially been assigned to the waitlist condition and subsequently received MBCT also demonstrated reduced depressive and anxious symptoms after they received the MBCT intervention (Foley et al., 2010).

In summary, the preliminary research indicates that MBCT has potential as a treatment for both mild residual and acute depression symptoms, as well as for more severe cases such as individuals with a history of suicidal ideation. However, further controlled research with adequate sample sizes is needed to evaluate the possible benefits of MBCT for these individuals.

MBCT and Bipolar Disorder

Bipolar disorder, while less common than MDD, is a highly debilitating disorder characterized by recurrent episodes of depression and/or mania, as well as inter-episodic mood symptoms that cause significant impairment and distress in the individual's psychosocial functioning (Angst, 1998; Angst et al., 2003; Judd et al., 2003; Kessler et al., 1994). Although individuals with BD may experience periods of recovery, they often continue to face substantial residual symptoms, which can frequently lead to the recurrence of a manic/depressive episode (Deckersbach et al., 2012). Individuals with BD will experience even higher rates of depressive relapse than those with MDD, and will spend up to three times as many days experiencing depressive as compared to manic or hypomanic symptoms (Angst, 1998; Judd et al., 2003; Kupka et al., 2007).

While pharmacological interventions are currently the cornerstone treatment for managing BD, no single pharmacological agent has been identified as a first-line therapy for the management of acute bipolar depression (Yatham et al., 2005). Many of these medications produce undesirable side effects (e.g., sedation) and using antidepressants has been associated with a greater risk of patients switching from a depressive phase into hypomania or mania (Yatham et al., 2005). As is the case for acute treatments, limited proven pharmacological options exist for long-term preventive treatment. One approach to address this problem is to use psychotherapy adjunctively to pharmacological treatment to enhance mood

stability and prevent relapse, which researchers have now started to investigate.

Empirical Support: Residual Symptoms

As a result of MBCT's success in treating MDD relapse/recurrence, several studies have evaluated MBCT for treating residual mood and anxiety symptoms for individuals with BD. For example, in a small randomized pilot study, Williams et al. (2008) assigned individuals with a history of suicidality with unipolar and bipolar depression, in remission, to either an MBCT group or a waitlist. Participants from both conditions were compared on their levels of inter-episodic symptoms of anxiety and depression after the treatment period was over. The researchers found that, in comparison to those on the waitlist, participants who received MBCT demonstrated decreased residual depressive symptoms between mood episodes. Furthermore, patients with BD showed stable anxiety scores in the MBCT condition, whereas those in the waitlist condition demonstrated significant increases on anxiety measures. Although only 14 remitted BD patients were evaluated in this study, the findings are encouraging and highlight the need for further research.

Several uncontrolled studies and systematic reviews have also demonstrated the benefit of MBCT for residual mood symptoms in BD. For example, Deckersbach et al. (2012) used an adapted version of MBCT to treat residual symptoms of depression in individuals with BD. This intervention consisted of 12 sessions, shorter sitting meditations and body scans (to accommodate participants' ability to concentrate), as well as mindful movement exercises to help them focus. The researchers also added a problem solving element to assist patients in managing potential hassles and obstacles in their lives. Participants at the end of treatment, as well as at the 3-month follow-up, demonstrated higher levels of mindfulness and lower residual depressive mood symptoms than they did prior to starting treatment (Deckersbach et al., 2012). Miklowitz et al. (2009) also conducted an uncontrolled pilot study and found that, of the 22 patients who completed MBCT, there were significant reductions in depressive symptoms and suicidal ideation, as well as manic symptoms and anxiety. They concluded that MBCT appeared to be a promising treatment alternative for BD, particularly for subsyndromal symptoms of depression, and that there is a need for future large-scale randomized trials evaluating the potential of MBCT for the prevention of relapse in BD. Weber et al. (2010) conducted a feasibility trial exclusively with bipolar patients for MBCT and concluded that this treatment was feasible and favorably received by the participants, though in need of larger, randomized controlled trials. Finally, in their systematic review of the research, Chiesa and Serretti (2010) found MBCT to be effective in reducing anxiety symptoms for people with BD, confirming that this treatment provides benefit to these patients.

Empirical Support: Relapse Prevention

Perhaps more important to inter-episodic mood management in BD is finding treatments to increase mood stability and prevent depressive relapse/recurrence. This notion is based on the success of MBCT in treating relapse in unipolar depression and the promising results of alleviating residual symptoms. Given that no studies to date have directly examined the effect of MBCT in preventing relapse in BD, it is an important area in need of investigation.

Patient Suitability: Important Considerations

When working with mood disorders, it is important to consider the impact of unique patient factors on treatment course and outcome when considering the clinical application of MBIs. Careful assessment and determination of patient suitability will better prepare both clients and clinicians prior to commencing mindfulness treatments.

First, whenever a psychotherapeutic technique is used, it is important for the therapist to consider the patient's capacity to engage with the treatment. In mood disorders, particularly for individuals with acute depression or residual depressive symptoms, difficulties in focus, concentration, and motivation are very common. Those who are unable to fully engage in the training may be incapable of cultivating mindfulness and could even be practicing rumination. These psychological barriers may lead to heightened feelings of inadequacy and incapacity and could result in treatment dropout or unsuccessful therapeutic intervention. Like in DBT where goals for mindfulness practices are established based on the capacity of the individual (Linehan, 1993), clinicians working with clients whose concentration and focus are affected may elect to summarize the readings or cognitively complex tasks. They may focus on mindfulness practices that are less demanding, or more movement oriented, until the patient is able to engage more fully.

Second, it is unclear if mindfulness training should be applied to mood disorder patients with current or past psychotic features. While the prevalence rates are low (e.g., 0.35 % for MDD and 0.24 % for BD; Perälä et al., 2007), these cases are often more serious and currently there is only indirect evidence to suggest how mindfulness may impact these patients. Limited past clinical literature has advised against using meditation with patients who have or are vulnerable to experiencing active psychotic symptoms, claiming that meditation may produce negative consequences (Deatherage & Lethbridge, 1975; Yorston, 2001). However, recent small controlled studies have indicated that MBIs may be beneficial. In a small randomized evaluation of group therapy for psychosis, Chadwick, Hughes, Russell, Russell, and Dagnan (2009) found that, although the initial analysis indicated that there were no significant differences between those who received the mindfulness intervention and those who remained on the waitlist, once the waitlist group received the intervention, a secondary analyses combining both mindfulness groups revealed significant positive differences in clinical functioning and mindfulness (Chadwick et al., 2009). In another small controlled study Langer, Cangas, Salcedo, and Fuentes (2012) replicated Chadwick et al.'s (2009) results and found that individuals in the MBCT group were better able than those in the control group to respond mindfully to stressful internal events. These results must be interpreted with caution, however, as both studies were evaluating psychosis specific to psychotic disorders (e.g., schizophrenia, schizoaffective disorders) and not psychosis as it presents in mood disorders and there may be important differences between these groups. Mood disorder patients with psychotic features may require more acute, specific, or intensive interventions, such as inpatient hospitalization and/or medication. Given that there is no direct evidence to support the utility of mindfulness for patients with mood disorders with past or current psychotic symptoms, therapists must carefully screen these patients and use caution prior to using MBCT.

It is also important to carefully consider the use of MBCT in mood disorder patients with a history of or current post-traumatic stress disorder (PTSD). Germer, Siegel, and Fulton (2005) state that mindfulness must be "skillfully applied" with these patients and emphasized the importance of first determining their stability of attention (p. 171). This is to ensure that the patient will be able to experience any painful thoughts, emotions, or sensations as they arise without becoming overwhelmed. Therefore it is again important to carefully assess a patient prior to commencing mindfulness training as well as to carefully monitor those who may be vulnerable to PTSD symptoms.

A fourth factor to consider is the presence of other concurrent disorders and their potential to affect the outcome of MBIs. Some examples of disorders frequently co-occurring with mood disorders are anxiety, substance abuse/dependence, eating disorders, and personality disorders. While there is evidence to suggest that mindfulness may be helpful for the mood symptoms and even the primary symptoms seen in these patients, these comorbidities may impact the patient's ability to engage or benefit from the treatment. Therefore therapists will need to account for these special considerations.

Finally, while mindfulness techniques may be beneficial in the treatment of mood disorders, it is important to remember that idiosyncratic patient factors may also present barriers to effective treatment delivery. For example, the idea of MBIs may initially be off-putting to certain clients. Although MBIs have been gaining in popularity, some individuals may be dissuaded due to their non-conventional, esoteric, or foreign nature, or even to the meditations themselves due to misperceptions of religiosity or spirituality (Baer, 2003). If a therapist is able to recognize and appropriately address these concerns and clarify misconceptions, these barriers may be surmountable allowing the client to learn skills they may have otherwise avoided.

Each of these factors highlights the importance of appropriate screening and assessment, as well as proper selection of suitable interventions based on the unique needs of each patient. To accomplish this, therapists require adequate knowledge, training, and experience.

Mindfulness-Based Psychotherapy: Therapist Training and Practice

The therapist's initial training and ongoing personal practice play an important role in the effective delivery of MBCT (Segal et al., 2013). Santorelli and Kabat-Zinn (2009) regarded sufficient mindfulness training and practice as necessary for treatment fidelity. In addition, recent studies have provided preliminary evidence for the benefits of therapists' practice on patient outcomes. For example, Grepmair et al. (2007) found that patients of psychotherapists-in-training randomly assigned to a Zen-meditation condition demonstrated better treatment outcomes than patients of the therapists who did not practice daily meditation.

Recognizing the importance of the MBCT teacher's own training in treatment outcome, Segal et al. (2013) provide several recommendations for potential MBCT instructors. First, therapists should have an adequate clinical background as well as sufficient training in leading group psychotherapy and cognitive therapy. Second, instructors should receive formal MBCT teacher development training. Segal et al. (2013) also recommend attendance at a formal mindfulness meditation retreat for a minimum of 7–10 days. Finally, they stressed the importance of maintaining a personal daily meditation practice. These guidelines are based on the assumption that, when teaching from their own meditation experience, instructors will better embody the mindfulness qualities they are inviting their patients to practice, particularly when responding to patient's reports of their meditation experiences. Therapists with sufficient training and personal experience may be better able to coach patients who struggle with resistance, striving, or the inevitable discomforts and unfamiliar subjective experiences that arise through mindfulness practices. This may be particularly important to individuals with mood disorders and ruminative thinking patterns or to those who are especially resistant or fearful. A therapist strongly embodying mindfulness may also be less inclined to try to challenge the content of the patients' thoughts, as is emphasized in other therapies, but rather focus on changing the patients' relationship to their thoughts which is the emphasis in MBCT. Overall, a well-trained therapist who embodies mindfulness and maintains a personal practice is more likely to have the necessary skills when using MBCT with mood disorder patients.

Alternative Delivery Formats

Investigators are now exploring patient interest levels and the feasibility of alternative MBCT delivery formats. As the support for MBCT's efficacy and clinical interest grows, it is important to address the possibility that the traditional structured in-person weekly group format of MBCT may limit the number of patients accessing this treatment. First, the group format may limit access in healthcare systems that favor the delivery of individual versus group therapy. For example, Australian mental healthcare is much more orientated towards provision of individual therapies than group therapies with the overwhelming

majority of services being provided to individuals. In addition, 5 % of potentially eligible patients declined participation in an MBCT study due to the group aspect (Kuyken et al., 2008). Second, in-person delivery may limit access due to geographical constraints or physical barriers such as immobility or lack of transportation, or may not appeal to individuals with concerns about maintaining anonymity.

As a result, investigators are exploring whether patients would be interested in alternative MBCT delivery formats, as well as whether they are feasible and effective in comparison to attending in-person groups. A recent study evaluated health authority employees' stated preferences for receiving MBCT in the workplace in four alternative delivery formats via an online Discreet Choice Experiment (DCE) (Lau, Colley, Willett, & Lynd, 2012). A DCE is a technique to elicit stated preferences by asking respondents to choose between competing hypothetical but realistic scenarios. One hundred and fifty-one respondents completed the DCE. They found that respondents with a history of depression demonstrated significant preferences as to whether they would choose to receive MBCT individually in-person, individually over the phone, online with a group, or in-person with a group. A latent class analysis suggested four classes. Class one consisted of 42 % of the individuals whose primary concern was the effectiveness of therapy. The second class (23 %) was primarily concerned about the type of *interaction*, preferring to receive MBCT by telephone on their employer's time. The third class (13 %) had the strongest preference for face-to-face delivery, whether individually or in a group. The fourth class (8 %) wished to receive MBCT on their own time and wanted to remain anonymous.

More recently, the actual preferences for, and feasibility of, MBCT as delivered in the same four formats in employees of large healthcare organizations with a history of depression (Lau, Grabovac, & Willett, 2011) were evaluated. Eligible participants with at least two previous depressive episodes and who were not currently depressed were offered MBCT (if available) either online, in-person one on one, over the telephone, or in the traditional group format. The delivery format chosen most frequently by participants was individual in-person, followed by in-person group, online group, and finally telephone delivery. Participants were also assessed pre- and post-treatment on a variety of outcome measures, including self-reported state (Toronto Mindfulness Scale; Lau et al., 2006) and trait (Five Facets of Mindfulness Questionnaire; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) mindfulness, decentering (Experiences Questionnaire; Fresco et al., 2007), and rumination (Response Styles Questionnaire; Nolen-Hoeksema, 1991). The participants in the in-person group, online group, and individual face-to-face conditions demonstrated similar patterns of significant improvements on all outcome measures after receiving MBCT. While the pattern of results was similar for the telephone condition, the improvements were not statistically significant. This is likely due to the low sample size associated with higher dropout rate for this condition relative to the other conditions. While larger studies with increased sample sizes (especially for telephone delivery) are needed, these results provide support for new MBCT delivery formats in that they produced similar benefits as compared to the traditional in-person group delivery.

Similarly, in a pilot study called Project UPLIFT (Thompson et al., 2010) patients with epilepsy and depression were randomly assigned to receive MBCT over the phone or online, or to a waitlist condition. Those treated with MBCT showed a reduction in depressive symptoms as compared to the waitlist, and there was little difference between telephone and online delivery. An associated study exploring these participants' impressions on the distance treatments found that the participants viewed them as acceptable and beneficial (Reisinger-Walker, Obolensky, Dini, & Thompson, 2010).

Overall these studies provide preliminary support that patients with mood disorders and other conditions are interested in receiving MBCT and that they have definite preference differences for the method of delivery. Furthermore, each of these studies has provided preliminary support

for the efficacy of MBCT when delivered in alternative formats such as online, over the phone, or one on one with the instructor. Additional research to determine whether there are any differences in relapse rates across the different delivery models is needed, however, to support the use of alternative delivery methods in future MBCT dissemination efforts.

Future Directions/Considerations

Mood disorders are a major clinical concern and evidence is accumulating for MBCT's efficacy in preventing relapse and treating acute symptoms for MDD and BD. Future larger scaled controlled studies are needed to determine the effectiveness of MBCT in treating acute depressive symptoms in MDD as well as preventing episodic relapse in patients with BD. Based on the promising preliminary evidence, more research is needed to evaluate the feasibility and efficacy of MBCT delivered in alternative formats, such as online, individually in-person, over the telephone, or an in-person group. Given the complexities of mood disorders and patient differences, it is important for the clinician to carefully consider the unique characteristics of the individual and the disorder when considering MBCT for their client. A therapist should receive adequate training prior to commencing MBCT treatment with their patients and consistently maintain their own personal mindfulness practice to optimize patient treatment outcomes. As the support for MBIs grows and the availability of these interventions broadens, so does the potential to reduce patient suffering and improve the lives of individuals with mood disorders.

References

Angst, J. (1998). The emerging epidemiology of hypomania and bipolar II disorder. *Journal of Affective Disorders, 50*, 143–151.

Angst, J., Gamma, A., Benazzi, F., Ajdacic, V., Eich, D., & Rossler, W. (2003). Toward re-definition of subthreshold bipolarity: Epidemiology and proposed criteria for bipolar-II, minor bipolar disorders and hypomania. *Journal of Affective Disorders, 73*, 123–131.

Baer, R. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*, 125–143.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45.

Barnhofer, T., Crane, C., Hargus, E., Amarasinghe, M., Winder, R., & Williams, J. M. G. (2009). Mindfulness-based cognitive therapy as a treatment for chronic depression. *Behaviour Research and Therapy, 47*, 366–373.

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression*. New York, NY: Guilford.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck depression inventory—Second edition manual*. San Antonio, TX: The Psychological Corporation.

Bondolfi, G., Jermann, F., Van der Linden, M. V., Gex-Fabry, M., Bizzini, L., Rouget, B. W., … Bertschy, G. (2010). Depression relapse prophylaxis with Mindfulness-based cognitive therapy: Replication and extension in the Swiss health care system. *Journal of Affective Disorders, 122,* 224–231.

Bowen, S., Chawla, N., & Marlatt, G. A. (2010). *Mindfulness-based relapse prevention for addictive behaviours: A clinician's guide*. New York, NY: Guilford Press.

Chadwick, P., Hughes, S., Russell, D., Russell, I., & Dagnan, D. (2009). Mindfulness groups for distressing voices and paranoia: A replication and randomized feasibility trial. *Behavioural and Cognitive Psychotherapy, 37*, 403–412.

Chiesa, A., & Serretti, A. (2010). A systematic review of neurobiological and clinical features of mindfulness meditations. *Psychological Medicine, 40*, 1239–1252.

Chiesa, A., & Serretti, A. (2011). Mindfulness based cognitive therapy for psychiatric disorders: A systematic review and meta-analysis. *Psychiatry Research, 187*, 441–453.

Coelho, H. F., Canter, P. H., & Ernst, E. (2007). Mindfulness-based cognitive therapy: Evaluating current evidence and informing future research. *Journal of Consulting and Clinical Psychology, 75*, 1000–1005.

Crane, C., Barnhofer, T., Duggan, D., Hepburn, S., Fennell, M. V., & Williams, J. (2008). Mindfulness-based cognitive therapy and self-discrepancy in recovered depressed patients with a history of depression and suicidality. *Cognitive Therapy and Research, 32*, 775–787.

Deatherage, G., & Lethbridge, U. (1975). The clinical use of "mindfulness" meditation techniques in short term therapy. *Journal of Transpersonal Psychology, 7*, 133–143.

Deckersbach, T., Hölzel, B. K., Eisner, L. R., Stange, J. P., Peckham, A. D., Dougherty, D. D., & Nierenberg, A. A. (2012). Mindfulness-based cognitive therapy for nonremitted patients with bipolar disorder. *CNS Neuroscience & Therapeutics, 18*(2), 133–141.

Eisendrath, S. J., Delucchi, K., Bitner, R., Fenimore, P., Smit, M., & McLane, M. (2008). Mindfulness-based cognitive therapy for treatment-resistant depression: A pilot study. *Psychotherapy and Psychosomatics, 77*, 319–320.

Finucane, A., & Mercer, S. W. (2006). An exploratory mixed methods study of the acceptability and effectiveness of mindfulness-based cognitive therapy for patients with active depression and anxiety in primary care. *BMC Psychiatry, 6*, 14–28.

Foley, E., Baillie, A., Huxter, M., Price, M., & Sinclair, E. (2010). Mindfulness-based cognitive therapy for individuals whose lives have been affected by cancer: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 78*, 72–79.

Fresco, D. M., Moore, M. T., van Dulmen, M., Segal, Z. V., Teasdale, J. D., Ma, H., & Williams, J. M. G. (2007). Initial psychometric properties of the Experiences Questionnaire: Validation of a self-report measure of decentering. *Behavior Therapy*, *38*, 234–246.

Galante, J., Iribarren, S. J., & Pearce, P. F. (2012). Effects of mindfulness-based cognitive therapy on mental disorders: A systematic review and meta-analysis of randomised controlled trials. *Journal of Research in Nursing, 18*, 133–155.

Germer, C. K., Siegel, R. D., & Fulton, P. R. (2005). Anxiety disorders: Befriending fear. In C. K. Germer, R. D. Siegel, & P. R. Fulton (Eds.), *Mindfulness and psychotherapy* (pp. 152–172). New York, NY: Guilford Press.

Geschwind, N., Peeters, F., Huibers, M., van Os, J., & Wichers, M. (2012). Efficacy of mindfulness-based cognitive therapy in relation to prior history of depression: Randomized controlled trial. *The British Journal of Psychiatry, 201*, 320–325.

Godfrin, K. A., & van Heeringen, C. (2010). The effects of mindfulness-based cognitive therapy on recurrence of depressive episodes, mental health and quality of life: A randomized controlled study. *Behaviour Research and Therapy, 48*, 738–746.

Grepmair, L., Mitterlehner, F., Loew, T., Bachler, E., Rother, W., & Nickel, M. (2007). Promoting mindfulness in psychotherapists in training influences the treatment results of their patients: A randomized, double-blind, controlled study. *Psychotherapy and Psychosomatics, 76*, 332–338.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits. A meta-analysis. *Journal of Psychosomatic Research, 57*, 35–43.

Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery, and Psychiatry, 23*, 56–62.

Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and commitment therapy*. New York, NY: Guilford Press.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169–183.

Judd, L. L., Schettler, P. J., Akiskal, H. S., Maser, J., Coryell, W., Solomon, D., … Keller, M. (2003). Long-term symptomatic status of bipolar I vs. bipolar II disorders. *International Journal of Neuropsychopharmacology, 6*, 127–137.

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*, 33–47.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York, NY: Dell.

Keng, S., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review, 31*, 1041–1056.

Kenny, M. A., & Williams, J. M. G. (2007). Treatment-resistant depressed patients show a good response to mindfulness-based cognitive therapy. *Behaviour Research and Therapy, 45*, 617–625.

Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S., … Kendler, K. S. (1994). Lifetime and twelve-month prevalence of DSM-III-R in psychiatric disorders in the United States: Results from the National Comorbidity Study. *Archives of General Psychiatry, 51*, 8–19.

Kingston, T., Dooley, B., Bates, A., Lawlor, E., & Malone, K. (2007). Mindfulness-based cognitive therapy for residual depressive symptoms. *Psychology and Psychotherapy: Theory, Research and Practice, 80*, 193–203.

Kristeller, J. L., & Hallett, C. B. (1999). An exploratory study of a meditation-based intervention for binge eating disorder. *Journal of Health Psychology, 4*, 357–363.

Kupka, R. W., Altshuler, L. L., Nolen, W. A., Suppes, T., Luckenbaugh, D. A., Leverich, G. S., … Post, R. M. (2007). Three times more days depressed than manic or hypomanic in both bipolar I and bipolar II disorders. *Bipolar Disorders, 9*, 531–535.

Kuyken, W., Byford, S., Taylor, R. S., Watkins, E., Holden, E., White, K., … Teasdale, J. D. (2008). Mindfulness-based cognitive therapy to prevent relapse in recurrent depression. *Journal of Consulting and Clinical Psychology, 76*, 966–978.

Langer, A. I., Cangas, A. J., Salcedo, E., & Fuentes, B. (2012). Applying mindfulness therapy in a group of psychotic individuals: A controlled study. *Behavioural and Cognitive Psychotherapy, 40*, 105–109.

Lau, M. A., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, N. D., Carlson, L. S., … Devins, G. (2006). The Toronto mindfulness scale: Development and validation. *Journal of Clinical Psychology, 62*, 1445–1467.

Lau, M. A., Colley, L., Willett, B. R., & Lynd, L. D. (2012). Employee's preferences for access to

mindfulness-based cognitive therapy to reduce the risk of depressive relapse: A discrete choice experiment. *Mindfulness, 3*, 318–326.

Lau, M. A., Grabovac, A., & Willett, B. R. (2011). *Evaluating the feasibility of delivering mindfulness-based cognitive therapy in group over the internet or individual face-to-face or via telephone in the workplace*. Paper presented at the 45th Annual Conference of the Association for Behavioral and Cognitive Therapies, Toronto, Canada.

Lau, M. A., Segal, Z. V., & Williams, M. G. (2004). Teasdale's differential activation hypothesis: Implications for mechanisms of depressive relapse and suicidal behaviour. *Behaviour Research and Therapy, 42*, 1001–1017.

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality*. New York, NY: Guilford Press.

Ma, S. H., & Teasdale, J. D. (2004). Mindfulness-based cognitive therapy for depression: Replication and exploration of differential relapse prevention effects. *Journal of Consulting and Clinical Psychology, 72*, 31–40.

Mathew, K. L., Whitney, H. S., Kenny, M. A., & Denson, L. A. (2010). The long term effects of mindfulness-based cognitive therapy as a relapse prevention treatment for major depressive disorder. *Behavioural and Cognitive Psychotherapy, 38*, 561–576.

Miklowitz, D., Alatiq, Y., Goodwin, G., Geddes, J., Dimidjian, S., Hauser, M., & Williams, M. (2009). A pilot study of mindfulness-based cognitive therapy for bipolar disorder. *International Journal of Cognitive Therapy, 2*, 373–382.

Munshi, K., Eisendrath, S., & Delucchi, K. (2012). Preliminary long-term follow-up of mindfulness-based cognitive therapy induced remission of depression. *Mindfulness, 4*, 354–361.

National Institute for Clinical Excellence (NICE). (2009). *Management of depression in primary and secondary care*. London, UK: National Institute for Clinical Excellence.

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology, 100*, 569–582.

Perälä, J., Suvisaari, J., Saarni, S. I., Kuoppasalmi, K., Isometsä, E., Pirkola, S., … Lönnqvist, J. (2007). Lifetime prevalence of psychotic and bipolar I disorders in a general population. *Archives of General Psychiatry, 64*, 19–28.

Piet, J., & Hougaard, E. (2011). The effect of mindfulness-based cognitive therapy for prevention of relapse in recurrent major depressive disorder: A systematic review and meta-analysis. *Clinical Psychology Review, 31*, 1032–1040.

Ree, M. J., & Craigie, M. A. (2007). Outcomes following mindfulness-based cognitive therapy in a heterogeneous sample of adult outpatients. *Behaviour Change, 24*, 70–86.

Reisinger-Walker, E., Obolensky, N., Dini, S., & Thompson, N. J. (2010). Formative and process evaluations of a CBT and mindfulness intervention for people with epilepsy and depression. *Epilepsy & Behavior, 19*, 239–246.

Santorelli, S. F., & Kabat-Zinn, J. (2009). *Mindfulness-based stress reduction professional training resource manual: Integrating mindfulness meditation into medicine and health care*. Worcester, MA: Center for Mindfulness in Medicine, Health Care, and Society.

Segal, Z. V., Bieling, P., Young, T., MacQueen, G., Cooke, R., Martin, L., … Levitan, R. D. (2010). Antidepressant monotherapy vs. sequential pharmacotherapy and Mindfulness Based Cognitive Therapy, or placebo, for relapse prophylaxis in recurrent depression. *Archives of General Psychiatry. 67*, 1256–1264.

Segal, Z. V., Gemar, M., & Williams, S. (1999). Differential cognitive response to a mood challenge following successful cognitive therapy or pharmacotherapy for unipolar depression. *Journal of Abnormal Psychology, 108*, 3–10.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach for preventing relapse*. New York, NY: Guilford Press.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2013). *Mindfulness-based cognitive therapy for depression: A new approach for preventing relapse* (2nd ed.). New York, NY: Guilford Press.

Teasdale, J. D. (1983). Negative thinking in depression: Cause, effect or reciprocal relationship? *Advances in Behaviour Research and Therapy, 5*, 3–25.

Teasdale, J. D. (1988). Cognitive vulnerability to persistent depression. *Cognition and Emotion, 2*, 247–274.

Teasdale, J. D. (1999). Metacognition, mindfulness and the modification of mood disorders. *Clinical Psychology & Psychotherapy, 6*, 146–155.

Teasdale, J. D., Segal, Z. V., Williams, J. M., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68*, 615–623.

Teasdale, J. D., Segal, Z. V., & Williams, J. M. G. (1995). How does cognitive therapy prevent relapse and why should attentional control (mindfulness) help? *Behaviour Research and Therapy, 33*, 25–39.

Thompson, N. J., Reisinger-Walker, E., Obolensky, N., Winning, A., Barmon, C., DiIorio, C., & Compton, M. (2010). Distance delivery of mindfulness-based cognitive therapy for depression: Project UPLIFT. *Epilepsy & Behavior*, *19*, 247–254.

Van Aalderen, J. R., Donders, A. R. T., Giommi, F., Spinhoven, P., Barendregt, H. P., & Speckens, A. E. M. (2012). The efficacy of mindfulness-based cognitive therapy in recurrent depressed patients with and without a current depressive episode: A randomized controlled trial. *Psychological Medicine, 42*, 989–1001.

Weber, B., Jermann, F., Gex-Fabry, M., Nallet, A., Bondolfi, G., & Aubry, J. M. (2010). Mindfulness-based cognitive therapy for bipolar disorder: A feasibility trial. *European Psychiatry, 25*, 334–337.

Williams, J. M., Alatiq, Y., Crane, C., Barnhofer, T., Fennell, M. J., Duggan, D. S., … Goodwin, G. M. (2008). Mindfulness-based cognitive therapy (MBCT) in bipolar disorder: Preliminary evaluation of immediate effects on between-episode functioning. *Journal of Affective Disorders, 107*, 275–279.

Williams, J. M., Russell, I., & Russell, D. (2008). Mindfulness-based cognitive therapy: Further issues in current evidence and future research. *Journal of Consulting and Clinical Psychology, 76*, 524–529.

Yatham, L. N., Kennedy, S. H., O'Donovan, C., Parikh, S., MacQueen, G., McIntyre, R., … Gorman, C. P. (2005). Canadian Network for Mood and Anxiety Treatments (CANMAT) guidelines for the management of patients with bipolar disorder: Consensus and controversies. *Bipolar Disorders, 7*(Suppl 3), 5–69.

Yorston, G. (2001). Mania precipitated by meditation: A case report and literature review. *Mental Health, Religion & Culture, 4*, 209–213.

Mindfulness and the Addictive Process: Psychological Models and Neurobiological Mechanisms

14

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Introduction

Mindfulness meditation aims at helping people reduce suffering that is fed and perpetuated by craving. The early Buddhist texts in which this practice is first articulated offer a therapeutic model explicating suffering, its cause, the possibility of a cure, and the methods required to achieve that cure. This approach targets the psychological roots of suffering, and in particular, craving, which is identified as the primary cause of suffering. It is through the "relinquishment, release, and letting go" of craving that suffering is cured (SN.56.11 in Thanissaro, B. (trans.), 2010a).[1] Mindfulness is a central component of the method prescribed for creating release from the cycle of craving and suffering.

In the recent psychological literature, craving has been defined as the "subjective experience of wanting …[something]" (Tiffany & Wray, 2012, p. 2). There are many components that contribute to the experience of craving; here we emphasize craving as a non-elaborative, somatic, and affective experience of grasping after a particular desired object (i.e., the "gut feeling" of wanting). The term for craving used in the early Pali Buddhist texts, *taṇhā*, more literally means thirst. This apt turn of phrase indeed suggests the insatiable desire reported by people dealing with addictions, and the enormous suffering that can result. Addictive behaviors cause stress and anguish on personal, family, and societal levels, and people with addictions use language reminiscent of the ancient texts we cite below. In a book entitled *Ninety Days: A Memoir of Recovery*, Billy Clegg wrote "… I can feel that old burn, that hibernating want, come awake. I imagine the relief that first hit will deliver and I'm suddenly up off the couch and pacing. No no no, I chant. No f-king way. That craving, once it begins, is almost impossible to reverse. What my addict mind imagines, my addict body chases." As he points out, we are literally slaves to our bodily sensations when we do not have mental training tools in place to work skillfully with our sensations. Not surprisingly, craving is rooted in our most basic neural processes: positive and negative reinforcement. And of course, this is where mindfulness training can help. Paradoxical to many

[1] Following convention, sutta references are to collection (e.g., Majjhima Nikāya (MN), Suttanipāta (Sn)), and then either to sutta number (in the case of DN, MN, and Iti), saṃyutta and sutta number (SN), nipāta and sutta number (AN), verse number (Dhp), vagga and sutta number (Ud, Sn).

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modern cognitive-behavioral and/or control-based treatments, which focus on building "mental muscle" to avoid, think through, and substitute behaviors, mindfulness training teaches us to see more clearly what we get from our addictions, rather than avoiding or trying to change them. In doing so, we naturally begin to become disenchanted with the cycle of craving, which begins the process of letting go.

Addictions are one of the costliest human conditions, having significant effects on mental, physical, and economic health. Drug abuse, as a whole in the USA, grows in economic cost by an estimated $7 billion per year, costing approximately $180.8 billion in 2002, primarily in lost productivity (Office of National Drug Control Policy, 2004). Given the impact of these disorders, much convergent work has been done to identify the mechanistic underpinnings of addictions, and to develop effective treatments (Goldstein et al., 2009; Kalivas & Volkow, 2005). In this chapter, we outline contemporary psychological models of addiction and highlight how current understanding of the addictive process relates to Buddhist psychological models of human suffering. Also, we review studies of mindfulness training for addictions and discuss insights they might provide with regard to targeting core components of the addictive process. Finally, we relate models of addiction and mindfulness to emerging neuroimaging studies and explain how these may provide critical links between psychological models of addiction, the key components of the addictive process that mindfulness training targets, and the neurobiological mechanisms thereunder.

Early Models of Addiction

Buddhist psychological models distinguish five aspects of emotional reaction to triggers (i.e., anything that elicits a reaction): bodily, affective, cognitive, volitional, and conscious components. The dynamic, causal relationships between these differentiated processes are delineated by the notion of "dependent [co-]origination." In this process, craving is said to result from a process

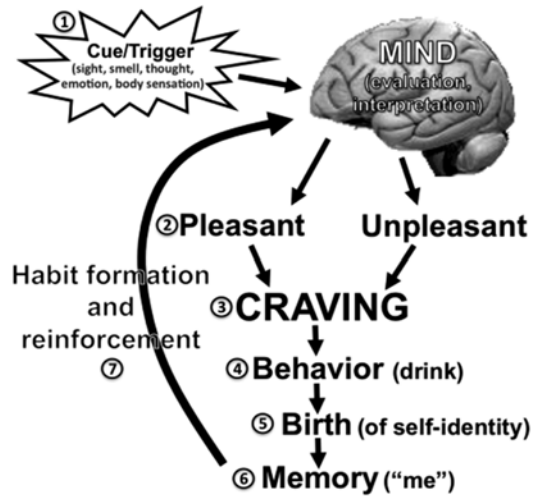

Fig. 14.1 Early models of addiction: dependent origination. Copyright 2011 Judson Brewer. Reprinted with permission of author

based in automated affective reactions to perceptual stimuli. For example, when environmental cues register through the senses (thoughts are considered categorically indistinct from the standard five senses, Fig. 14.1, #1), an "affective tone" automatically arises that is typically felt as pleasant or unpleasant (#2). The valence of this affective tone is conditioned by associative memories that were formed from previous experiences (#6 + MIND). Subsequently, a desire or craving arises as a psychological urge to act or perform a behavior (#3). The craving is for the continuation of pleasant, or the cessation of unpleasant feeling tones, respectively. This craving motivates action (#4) and fuels the "birth" of self-identity (#5), creating a link between action and outcome that is recorded in memory (#6). Importantly, when this pleasant affective tone (or absence of an unpleasant affective tone) passes, one is left with the "pain, distress, and despair" of its absence, thus completing one cycle and priming the individual for the next time he/she encounters a similar sensory stimulus (#7) (SN.12.2 in Thanissaro, 2010b).

In other words, an individual learns that drug use (action) decreases unpleasant feelings such as negative affect and craving, and he/she starts forming a behavior pattern related to these affective reactions.

The perception of an object is influenced by previous experiences, and the consolidation of related memories leads to habits or dispositions—consequently "updating" how perception will function in the future (MIND). This cycle can build on itself in another way as well: states associated with craving and aversion are themselves unpleasant; individuals often develop aversive reactions towards their own craving and aversion. Fortunately, the iterative nature of this cycle also means that it can be disrupted at each new round.

The central point of this model is that craving and aversion arise in response to an affective tone that is associated with perceptual representations of a sensory object, rather than directly in response to the object (Grabovac, Lau, & Willett, 2011). This provides a critical entry point for therapeutic interventions: through paying careful attention to one's own experience, the Buddhist accounts claim that one can see that perceptions and associated affective reactions (affective tone) are separate from—and indeed separable from—craving and aversion, as well as the elaborative thought processes these can initiate. As one Buddhist scholar puts it, through paying mindful attention to affective reactions, "one distinctly realizes that a pleasant feeling is not identical with lust and need not be followed by it … By doing so, he makes a definite start in cutting through the chain of dependent origination at that decisive point where feeling becomes the condition for craving … It will thus become the meditator's indubitable experience that the causal sequence of feeling and craving is not a necessary one …" (Nyanaponika, 2000). It should also be noted that even when craving has already arisen, mindful awareness can prevent further cycles of aversive reaction to the unpleasant feelings associated with this craving, and thus reduce habitual reactions that arise in an attempt to escape this unpleasantness.

Importantly, craving is the link that is targeted here in cutting through the cycle of dependent origination. Some traditional accounts take meditation practice to be aimed at the realization that there is no self. However, this interpretation has been controversial in contemporary Buddhist scholarship (Hamilton, 2000). Indeed, nowhere in the early Buddhist dialogues is the Buddha reported as claiming that there is no self; on the contrary, both the view that there is no self and the view that there is a self are said to lead to suffering (MN.2 in Ñāṇamoli & Bodhi, 1995). The sense of self that is born in the process of dependent co-arising, sketched above, is constituted by habituated reactions of clinging to pleasant aspects of experience and to the absence of the unpleasant. In a moment of desperate craving for something, it seems as if appeasing this particular sense desire will bring all that one needs, even if one knows better. But this is a distorted perception; sense pleasures are fleeting, and incapable of resolving the core distress that fuels the cycle of searching for gratification. As one discourse puts it, "Indeed, I have long been tricked, cheated, and defrauded by this mind. For when clinging, I have been clinging just to material form … feeling … perception … formations, consciousness … With my clinging as condition, being … birth … ageing and death, sorrow, lamentation, pain, grief, and despair come to be. Such is the origin of this whole mass of suffering" (MN.75 in Ñāṇamoli & Bodhi, 1995). The idea here is that *by clinging to any kind of experience, a sense of self is born*. This sense of self is very basic, being dependent only on grasping after the objects of experience. It does not depend on clinging to an explicit self-identity. Thus, even if one does not ruminate about one's self-identity, as long as there is craving for any aspect of experience, this affectively constructed sense of self continues. When the sense of self is threatened, by the inability to prevent the loss of what is grasped after or to prevent the presence of what is pushed away, then one suffers.

We postulate that mindfulness does not prevent the cognitive construction of self-identity necessary for functioning in the world, but instead targets previously developed affective biases (Elliott, Zahn, Deakin, & Anderson, 2011). Such affective biases prevent individuals from accurately assessing what is happening in the present moment, and acting accordingly. Mindfulness functions to decouple pleasant and unpleasant experience from habitual reactions of

craving and aversion. By overcoming affective biases of attention and memory, mindfulness allows individuals to feel and know more clearly the pain of perpetuating emotional craving and aversion. As we suggest below in more detail, being fully present with the pain of this emotional reactivity may be sufficient to motivate individuals not to perpetuate it. In other words, mindfulness does not stop one from being a person, but rather from taking things personally.

From this perspective, mindfulness allows practitioners to clearly ascertain what is driving their behavior, and whether or not it is moving them towards or away from their goals. To illustrate this point, we will use a fictional character, Ethel Knoll-Kraver throughout this chapter (see Text Box). For example, mindfulness might enable Ethel Knoll-Kraver to see clearly that each time she drinks in reaction to being stressed, she only briefly avoids the stress. By seeing that drug use only provides a minimal amount of relief, and does not address whatever led to her stress in the first place, she can work to fix its root cause. By better understanding her context and the factors that have previously contributed to her drug use, Ethel may also become more disenchanted with drinking by simply seeing more clearly its effects. Ethel may know the health risks and financial costs of drinking but fail to give sufficient weight to these facts in her decisions about her behavior. By attenuating emotional distortions in the decision-making process, mindfulness may function to enable Ethel to weigh these factors more accurately.

Young Ethel Knoll-Kraver is invited to have a drink by a group of older kids who are popular at school (see #1 "positive cue" in Fig. 14.1a). She learns to associate drinking with "being cool"—when she's at a party drinking with friends, she feels good (#2). Over time, she also learns that having a drink after work calms her nerves (#2–6). When Ethel gets yelled at by her boss, or gets a bad grade in school (#1 "negative cue"), she feels stressed out (#2), gets a craving (#3), and stops by a bar on the way home for a drink (#4). The more Ethel drinks in these situations, the more she reinforces her behavior (#5–7), and the more she finds herself licking her lips when she gets stressed out. At times, she may even find herself at a bar before "waking up" to the fact that something triggered her to habitually drive there and order a drink.

Given that one's self-identity is largely based on memory, the Buddhist description of dependent origination is remarkably similar to the contemporary model of the addictive loop. When Ethel, who has learned to associate drinking with the reduction of stress and/or the temporary abatement of withdrawal (#6), encounters a stressful situation or alcohol withdrawal symptoms such as irritability, restlessness, and agitation (#1), her brain interprets these as unpleasant (#2). She wants the unpleasant feeling to go away, and consequently gets a craving to drink (#3). When she drinks, she reinforces the habituated reaction to affective experience (e.g., "if I drink, I will feel better"; #4–6).

While Ethel might take this personally, having thoughts such as "I am drinker," it is not these particular self-related thoughts but rather the affective bias underlying the reaction of taking things personally that fuels the birth of self-identity (i.e., habituated reactions to affective experience). As the state of satisfaction from feeding the craving is short-lived, the passing away of this mind state inevitably ensues, leading to dissatisfaction, stress, or suffering once again. Importantly, each time Ethel drinks, she re-engages and reinforces this loop, resulting in subsequent rounds of this process (#7). Buddhist texts call this repetitive process *samsara*, or endless wandering, as there is no obvious way out of it when propagated. Ethel may even begin to ruminate about drinking and start planning her day around access to alcohol, which, as we will see later, likely engages brain circuits involved in self-referential processing, thus further fueling this process. Our modern-day equivalent of the endless wandering characterized by Buddhism appears remarkably similar: the addictive loop. However, the psychological terms and links employed in dependent origination will need careful refinement and empirical validation to determine their relative explanatory and predictive power in contemporary models of addiction.

The Birth of an Addiction

Acquisition of an addictive behavior is a complex process based on operant conditioning: pairing action with reward, which leads to modified behavior. This process has been observed for over a century in animals ranging from the simple sea slug (Aplysia) to humans. Addictions are developed in part from the formation of associative memories between behavior and both positive and negative affective states (see Text Box). Subsequently, cues that are judged to be positive or negative can induce positive or negative affective states, which can then trigger craving to repeat this behavior (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). Additionally, neutral cues that have been classically conditioned may directly trigger craving (Lazev, Herzog, & Brandon, 1999). Craving then leads to repeated behavior, whether drinking alcohol, smoking cigarettes, or eating food and results in the maintenance of positive or reduction of negative affective states (Baker et al., 2004).

This process sets up positive or negative reinforcement loops, respectively, by reinforcing the associative memories between these affective states and behavior. This associative learning process may then lead to increased motivational salience of future cues (in which both positive and negative cues become more motivationally relevant) (Robinson & Berridge, 2008), resulting in what, building on the work of Baker, Curtin, and others (Baker et al., 2004; Curtin, McCarthy, Piper, & Baker, 2006), for convenience we term the "addictive loop." Through repeated substance use, this loop may become habitual, leading to cue-induced behavior that is largely outside of consciousness, let alone conscious control (Bargh & Chartrand, 1999; Curtin et al., 2006). So strong is this cue-induced habitual behavior, that the longer an individual remains abstinent from a drug of abuse, the stronger his or her craving for the drug becomes, making relapse more likely, and termination of the cycle less likely (Bedi et al., 2011).

This addictive loop model is noteworthy for several reasons. First, each link in the chain is supported by convergent findings from both non-human animal and human studies, suggesting an evolutionarily conserved process. Second, it provides some explanatory power for the relative strengths and weaknesses of current treatment paradigms. Third, its self-propagating nature aligns surprisingly well with Buddhist psychological models as described above regarding the causes of human suffering: craving and attachment.

The Promise of Mindfulness-Based Cessation Treatments

The multitude of cues that can be associated with positive and negative affective states, along with drug use, creates tremendous challenges for successful treatment and long-term abstinence. Mainstay behavioral treatments have focused on teaching individuals to avoid cues, foster positive affective states (e.g., practice relaxation or physical exercise), divert attention from cravings, substitute other activities, and develop social support mechanisms (Fiore et al., 2008). Unfortunately, these have shown only modest success, with abstinence rates for cognitively based treatments hovering between 20 and 30 % (Law & Tang, 1995). This may be because triggers are omnipresent. The omnipresence of cues makes avoidance difficult; diversion of attention requires cognitive reserves, which are often depleted after strong affective states (Muraven & Baumeister, 2000), and effective substitutions are not always available. Further, these strategies may not actually target the core addictive loop (e.g., avoidance of cues decreases input to the loop), while substitute behaviors (e.g., eating carrot sticks or candy) circumvent the loop. Importantly, these strategies, at least in theory, may not diminish the loop itself, instead leaving it dormant to reactivate at a later time. One recent finding even suggests that cue-induced craving may increase with length of abstinence, suggesting that avoiding cues or substituting behaviors may do little to target core processes fueling addictive behaviors (Bedi et al., 2011). Even cue exposure that aims to decrease the conditioned responses may not adequately disrupt the addictive loop, instead leading to different

associations that are also situation specific (Bouton, Westbrook, Corcoran, & Maren, 2006). The experimental evidence for the core links of the addictive loop and the modest long-term efficacy of current treatments provide compelling evidence for the need for innovative treatments that directly dismantle this loop instead of treating "around" it (Niaura & Abrams, 2002). Remarkably, the early Buddhist model of suffering does both, and the clinical therapeutic interventions it has inspired have gained increasing support from recent studies.

Derived from Buddhist practices, mindfulness training has been adapted for use in Western cultures, taking forms such as Mindfulness-based Stress Reduction (MBSR), Mindfulness-based Cognitive Therapy (MBCT; combined with Cognitive Therapy for depression relapse prevention), and Mindfulness-based Relapse Prevention (MBRP; combined with Relapse Prevention for addiction treatment). Typical treatments are 8 weeks in duration, though alternate lengths have been employed for targeted uses (Brewer, Mallik et al., 2011). Common features of these treatments include the training of attention to detect and modify an individual's relationship to automatic thought patterns, among others. For a review see Hölzel et al. (2011).

Mindfulness training's effectiveness has been investigated for the treatment of a number of disorders including pain, anxiety, and depression among others (reviewed in Baer, 2003; Grossman, Niemann, Schmidt, & Walach, 2004; Hofmann, Sawyer, Witt, & Oh, 2010). These data are promising, although more confirmatory studies are needed, as many of the studies were small and/or employed wait-list or other suboptimal control conditions.

Mindfulness training has only recently been evaluated in the treatment of addictions (Bowen et al., 2009; Brewer et al., 2009; Zgierska et al., 2008). It has been operationalized to include two distinct components: (1) maintaining attention on the immediate experience and (2) maintaining an attitude of acceptance towards this experience (Bishop et al., 2004). Here, for example, Ethel Knoll-Kraver might bring mindful awareness to the body sensations that constitute a craving, and just observe them from moment to moment. Even judgment of the craving becomes an object itself, instead of a driving force for subsequent behavior. As such, mindfulness training may specifically target the associative learning *process* with an emphasis on the critical link between affect and craving in the addictive loop (Nyanaponika, 2000). Through changing one's relationship to craving, via nonjudgmental awareness, one begins to remove the fuel from its fire, such that over time, craving and its resultant identity formations eventually burn out or die off.

Mindfulness training has been incorporated into several approaches for addiction treatment, such as Acceptance and Commitment Therapy (ACT) and MBRP (Bowen et al., 2009; Brewer et al., 2009), and has shown preliminary success therein. For example, Gifford et al. (2004) randomized 76 participants to nicotine replacement or ACT (seven individual + seven group sessions) and found 24-h abstinence of 33 % and 35 %, respectively, after treatment and 15 and 35 % at 1-year follow-up. Because mindfulness training has the advantages of teaching just a few basic techniques (awareness) that target the addictive loop *process*, aiming both at reducing automaticity and interrupting the loop, it requires fewer and less specialized sessions than other treatments. Theoretically, this simpler, more focused approach may facilitate both conceptual and behavioral skills mastery and durability of effects in a relatively brief treatment. Studies on the efficacy of mindfulness training for addictions remain preliminary: a recent review of trials that included mindfulness training reported that only 1 of 22 included a randomized experimental design (Zgierska et al., 2009). Importantly, a number of these studies showed no significant differences between the mindfulness and comparison conditions. However, subsequent randomized trials have shown some promise. For example, in a small pilot study of cocaine and alcohol dependence, Brewer et al. (2009) found equivalent efficacy of mindfulness training to that of cognitive behavioral therapy (CBT, which is considered a "gold standard" treatment for addictions) during an 8-week treatment period. Importantly, in this study, participants that

received mindfulness training also showed adaptive psychological and autonomic changes during a laboratory-based stress challenge that weren't observed in the CBT group at the end of treatment. This suggests that mindfulness may help to target core addictive loop features, such as negative affective states. Further, in a larger trial, Bowen et al. (2009) found significantly lower rates of substance use up to 4 months post-intervention in individuals receiving MBRP compared to those receiving treatment as usual. However, these studies should be interpreted cautiously, as MT has not yet been rigorously compared to empirically based treatments in large-scale head-to-head trials, and indeed may not be more efficacious for these conditions than standard treatment (Zgierska et al., 2009).

With regard to smoking, mindfulness training has shown preliminary utility in reducing cigarette cravings and withdrawal symptoms (Cropley, Ussher, & Charitou, 2007), as well as in smoking cessation (Davis, Fleming, Bonus, & Baker, 2007). Bowen et al. (2009) provided college students with brief mindfulness-based instructions and found that they smoked significantly fewer cigarettes 1 week after the intervention compared to those that did not receive instructions. Also, in an uncontrolled trial, Davis et al. (2007) found that 10 of 18 patients showed abstinence 6 weeks post-quit after receiving MBSR. More recently, Brewer et al. (2011a) randomized 88 subjects to receive mindfulness training or the American Lung Association's Freedom From Smoking treatment. They found significant differences in number of cigarettes smoked as well as abstinence rates 4 months after treatment completion (31 vs. 6 % at 4 months, $p=0.01$).

Mindfulness Training May Directly Target the Addictive Loop

Effective implementation of mindfulness training may, over time, lead to the dampening and eventual dismantling of the addictive loop that perpetuates smoking or drug use rather than just removing stimuli that might propagate it. For example, through its attentional focus, individuals learn to become more aware of habit-linked, minimally conscious affective states and bodily sensations (e.g., low-level craving), thus "de-automating" this largely habitual process (Brewer, Bowen, Smith, Marlatt, & Potenza, 2010). One recent study showed that MT alters the way that the brain processes interoceptive cues, showing greater activity in regions (anterior insula) associated with integration of internal bodily sensations with external conditions or cues (Farb, Segal, & Anderson, 2013). Another study showed that MT, relative to a relaxation control group, not only decreased emotional interference on a cognitive processing task, but also led to significant changes in a psychophysiological measure of arousal while viewing pleasant and unpleasant images (Ortner, Kilner, & Zelazo, 2007). Together these findings may suggest that MT leads not only to greater emotional stability at a physiological level, but also that this emotional stability is paired with better neural monitoring of the body and association of its states with the external environment, in essence, helping individuals to "see things as they are."

By decoupling pleasant and unpleasant experience from the habitual reactions of craving and aversion, careful attention to present moment experience can function to bring a broadening or spaciousness of awareness that allows new appraisals of life situations. A possible result of this is the ability of mindfulness to specifically facilitate positive reappraisal. For instance, Garland, Gaylord, and Fredrickson (2011) have given the example of mindfulness allowing individuals' reappraisal of a serious heart condition as "an opportunity to change their lifestyle and health behaviors rather than as a catastrophe portending imminent doom." Other empirical findings do not support this idea. Ortner et al. (2007) found that decreases in arousal to negative images were *common* to both MT and relaxation training groups, but decreases in arousal to positive images were *unique* to MT. Interestingly, traditional presentations also do not support a conception of mindfulness as biasing subjects especially towards positive appraisal of life situations. Rather, as Garland, Gaylord, and Park (2009) acknowledge, mindfulness may function by

"attenuating emotional distortions of stimuli perception by encouraging non-evaluative contact with phenomenological experience," leading to more clearly "seeing things as they are." This point deserves emphasis. Explicit techniques for positive reappraisal are taught both in contemporary clinical settings and also in holistic traditional approaches to ending suffering. For example, Theravada Buddhist teachings include cultivation of loving-kindness (*metta*) as well as other positive or wholesome mind states such as appreciation/sympathetic joy at the joy of others (*mudita*). In traditional presentations, however, these practices are clearly delineated from the practice of mindfulness (*satipatthana*), which involves attenuating both desire and discontent in regard to external objects (MN.10 in Ñāṇamoli & Bodhi, 1995). On this construal, the application of mindfulness in Ethel Knoll-Kraver's case (see Text Box) may not result in positive appraisal, but will allow her to be more aware of the various features of craving as they actually are.

As mentioned above, mindfulness may help in dispelling emotional distortions based on positive as well as negative affective biases (Brewer, Davis, & Goldstein, 2012), which keep us from paying careful attention to the painful aspects of grasping and distorting our memory of them even after we act in unskillful ways. For example, women who are distracted by emotionally driven, self-evaluative thoughts have been shown to be much slower in registering bodily reactions to emotionally charged images, an effect that is reversed by meditation training (Silverstein, Brown, Roth, & Britton, 2011). The textual account of the Buddha's spiritual journey highlights these types of cognitive distortions in comparing his pre-awakening times of mistaking stress for happiness: "In the past sensual pleasures were painful to touch, hot, and scorching; in the future sensual pleasures will be painful to touch, hot, and scorching; and now at present sensual pleasures are painful to the touch, hot, and scorching. But these beings who are not free from lust for sensual pleasures, who are devoured by craving for sensual pleasures, who burn with fever for sensual pleasures, have faculties that are impaired; thus, though sensual pleasures are actually painful to touch, they acquire a mistaken perception of them as pleasant" (MN.75 in Ñāṇ amoli & Bodhi, 1995).

Mindfulness counteracts both not knowing (lack of awareness) and knowing wrongly (misperception), indicating an important role in developing what the texts call "knowledge and vision of things as they are." The role of mindfulness in increasing individuals' ability to register and report on their emotional reactions in conceptual terms may derive from a more fundamental function of cultivating and broadening a kind of rich, experiential feeling of emotional states within ourselves (Davis & Thompson, 2012). Knowing cognitively that continued substance use only perpetuates one's and others' suffering is often not sufficient. In their seminal article examining behavioral change, Prochaska, DiClemente, and Norcross (1992) stated, "The progression from contemplation to action is… essential to beneficial outcome …." Instead of merely developing awareness or contemplating the problem, individuals need to feel the pain of this cycle directly, in a rich, experiential, preverbal way. In the words of Bob Marley, "who feels it knows it." When one is fully and accurately aware of the pain involved in the search for gratification, one does not have to positively reappraise the situation or suppress emotional reactions in other ways. Rather, by feeling and knowing what brings pain, individuals can counteract motivated reasoning and other unconscious strategies to appease their craving. There is already some evidence that training in meditation increases this type of subtle awareness of bodily states and their integration with thoughts, beliefs, feelings, etc. (Farb et al., 2013). In this way, Ethel Knoll-Kraver may come to see directly for herself what she actually gets from feeding her cravings—a relief that is temporary, and is motivated by a pain and destructive type of emotional reactivity.

By teaching individuals to simply observe aversive body and mind states (e.g., negative affect) rather than reacting to them, mindfulness training may foster the replacement of stress- and affect-induced, habitual reactions with more adaptive responses (e.g., enhanced self-control and regulation; Curtin et al., 2006).

Additionally, mindfulness training may help individuals change their relationships to negative affective or physically unpleasant states and thoughts (i.e., to "not take them personally"). To be clear, we postulate that the mechanism of action here is the attenuation of affective bias underlying the reaction of "taking things personally," rather than a change in self-related thoughts or cognitive attributions. As noted above, it is the habitual affective bias underlying emotional reactivity that fuels further rounds of craving and habituation. Thus, with attenuation of this affective bias, oxygen is slowly removed from the fire, ultimately leading to smoking cessation (Bowen et al., 2009; Bowen & Marlatt, 2009; Brewer et al., 2010). However, studies that directly test these hypotheses are needed.

Is Craving an Important Target of Mindfulness Training?

As stated above, mindfulness training may help individuals sit with or "ride out" their cravings. What is meant by this, and how does it fit with the theoretical underpinnings of mindfulness training? First, craving is inherently unpleasant (consider the feeling of wanting a drink of water on an extremely hot day), and naturally drives individuals to act, whether to smoke, drink, or use other drugs. The longer this craving goes unsatisfied, the more it may intensify as it becomes fueled by further reactions to the unpleasantness of the wanting itself. For example, in a study of treatment-seeking smokers, for each standard deviation increase in craving scores on the target quit date, the risk of lapsing rose by 43 % on that day, and 65 % on the following day (Ferguson, Shiffman, & Gwaltney, 2006). Mindfulness training teaches individuals to instead step back and take a moment to explore what cravings actually *feel* like in their bodies, however uncomfortable or unpleasant they may be. Two important insights can be learned from this process. First, individuals learn that cravings are physical sensations in their bodies rather than moral imperatives that must be acted upon. Second, they gain first-hand experience of the impermanent nature of these physical sensations. Each time they ride out a craving—experiencing its physicality without acting on it—this reinforces their insight that cravings will subside on their own, even if not satisfied. In theory, this allows individuals to learn how to tolerate the physical sensations without acting on them. Cravings may continue to arise, but learning to sit with urges, to pause and not immediately react, may disrupt the associative learning process and the automaticity of the action ordinarily taken. In other words, the birth of an identity around an object ("This is uncomfortable for me, I'd better go smoke a cigarette") is not fostered or fed. Or put another way, the fuel has not been added to the fire, such that the fire burns out more quickly. If this is true, MT should affect the traditional observation that smoking and craving are positively correlated. In fact one might predict that it would decouple this relationship.

A recent study suggests that this decoupling may be true. In a follow-up to their MT for smoking cessation trial, Brewer and colleagues examined the relationship between craving and smoking behavior during treatment (Elwafi, Witkiewitz, Mallik, Iv, & Brewer, 2012). At the start of MT, individuals showed a strong positive correlation between average daily cigarette use and their self-reported craving for cigarettes, as measured by the Questionnaire on Smoking Urges ($r = 0.58$, $p < 0.001$). At the end of the 4-week treatment period, this correlation was reduced to the point of statistical nonsignificance ($r = 0.13$, $p = 0.49$). Importantly, individuals who quit smoking showed *no difference* in craving scores compared to those who continued to smoke at the end of treatment, but instead demonstrated a delayed reduction in reported craving, while those who did not quit reported an increase in craving concomitant with increases in smoking. These results suggest that after just 4 weeks of mindfulness training, individuals were no longer reacting to their cravings by smoking. One interpretation of this is that mindfulness training may have decoupled the relationship between craving and smoking during treatment. In other words, mindfulness practice may help individuals stop adding fuel to the fire (craving), but the

fire still continues to burn based on the fuel that is already present (e.g., individuals still crave when they first quit). Importantly, over time, without continued sustenance (smoking), the fire burns out by itself.

The possibility of craving and smoking being decoupled by MT is further supported by the amount of home practice that subjects reported. Similar to previous studies of psychological health and mindfulness training (Carmody & Baer, 2008), Brewer et al. (2011a) initially found that increased home practice was correlated with decreased cigarette use for both formal ($r=-0.44$, $p<0.02$) and informal practice ($r=-0.48$, $p<0.01$). In fact, the amount of mindfulness practice during treatment not only predicted smoking behavior at the end of treatment but moderated the relationship between craving and smoking as well: the more that individuals practiced during treatment, the less craving correlated with the number of cigarettes individuals smoked at the end of treatment (Elwafi et al., 2012).

The ability of mindfulness training to attenuate the relationship between craving and substance use has been observed in other studies as well. Witkiewitz and Bowen (2010) examined the relationship between depression, craving, and substance use following a randomized clinical trial of MBRP. They found that craving mediated the relationship between depressive symptoms and substance use in the group that received conventional treatment, but not in the group that received MBRP. Taken together, these results suggest that mindfulness training may indeed help individuals develop a tolerance to craving itself, thus over time acting to dismantle the addictive loop through a dis-identification with the object (or dismantling of self-identity). The next logical steps will be to determine how these map onto current psychological models of change behavior. For example, do tolerance of craving and dismantling of self-identity equate to reappraisal and extinction, respectively, or to other skills, or constitute unique entities unto themselves?

Neurobiological Mechanisms of Mindfulness Training

Brain regions that show commonality between a number of different maladies and importantly have also been theoretically and functionally linked to mindfulness training may provide a logical starting point in assaying its neurobiological mechanisms (for a more detailed review of possible mechanisms, see Hölzel et al., 2011). The default mode network (DMN; a network of highly correlated brain regions that show coherent activity during rest and relate to aspects of self-referential processing—see Andrews-Hanna, Reidler, Sepulcre, Poulin, & Buckner, 2010; Buckner, Andrews-Hanna, & Schacter, 2008; Fox & Raichle, 2007) may be one of these targets, given its primacy in a number of psychiatric disorders ranging from anxiety to addiction (Buckner et al., 2008). There are two primary nodes of the DMN, the medial prefrontal cortex and the posterior cingulate cortex (PCC). These have been shown to be temporally correlated with a number of peripheral nodes, and anticorrelated with brain regions involved in self-monitoring, and cognitive control (anterior insula; AI; dorsal anterior cingulate cortex, dACC; dorsolateral prefrontal cortex, dlPFC) (Andrews-Hanna et al., 2010). Though self-referential processing is a complex area of investigation in itself, on a first approximation, this may be where models of self-identity formation at least partially overlap; memory retrieval and the "self across time" are linked by PCC activity (Andrews-Hanna et al., 2010; Buckner et al., 2008). As the DMN has been shown to be altered by mindfulness training (Brewer et al., 2011b), and given its documented contributions to mind-wandering and self-referential processing, the DMN is a biologically plausible target for mindfulness training as MT teaches the inverse of mind-wandering and self-referential processing. Of course, the exact patterns and functions of the brain's resting state networks (of which the DMN is one) should be interpreted with some caution as there are

limitations to our current analytic methods and we are only just beginning to understand the various causal factors that lead to the observed patterns (see, e.g., Fan et al., 2012).

With regard to the effects of mindfulness training on the DMN, there is evidence of decreased DMN activity during mindful awareness of visually presented adjectives versus determination of personal meaning of adjectives, following 8 weeks of MBSR (Farb et al., 2007). Taylor et al. (2011) similarly found deactivation of DMN structures in meditators practicing a "mindful state" while viewing emotionally evocative pictures. Extending these, Brewer and colleagues found that in very experienced meditators (>10,000 h of practice on average), DMN deactivation was common to three different types of meditation (concentration, loving-kindness, and choiceless awareness) (Brewer, Worhunsky et al., 2011). These findings may suggest that the success of MT for addictions may work via a disengagement from self-identified habitual response patterns. By mindfully attending to cravings, the DMN node activity and/or connectivity may be altered, as seen above during meditation or the viewing of evocative pictures. Over time, these circuits may even change, as the habituated sense of self around smoking fades due to lack of sustenance or fuel.

Interestingly, Brewer and colleagues found an increase in functional connectivity between the PCC, and the dACC as well as the dlPFC in experienced meditators compared to controls. This is important, because these regions are anticorrelated in the vast majority of contexts, and thus named the "task-negative" (DMN) and "task-positive" (dACC, dlPFC, and others) networks, respectively (Fox & Raichle, 2007). Controls showed typical anticorrelation patterns between these structures at baseline, which decreased during meditation, suggesting a state-dependent connectivity pattern in untrained individuals. However, the observed *increased* connectivity patterns seen in experienced meditators were present *both* at baseline and during meditation, suggesting that they may have established a "new" *default mode* of intrinsic brain activity and connectivity. These findings should be interpreted with caution, as this study was cross-sectional, and could be influenced by self-selection bias.

As action-monitoring/prediction (e.g., dACC) and cognitive control regions (e.g., dlPFC) have been shown to be important in self-control, addictions, and treatment outcomes (Brewer, Worhunsky, Carroll, Rounsaville, & Potenza, 2008), these findings suggest that MT may fundamentally alter brain activity and connectivity patterns in networks important for perpetuation of addictive behaviors. In essence, mindfulness may help to bring together our capacity to monitor our internal and external environments (AI/dACC; see Farb et al., 2013), especially when craving or self-referential states arise (likely activation of DMN), and to utilize self-control (likely activation of dlPFC) when needed. Over time, as monitoring strengthens and the processes of craving weaken due to a lack of sustenance, effortful self-control may not be needed as much. In theory, the more Ethel develops her capacity to pay attention to her internal and external environment, the less she would fuel her habitual "coping" strategies of drinking to deal with stress and withdrawal states, leading to the cooling off of her habituated affective self-identity and its eventual cessation. However, prospective studies of individuals receiving MT for addictions that measure changes in brain activity and connectivity over time are needed to test such hypotheses. As we focused mainly on the DMN in this chapter, studies assessing other possible brain regions/networks that may emerge as prominent players in the neural mechanisms of mindfulness will also be important.

Conclusions and Future Directions

Over the past century, much has been discovered about the addictive process and its underlying neurobiology (Goldstein et al., 2009; Kalivas & Volkow, 2005). From these findings, psychological models have been put forward that have been instrumental in the development of novel treatments that directly target core components of this process. These models show remarkable similarities to ancient Buddhist psychological models

aimed at describing the causes of human suffering. Modern treatments, such as MT that are based on these Buddhist models, are beginning to show preliminary efficacy in the treatment of addictions, and may be doing so through changing one's relationship to core addictive elements such as craving. Recent neuroimaging studies are converging with these concepts, suggesting that MT can fundamentally change basic brain processes, such as the brain's spontaneous activation and intrinsic connectivity patterns. These may manifest behaviorally, in that individuals may develop new habits such as monitoring unskillful thought processes and automatic behaviors, and objectively observing them rather than being "sucked in" by them and smoking, using other drugs, or engaging in other unhealthy behaviors. Perhaps people can even practice becoming interested and fascinated with the bodily sensations of craving, thereby co-opting the very process that perpetuates this addictive cycle to uproot it, leading to the later dying away or cessation of craving itself. Ultimately, with practice, this may lead to more adaptive choices with concomitant decreases in stress and suffering.

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References

Andrews-Hanna, J. R., Reidler, J. S., Sepulcre, J., Poulin, R., & Buckner, R. L. (2010). Functional-anatomic fractionation of the brain's default network. *Neuron, 65*, 550–562.

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clininical Psychology: Science and Practice, 10*, 125–143.

Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction motivation reformulated: An affective processing model of negative reinforcement. *Psychological Review, 111*, 33–51.

Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist, 54*, 462–479.

Bedi, G., Preston, K. L., Epstein, D. H., Heishman, S. J., Marrone, G. F., Shaham, Y., et al. (2011). Incubation of cue-induced cigarette craving during abstinence in human smokers. *Biological Psychiatry, 69*, 708–711.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., …, Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241.

Bouton, M. E., Westbrook, R. F., Corcoran, K. A., & Maren, S. (2006). Contextual and temporal modulation of extinction: Behavioral and biological mechanisms. *Biological Psychiatry, 60*, 352–360.

Bowen, S., Chawla, N., Collins, S. E., Witkiewitz, K., Hsu, S., Grow, J., …, Marlatt, A. (2009). Mindfulness-based relapse prevention for substance use disorders: a pilot efficacy trial. *Substance Abuse, 30*, 295–305.

Bowen, S., & Marlatt, A. (2009). Surfing the urge: Brief mindfulness-based intervention for college student smokers. *Psychology of Addictive Behaviors, 23*, 666–671.

Brewer, J. A., Bowen, S., Smith, J. T., Marlatt, G. A., & Potenza, M. N. (2010). Mindfulness-based treatments for co-occurring depression and substance use disorders: What can we learn from the brain? *Addiction, 105*, 1698–1706.

Brewer, J. A., Davis, J. H., & Goldstein, J. (2012). Why is it so hard to pay attention, or is it? Mindfulness, the factors of awakening and reward-based learning. *Mindfulness, 1–6*.

Brewer, J. A., Mallik, S., Babuscio, T. A., Nich, C., Johnson, H. E., Deleone, C. M., …, Rounsaville, B. J. (2011a). Mindfulness training for smoking cessation: Results from a randomized controlled trial. *Drug and Alcohol Dependence, 119*, 72–80.

Brewer, J. A., Sinha, R., Chen, J. A., Michalsen, R. N., Babuscio, T. A., Nich, C., …, Rounsaville, B. J. (2009). Mindfulness training and stress reactivity in substance abuse: results from a randomized, controlled stage I pilot study. *Substance Abuse, 30*, 306–317.

Brewer, J. A., Worhunsky, P. D., Carroll, K. M., Rounsaville, B. J., & Potenza, M. N. (2008). Pretreatment brain activation during Stroop task is associated with outcomes in cocaine-dependent patients. *Biological Psychiatry, 64*, 998–1004.

Brewer, J. A., Worhunsky, P. D., Gray, J. R., Tang, Y. Y., Weber, J., & Kober, H. (2011b). Meditation experience is associated with differences in default mode network activity and connectivity. *Proceedings of the National Academy of Sciences of the United States of America, 108*, 20254–20259.

Buckner, R. L., Andrews-Hanna, J. R., & Schacter, D. L. (2008). The brain's default network: Anatomy, function, and relevance to disease. In A. Kingstone & M. B. Miller (Eds.), *The year in cognitive neuroscience 2008* (pp. 1–38). Malden, MA: Blackwell Publishing.

Carmody, J., & Baer, R. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine, 31*, 23–33.

Cropley, M., Ussher, M., & Charitou, E. (2007). Acute effects of a guided relaxation routine (body scan) on tobacco withdrawal symptoms and cravings in abstinent smokers. *Addiction, 102*, 989–993.

Curtin, J. J., McCarthy, D. E., Piper, M. E., & Baker, T. B. (2006). Implicit and explicit drug motivational processes: A model of boundary conditions. In R. W. Wiers & A. W. Stacy (Eds.), *Handbook of implicit cognition and addiction* (pp. 233–250). Thousand Oaks, CA: Sage.

Davis, J. M., Fleming, M. F., Bonus, K. A., & Baker, T. B. (2007). A pilot study on mindfulness based stress reduction for smokers. *BMC Complementary and Alternative Medicine, 7*, 2.

Davis, J. H., & Thompson, E. (2012). From the five aggregates to phenomenal consciousness: Toward a cross-cultural cognitive science. In S. Emmanual (Ed.), *A companion to Buddhist philosophy*. New York, NY: Wiley-Blackwell.

Elliott, R., Zahn, R., Deakin, J. F., & Anderson, I. M. (2011). Affective cognition and its disruption in mood disorders. *Neuropsychopharmacology, 36*, 153–182.

Elwafi, H. M., Witkiewitz, K., Mallik, S., Iv, T. A., & Brewer, J. A. (2012). Mindfulness training for smoking cessation: Moderation of the relationship between craving and cigarette use. *Drug and Alcohol Dependence, 130*(1–3), 222–229.

Fan, J., Xu, P., Van Dam, N. T., Eilam, T., Gu, X., Luo, Y., et al. (2012). Spontaneous brain fluctuations relate to autonomic arousal. *Journal of Neurosicence, 15*, 11176–11186.

Farb, N. A., Segal, Z. V., Mayberg, H., Bean, J., McKeon, D., Fatima, Z., et al. (2007). Attending to the present: Mindfulness meditation reveals distinct neural modes of self-reference. *Social, Cognitive, and Affective Neuroscience, 2*, 313–322.

Farb, N. A., Segal, Z. V., & Anderson, A. K. (2013). Mindfulness meditation training alters cortical representations of interoceptive attention. *Social, Cognitive, and Affective Neuroscience, 8*, 15–26.

Ferguson, S. G., Shiffman, S., & Gwaltney, C. J. (2006). Does reducing withdrawal severity mediate nicotine patch efficacy? A randomized clinical trial. *Journal of Consulting and Clinical Psychology, 74*, 1153–1161.

Fiore, M. C., Jaen, C. R., Baker, T. B., Bailey, W. C., Bennowitz, N. L., Curry, S. J., …, Wewers, M. E. (2008). Treating tobacco use and dependence: 2008 Update. *Washington, DC: U.S. Department of Health and Human Services*.

Fox, M. D., & Raichle, M. E. (2007). Spontaneous fluctuations in brain activity observed with functional magnetic resonance imaging. *Nature Reviews Neuroscience, 8*, 700–711.

Garland, E., Gaylord, S., & Fredrickson, B. (2011). Positive reappraisal mediates the stress-reductive effects of mindfulness: An upward spiral process. *Mindfulness, 2*, 59–67.

Garland, E., Gaylord, S., & Park, J. (2009). The role of mindfulness in positive reappraisal. *EXPLORE: The Journal of Science and Healing, 5*, 37–44.

Gifford, E. V., Kohlenberg, B. S., Hayes, S. C., Antonuccio, D. O., Piasecki, M. M., Rasmussen-Hall, M. L., et al. (2004). Acceptance-based treatment for smoking cessation. *Behavior Therapy, 35*, 689–705.

Goldstein, R. Z., Craig, A. D., Bechara, A., Garavan, H., Childress, A. R., Paulus, M. P., et al. (2009). The neurocircuitry of impaired insight in drug addiction. *Trends in Cognitive Sciences, 13*, 372–380.

Grabovac, A., Lau, M., & Willett, B. (2011). Mechanisms of mindfulness: A Buddhist psychological model. *Mindfulness, 2*, 154–166.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*, 35–43.

Hamilton, S. (2000). *Early Buddhism: A new approach: The I of the beholder* (Vol. 16). London, UK: Routledge-Curzon.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169–183.

Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science, 6*, 537–559.

Kalivas, P. W., & Volkow, N. D. (2005). The neural basis of addiction: A pathology of motivation and choice. *American Journal of Psychiatry, 162*, 1403–1413.

Law, M., & Tang, J. L. (1995). An analysis of the effectiveness of interventions intended to help people stop smoking. *Archives of Internal Medicine, 155*, 1933–1941.

Lazev, A. B., Herzog, T. A., & Brandon, T. H. (1999). Classical conditions of environmental cues to cigarette smoking. *Experimental and Clinical Psychopharmacology, 7*, 56–63.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin, 126*, 247–259.

Ñāṇamoli, B., & Bodhi, B. (Eds.). (1995). *The middle length discourses of the Buddha: A translation of the Majjhima Nikāya*. Boston, MA: Wisdom Publications.

Niaura, R., & Abrams, D. B. (2002). Smoking cessation: Progress, priorities, and prospectus. *Journal of Consulting and Clinical Psychology, 70*, 494–509.

Nyanaponika, T. (2000). *The vision of Dhamma: Buddhist writings of Nyanponika Thera* (2nd ed.). Seattle, WA: Buddhist Publication Society.

Office of National Drug Control Policy. (2004). *The economic costs of drug abuse in the United States*. Retrieved July 4, 2012, from http://www.whitehouse.gov/ondcp

Ortner, C. N. M., Kilner, S. J., & Zelazo, P. D. (2007). Mindfulness meditation and reduced emotional interference on a cognitive task. *Motivation and Emotion, 31*, 271–283.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change. Applications to addictive behaviors. *American Psychologist, 47*, 1102–1114.

Robinson, T. E., & Berridge, K. C. (2008). The incentive sensitization theory of addiction: Some current issues.

Philosophical Transactions of the Royal Society, B: Biological Sciences, 363, 3137–3146.

Silverstein, R. G., Brown, A. H., Roth, H. D., & Britton, W. B. (2011). Effects of mindfulness training on body awareness to sexual stimuli: Implications for female sexual dysfunction. *Psychosomatic Medicine, 73*, 817–825.

Taylor, V. A., Grant, J., Daneault, V., Scavone, G., Breton, E., Roffe-Vidal, S., …, Beauregard, M. (2011). Impact of mindfulness on the neural responses to emotional pictures in experienced and beginner meditators. *Neuroimage, 57*, 1524–1533.

Thanissaro, B. (trans.) (2010a). Dhammacakkappavattana Sutta: Setting in motion the wheel of truth (SN 56.11). Retrieved October 7, 2011, from http://www.accesstoinsight.org/tipitaka/sn/sn56/sn56.011.than.html.

Thanissaro, B. (trans.) (2010b). Paticca-samuppada-vibhanga Sutta: Analysis of dependent co-arising (SN 12.2). Retrieved February 12, 2013, from http://www.accesstoinsight.org/tipitaka/sn/sn12/sn12.002.than.html.

Tiffany, S. T., & Wray, J. M. (2012). The clinical significance of drug craving. *Annals of the New York Academy of Sciences, 1248*, 1–17.

Witkiewitz, K., & Bowen, S. (2010). Depression, craving, and substance use following a randomized trial of mindfulness-based relapse prevention. *Journal of Consulting and Clinical Psychology, 78*, 362–374.

Zgierska, A., Rabago, D., Chawla, N., Kushner, K., Koehler, R., & Marlatt, A. (2009). Mindfulness meditation for substance use disorders: A systematic review. *Substance Abuse, 30*, 266–294.

Zgierska, A., Rabago, D., Zuelsdorff, M., Coe, C., Miller, M., & Fleming, M. (2008). Mindfulness meditation for alcohol relapse prevention: A feasibility pilot study. *Journal of Addiction Medicine, 2*, 165–173.

Mindfulness, Eating Disorders, and Food Intake Regulation

15

Jean L. Kristeller

Introduction

Most, if not all of us, eat mindlessly at times. We may overeat at a meal, choose foods without reflection, too often eat to handle stress, or more painfully develop an eating disorder. Cultivating mindfulness to create more balanced eating may therefore have widespread application, both for disorders such as binge eating or bulimia, or to help people create more balanced eating for other reasons, including better health and a decreased sense of struggle.

Eating engages complex self-regulatory processes, most fundamentally responding to needs for food energy, nutrition, and physical satiety processes. Such basic needs are also complemented by many other uses of food—to soothe and comfort, to celebrate, to socialize, or to obtain pleasure. Maintaining a balance between physical needs for food and the psychological value of eating often occurs flexibly and without much awareness. Among the physiological systems in the body that are necessary for survival, eating is perhaps unique in its flexible nature. In contrast, it is possible to override needs for sleep or fluids for only a few hours before it becomes difficult to function effectively. Yet people overeat or undereat regularly for extended periods of time, overriding feedback signals of physical hunger and satiety, and fluctuating tremendously in the nutritional value of their food intake. Overriding internal signals may be more exaggerated in individuals with eating disorders but also occurs in individuals without any eating-related problems. Such variation was protective from an evolutionary perspective, but with ready access to highly palatable food has become problematic (King, 2013).

The process of eating also involves virtually all the other systems that are being explored in regard to the impact of mindfulness on self-regulation, usefully understood from a multi-domain model of meditation effects (Kristeller, 2003, 2007). Eating is inherently a behavioral process, but it also involves emotions, thought processes, self-judgment and self-identity, and social relationships. The meaning of food may also engage spiritual experience, as beautifully addressed in several books on mindful eating (e.g., Altman, 2002; Bays, 2009; Hanh & Cheung, 2010; Kabatznick, 1998). This chapter explores a range of mindfulness practices both in regard to the clinical development and research evidence for the Mindfulness-Based Eating Awareness Training (MB-EAT) program (Kristeller, 2016; Kristeller & wolever, 2011; Kristeller, Wolever, & Sheets, 2013; Kristeller & Wolever, 2016), and in regard to broader theoretical issues. The clinical

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focus will extend from milder levels of dysregulated eating, experienced at times by most individuals, to the extreme degree of dysfunction observed in those with binge eating disorder (BED).

Self-Regulation Theory, Mindful Eating, and Meditation

From its inception, MB-EAT was informed by self-regulation theory, linked with early models of food intake regulation that acknowledged the complex interplay of psychological and physiological control processes (Rodin, 1978, 1981; Schachter, 1971; Schachter & Rodin, 1974). Early psychobiological formulations of self-regulation theory (Schwartz, 1975; Shapiro & Schwartz, 2000) focused on the importance of interoceptive awareness, particularly of physiological processes, as a core element of internal regulatory processes. These perspectives on self-regulation expanded on early theories of physiological homeostasis (e.g., Cannon, 1932) and systems theory (e.g., Bertalanffy, 1968; Miller, 1978).

A hallmark expression of early self-regulation theory were the biofeedback-based therapies (Schwartz, 1975; Patel, 1977). Biofeedback is effective because it facilitates interoceptive attention and awareness to assist individuals to manage stress-related physical symptoms. The link was then made to parallel aspects of meditation-based "relaxation training" that also facilitates psychobiological self-regulation by cultivating processes of attention and awareness (Cuthbert, Kristeller, Simons, Hodes, & Lang, 1981; Davidson, Goleman, & Schwartz, 1976; Kristeller, 1977; Schwartz, 1975). Although meditation practice has not been shown to be adequate to facilitate awareness of very subtle signals, such as heart rate (Khalsa et al., 2008), meditators have been shown to better track respiratory processes, a system more available to interoceptive awareness (Daubenmier, Sze, Kerr, Kemeny, & Mehling, 2013). Even though there are no easily applied external monitors, such as electrodes, to magnify subtle body signals of hunger and satiety, the self-regulatory value of using mindfulness techniques to cultivate attention to body signals that are generally available to awareness is clearly parallel.

Self-regulation theory further posits that even complex systems can be maintained and re-regulated with relatively little sense of effort or struggle (Carver & Scheier, 1982, 1998) if appropriate feedback mechanisms are engaged. This is in contrast to willpower models that assume the need for ongoing vigilance for extended periods of time, or in the case of some addiction models, indefinitely. Within the weight regulation area, "willpower" or abstinence-based models abound; while some individuals internalize recommended constraints, many individuals rebound in regard both to behavior and to weight regain. Although self-control models related to weight management (e.g., Brownell, 2000; Cooper, Fairburn, & Hawker, 2004) have contributed substantially to understanding how individuals can recondition long-standing eating patterns, they have tended to focus on managing externally or emotionally triggered impulses to eat, rather than engaging use of internal feedback systems. One notable exception to this is Linda Craighead's Appetite Awareness model (Brown, Smith, & Craighead, 2010; Craighead, 2006) in which a core part of treatment involves cultivating attention to hunger and satiety signals.

Regulation and Dysregulation of Food Intake

The importance of interplay between external or non-nutritive triggers for eating vs. internal signals related to physiological feedback systems has long been recognized within experimental and social psychology (Schachter, 1971; Schachter & Rodin, 1974). Decades of research on physiological hunger and satiety mechanisms indicate that such signals are easily overridden by non-nutritive influences, including both psychological and environmental triggers (Capaldi, 1996). It is important to emphasize that this complex interplay is part of normal food intake regulation. Wansink (2007), in his work on mindless eating, has found that individuals make over 200 decisions per day about food, including when to eat, what to eat, choices within a given meal, and

decisions to stop eating, increasing to about 300 decisions for those with significant weight problems (Wansink & Sobal, 2007). Given that complexity, cultivating self-regulatory balance in a flexible rather than constrained manner may be particularly desirable.

The elements involved in physiological regulation of food intake and weight are surprisingly complex. Those most available to interoceptive awareness include hunger signals, such as low blood sugar and stomach growling, taste sensitivity, and signals to terminate eating a particular food (sensory-specific satiety) or an entire meal (fullness, rise in blood sugar) (Capaldi, 1996; Ogden, 2010). Regardless of weight, people vary considerably in their underlying patterns (Drewnowski, 1996; Kristeller & Rodin, 1989) in regard to whether they initiate eating without being physically hungry, eat in response to emotional distress, or continue eating even when sated. In addition, individuals who are obese and report compulsive eating patterns show marked oversensitivity to "external" or "non-nutritive" cues to eat (social, emotional, or conditioned craving for certain foods), and a concomitant desensitization to "internal" cues, particularly related to normal satiety processes. While some models of this imbalance are grounded in biological (e.g., genetic or epigenetic) explanations (Appelhans, 2009), an alternative perspective is that most individuals can become "disconnected" from internal experience, creating patterns of "mindless" eating. Individuals with BED generally acknowledge frequently using eating to manage stress (Goldfield, Adamo, Rutherford, & Legg, 2008), and negative emotions (Chua, Touyz & Hill, 2004; Dunkley & Grilo, 2007), but this may range from relatively benign use of food as a source of comfort to extreme patterns in which eating facilitates dissociation from overwhelming feelings or reflects virtually their only coping mechanism, a significant failure of self-regulation. Individuals with BED also exhibit higher reactivity to food cues (Sobik, Hutchison, & Craighead, 2005), often expressing a sense of incapacity to control urges to eat when appealing food is available.

Deciding when to terminate food intake is also complex. Individuals who are obese and who eat larger amounts of food tolerate higher levels of stomach fullness and discomfort (Geliebter & Hashim, 2001; Geliebter, Hassid, & Hashim, 2001), both as a result of expanded stomach capacity and a failure to attend to distention signals as indicators for stopping eating. By definition, individuals with BED regularly eat very large quantities of food, well beyond normal feedback signals for satiety (Sysko, Devlin, Walsh, Zimmerli, & Kissileff, 2007). Individuals with BED and/or who are heavier often note that they don't stop eating "until the food is gone," or "when they feel too full to eat anymore." They virtually never mention awareness of more rapidly occurring feedback signals, such as no longer tasting or enjoying the food as much; early shifts in blood sugar that relate to a sense of satiety; or moderate, rather than extreme, feelings of fullness. Sensory-specific satiety or the process by which food loses its appeal as the taste buds in our mouths habituate to specific combinations of flavors is the fastest feedback system (Remick, Polivy, & Pliner, 2009; Sørensen, Møller, Flint, Martens, & Raben, 2003). Evidence suggests that it may be disrupted in obesity or binge eating (Raynor & Epstein, 2001), but functions normally when adequate awareness is brought to the process (Brondel et al., 2007). Ironically, the hedonic value of food is often ignored in treatment of obesity and/or compulsive eating patterns, although it often informs addictive models of excessive food intake (Grosshans, Loeber, & Kiefer, 2011). However, the solution offered is often abstinence, rather than helping individuals cultivate more internalized self-regulation. Paradoxically, little comfort may actually be derived from the food being consumed, unlike for individuals without eating issues who acknowledge using food to manage negative emotions (Kristeller & Rodin, 1989).

Mindfulness Practice: A Self-Regulation Approach

Recent neurocognitive models support the value of meditation practice as a path toward re-regulation (Lutz, Slagter, Dunne, & Davidson, 2008), particularly within complex emotional

systems that require higher level neuro-processing to be brought into better balance. Ryan and Deci's (2000) Self-Determination Theory of mindfulness explicates the value of shifting from *external regulation*, such as is imposed by structured diets, to *integrated regulation* in which intrinsic processes meld with external factors for optimal self-regulation. As MB-EAT began to develop, the role of meditation was shifting from being conceptualized as a relaxation process to being a powerful way to quiet the mind and cultivate self-awareness of internal experience. Mindfulness practice also cultivates the capacity to disengage undesirable reactivity, and to engage processes that more "wisely" inform behavior, also particularly relevant to issues related to eating and food choices (Kristeller, Baer, & Quillian-Wolever, 2006; Wolever & Best, 2009). Meditation has become more appropriately viewed as a way to cultivate a particular quality of attention and awareness, which then mediates a wide range of self-regulatory processes.

Several specific aspects of meditation practice have informed the development of the MB-EAT program. These include both open and guided meditations, and both extended practice and very brief practice. All of these aspects have extensive basis in meditative traditions and play distinct roles in self-regulatory processes (Kristeller, 2007). Sitting practice, whether breath awareness or open awareness, cultivates a more general capacity for experiencing in the moment, whether that moment contains physical feelings, thoughts, or emotions. Guided practice encourages awareness of a specific targeted experience, yet in an observing, stable, nonjudgmental and curious manner. Given the complexity of our relationship to food, guided practices help individuals identify distinct aspects of their eating experience, viewing them with curiosity instead of judgment. These guided practices focus on physical vs. emotional hunger, taste, fullness, and making healthier and wiser food choices. Other therapeutic applications of mindfulness meditation, such as the Mindfulness-Based Stress Reduction Program (Kabat-Zinn, 1990), Mindfulness-Based Cognitive Therapy (Segal, Williams, & Teasdale, 2002), and Mindfulness-Based Relapse Prevention (Bowen, Chawla, & Marlatt, 2011), undertake similar goals in regard to treatment of anxiety disorders, depression, and addictions, also utilizing both mindfulness meditation training and mindfulness exercises specific to the presenting issues and associated therapeutic needs, such as depressive thoughts or urges to drink.

The concepts of "wisdom" or insight, and self-acceptance, core aspects of traditional meditation practice, are also central to the MB-EAT program. Wisdom, from a psychological perspective, has a number of definitions (Sternberg, 1990), but these generally involve exercising good judgment in complex or uncertain situations. Sternberg's balance theory of wisdom focuses on "tacit" rather than "explicit" knowledge; Baltes and Staudinger (1993) frame wisdom in terms of exercising judgment in the "fundamental pragmatics" of life. Within the context of meditation practice, wisdom can be understood from a neuroscience perspective as arising from greater access to and integration of the complexity of experience and knowledge that each person already carries within (Kristeller, 2003; Meeks, Cahn, & Jeste, 2012). Ostafin and Kassman (2012) have demonstrated that even novice meditators increase in creative or insight-oriented problem solving. We emphasize in the program that mindfulness practice can assist in accessing such "tacit" knowledge and judgment in any situation, including making apparently trivial, but often complex, decisions regarding food choice and eating.

From the first session of the MB-EAT program, participants are presented with the concept of wisdom as something accessible to them, in that wisdom emerges from their own experiences and abilities to recognize solutions to challenging situations, rather than having these proscribed from without. Self-acceptance is framed as an alternative to reacting judgmentally to every self-perceived slip from internalized norms, a hallmark of eating disorders. Instead, they are encouraged to use mindfulness first to self-observe reactive or overeating episodes, then to notice triggers, with an attitude of open curiosity,

and, finally, to access their own "wisdom" to look for alternatives. In contrast to approaches that emphasize simple solutions (i.e., highly structured diets), MB-EAT acknowledges the complexity of choices involved in eating, and that an attitude of patience, experimentation, and self-compassion goes much further in developing patterns that can be sustained indefinitely. Self-acceptance and self-forgiveness are particularly relevant to interrupting dysfunctional cycles of binging, self-recrimination, and over-restraint.

At the same time, the MB-EAT model is compatible with other perspectives on treating dysfunctional eating patterns, including cognitive-behavioral approaches (Apple & Agras, 1997), interpersonal therapy (Wilfley et al., 2002) for BED, and other approaches incorporating mindfulness within acceptance-based treatments (Safer, Telch, & Chen, 2009; Wilson, 2004). However, similar to Appetite Awareness Training (Allen & Craighead, 1999), MB-EAT brings more attention to processes of food intake per se. MB-EAT also incorporates recent work recognizing the complexity of hedonic drives associated with food (Appelhans, 2009; King, 2013). In sum, the MB-EAT program is designed to help individuals cultivate awareness of both internal and external triggers to eating; interrupt dysfunctional cycles of binging, self-recrimination, and over-restraint; and re-engage natural physiological processes of eating regulation. Moreover, the program emphasizes the pleasure and nurturing aspects of eating, in terms of both types and amount of food eaten, along with healthier patterns of food choice.

Mindful Eating and Mindfulness Practice: A Model of De-conditioning

Cultivating a Capacity for Mindfulness

As mindfulness is increasingly recognized as a general human capacity, rather than something esoteric and unique to meditation practice, it becomes easier to explain to individuals how we are assisting them to cultivate a capacity that brings this greater sense of self-control, balance, and wisdom. Figure 15.1 represents this process of engaging mindfulness in order to produce a sense of control over previously over-conditioned patterns of triggers and reactions. Although the examples provided here reflect the struggles of someone with a clinically significant level of disordered eating, the processes involved apply to anyone who has become "mindless" about some aspect of his or her relationship to food and eating.

First Stage: Cultivating Nonjudgmental Awareness

The top half (A) of the figure represents a conditioned cycle of dysfunctional eating. The individual depicted here has many issues with overeating; one of them, illustrated here, is coming home from work, feeling stressed, and often overly hungry, finding a box of tempting cookies, and rather than eating just a few, as intended, eating the whole box. As trigger "X" (seeing the cookies; thinking "I deserve a couple") leads to reaction "Y" (eating the whole box) over and over again, increasingly experienced as out of control and automatic, the individual begins to feel helpless and further distressed.

As mindfulness is introduced, the individual becomes more aware of the triggers (1), such as certain feelings, thoughts, or foods. These triggers are often more complex than first perceived. For example, someone may become aware that it's not only seeing the cookies, but also being stressed by a particular type of work issue AND being overly hungry, combined with certain thoughts ("I've blown it by eating one cookie, so I might as well keep on going.").

Second Stage: Cultivating Capacity to Interrupt Reactivity and Mindless Choice

The second stage (also depicted within the top half of the figure) emerges as the arrows of mindfulness penetrate awareness; the individual

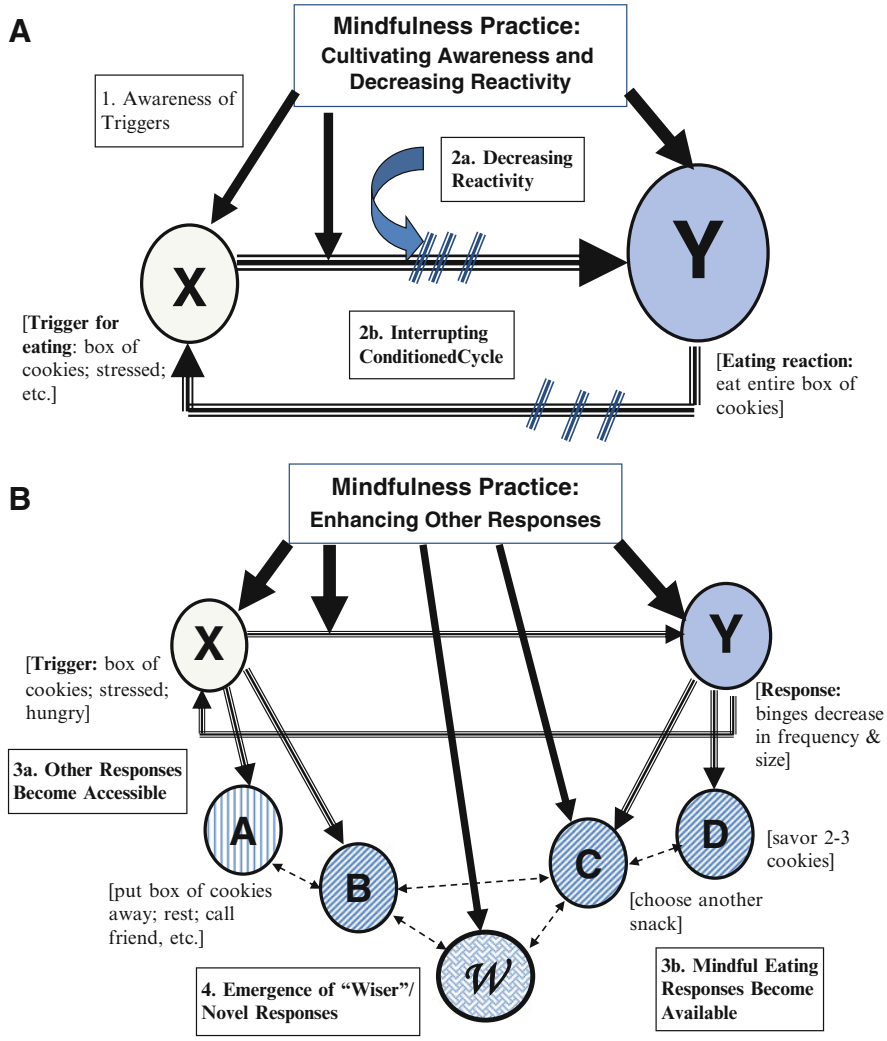

Fig. 15.1 Mindfulness practice and mindful eating: moving from awareness (**A**) to wise choice (**B**)

begins to recognize a decreasing sense of compulsion, and a weakening of the pull to react in response to the set of triggers (2a). As reaction is replaced by accepting observation, the reinforcement cycle begins to weaken (2b).

Although learning theory suggests that any decrease in pairing of "stimulus" and "response" weakens the conditioned reinforcement cycle, clinical evidence suggests that when access to the object is blocked by willpower, a vow of abstinence, or simple self-control techniques (i.e., hiding the boxes of cookies), there may be little decrease in desire nor in the perceived strength of the reinforcement cycle. In contrast, in our clinical experience, we have found that with mindfulness, as depicted in this figure, the entire cycle weakens fairly rapidly.

Third Stage: Cultivating Awareness of Alternatives and Development of Mindful Eating

Several elements have shifted in the bottom half (B) of the figure. In this next phase, the perceived strength of both the triggers and the reaction has

gotten weaker/smaller. The response/reaction (such as eating cookies just because they are there) has not completely disappeared, and the triggers are generally still present (feeling upset; seeing cookies), but their trigger strength, and the strength of the reinforcement cycle, has decreased. The arrows of awareness connecting mindfulness to both the trigger(s) (*X*) and responses/reactions (Y) have gotten larger/strengthened, as individuals learn to nonjudgmentally observe these overlearned patterns.

As significantly, awareness of alternative responses (circles A and B) to trigger situations has increased (3a). Although this can also occur in response to more traditional cognitive-behavioral approaches to treating overlearned patterns, mindfulness practice may increase the sense of accessibility of these alternatives, involving less effort to engage them. Often these alternatives, such as calling a friend when stressed, rise into awareness after only a few moments of mindfulness. For individuals with long-standing eating issues, the alternatives to eating may not be clear at first, as eating has served for so long as a primary coping tool. Exploring alternatives, whether in group or individual therapy, is therefore a valuable treatment component.

Circles C and D (3b) represent ways to engage the old response system—eating for comfort—but in better balance. This involves cultivating mindful awareness of food choice, physical hunger, taste satisfaction, and satiety. Even individuals with highly dysregulated eating patterns may find that this can happen relatively quickly. In this example, that might mean giving oneself permission to slowly eat and savor a few cookies—or to choose a different "comfort food." Over time, uncontrolled reactivity shifts into having a choice of responses. The sense of struggle decreases or even disappears, and the sense of choice and self-determination increases.

Fourth Stage: Access to Emergent Wise Mind

Finally, because mindfulness appears to act by more fully engaging neural networks, novel options may arise into consciousness. Such insight might happen during a sitting practice or in the moment of engaging in the behavior itself. People in our program strongly resonate to the concept of cultivating the "wise" mind. The term "wisdom" often implies a profound level of insight or new understanding. However, wisdom may also be simple, involving the emergence of new choices, not offered as solutions by others (such as structured diets), but growing out of one's own experience. For example, a woman in our group realized that she was most tempted at home by a particular type of cookie (oatmeal raisin); her previous solution had been not to buy any cookies at all, but that left her feeling deprived. She had the insight one day that she could keep a different type of cookie at home that she found far less tempting … but which was still satisfying when she really wanted a small, sweet snack. She then indulged her desire for oatmeal raisin cookies by buying one or two at a local bakery—particularly when feeling stressed. A year later she realized she could finally have such cookies in her home without overeating on them.

Program Content: The Conceptual Framework

Details of the MB-EAT program content are further outlined in Table 15.1, organized by key theoretical principles and concepts. The treatment components reflecting the principles fall into five distinct areas of practice: cultivating mindfulness in general; the application of mindfulness to all aspects of eating; improving emotional balance; cultivating "outer wisdom" or the wiser use of the wealth of nutritional information available; and engaging self-acceptance and non-self-judgment.

Cultivating Mindfulness

Mindfulness is the core capacity on which MB-EAT rests. As addressed above, it is not only central to cultivating attention and awareness, the core elements of practice (Jha, Krompinger, & Baime, 2007), but acts by softening and loosening

Table 15.1 MB-EAT: principles, practices, and targeted exercises

Concept/principle	Practices/exercises	Session
Cultivating mindfulness		
Cultivate capacity to direct attention, be aware, disengage reactivity, and be nonjudgmental	Mindfulness meditation practice in session. Daily practice	1–10
Cultivate ability to be mindful in daily experience, including eating	"Mini-meditation" use General use of mindfulness	2–10
Cultivating/engaging inner and outer "wisdom"	Meditation practice/mindfulness in daily life. Encouraging insight Wisdom meditation (Session 10)	1–10
Cultivating mindful eating		
Bring mindful attention and awareness to eating experience Recognizing mindless eating	Mindfulness meditation. Mini-meditations. Wide range of eating practices. Chain reaction model	1–10
Cultivate taste experience/savoring and enjoying food	Mindfully eating a variety of food. In session: Raisins; cheese and crackers; chocolate; fruit and veggies; "favorite food"; potluck. All meals during week; buffet homework	1, 2, 4, 6, 7, 9
Cultivate awareness of hunger experience	Hunger awareness meditation. Continuing as home practice	3
Awareness and cultivation of taste satiety/taste satisfaction/food choice	Training in sensory-specific satiety, both in and out of session. Taste satisfaction "meter" Choice: Chips or cookies Potluck/buffet homework	4, 7
Awareness and cultivation of fullness and body satiety experience	Fullness awareness/ratings with water. Potluck/buffet homework. Mindfully ending all meals	1–6
Awareness of negative self-judgment/cultivating nonjudgment of eating experience	Eating challenging foods Identifying cognitive distortions and "black and white" thinking; "surfing the urge"; abstinence violation effect	2–6, 9–10
Cultivating emotional balance		
Cultivate awareness of emotions and emotional reactivity	Learn to identify and tolerate emotional triggers. Chain reaction model	3–5, 9, 10
Meeting emotional needs in healthy ways	Mindfulness practice as stress reduction. Emotional eating visualization. Modifying comfort eating. Behavioral substitution	Most sessions
Cultivating "outer wisdom"		
Decreasing amount eaten in a flexible and sustainable manner	Tracking food energy/calories 500 Calorie Challenge. Mindfully attending to caloric values of different foods	2–6, 7
Attending to nutritional needs relative to better health	Mindfully making food choices based on personal health issues	
Increasing energy output by increased walking/gentle exercise	Pedometers; mindful walking; exploring other exercises	
Cultivating self-acceptance		
Acceptance and non-self-judgment of body/self-regulation	Improving relationship to the body. Breathe awareness; body scan; healing self-touch; chair yoga	1, 3–5, 8
Recognition of anger at self and others. Acceptance of self/others	Exploring feeling and thoughts toward self and others. Loving kindness meditation. Forgiveness meditation. Values exercise	4, 5, 8–10
Recognizing/engaging capacity for growth. Self-empowerment	Cultivating and honoring wisdom in self. Wisdom meditation. Discussion throughout	All, 10

long-standing conditioned reactions, as shown in the top half (A) of Fig. 15.1, and then extended toward flexible self-regulation Fig. 15.1 (B), invaluable in managing the complex daily decisions regarding eating. Training in mindfulness practice begins with breath awareness and sitting meditation. All sessions include mindfulness meditation practice. Participants are encouraged to practice daily at home, initially for 10 min, moving to 20 and then 30 min, gradually weaning themselves off use of the audio support. In Session 2, we introduce the practice of using "mini-meditations" as a way to bring mindfulness into everyday activities, and particularly to eating experiences. "Mini-meditations" are truly that; they are intended to encompass the few moments needed to stop, bring awareness to the breath, notice thoughts, and observe inner feelings of hunger, fullness, or the range of available food choices. Results from our research show that improvement in eating, emotional regulation, and weight loss occurs in direct relation to the use of practice elements, including sitting and guided eating meditations, and "mini-meditations."

Cultivating Mindful Eating

Varied mindfulness exercises are used throughout the program to help individuals re-balance distinct aspects of eating. In the top half of Fig. 15.1, mindfulness brings awareness to highly conditioned patterns; the bottom half of Fig. 15.1 focuses on cultivating alternative eating patterns that are more mindful and balanced. Exercises target the following: bringing awareness to sensations of physical hunger vs. other triggers for eating; awareness of different types of satiety, including taste satiety (our term for "sensory-specific satiety"), stomach fullness, and "body satiety"; and awareness of making food choices, both to optimize satisfaction from smaller amounts of food and in regard to the nutritive value of food choice.

The first guided practice is borrowed from MBSR: mindfully eating several raisins. The exercise focuses on noticing and amplifying each sensation, including thoughts and feelings, and savoring each raisin as fully as possible. Four raisins are used. After receiving guidance for the first two, individuals lead themselves through eating the third. They are given the option to eat the fourth, introducing the challenge of choice—and for many, a surprising realization that they actually don't want this last raisin. People share amazement at the intensity of the experience, the distinct texture, and even flavor of each raisin, and how it differs from "mindlessly" eating a handful of raisins. This practice lays the foundation to explore how to eat more mindfully at home and in future exercises.

As the program progresses, the foods used are increasingly challenging in terms of hedonic and caloric value, including potential "binge" foods with lower nutritional value. These challenges often help individuals become more aware of the distinction between "liking" and "wanting" particular foods (Finlayson, King, & Blundell, 2007). Cheese and crackers are presented in Session 2, and in Session 4, rich chocolate cookies, along with an explicit focus on awareness of changes in taste experience. As with the raisins, most participants express surprise at how quickly the flavor of these foods lose their appeal when fully and mindfully savored, engaging the experiences of "taste satisfaction" and "taste satiety." Research has extensively documented the process by which taste buds decrease their capacity for firing as food is eaten (and as physiological hunger decreases) (e.g., Heatherington & Rolls, 1996). Individuals who habitually overeat tend to ignore or override these feedback signals, "chasing the flavor" of the first few bites. Yet in our experience, they are able to quickly tune into this rapid drop in flavor when directed to do so, generally within a few bites. In Session 5, we focus on mindfully making food choices between savory and sweet snacks: corn chips vs. butter cookies. This exercise increases awareness of making food choices, the "pull" of different foods, and again, taste.

Other exercises related to mindful eating develop awareness of physical hunger and "fullness." Session 3 introduces the experience of physical hunger, as distinct from emotional

hunger or other triggers for eating. Participants are asked to note how physically hungry they are, with 10 "as hungry as possible," and 1 "not hungry at all." They are then asked "How do you know that?" a powerful question that helps them explore their inner experience more fully. In Session 5, the experience of fullness is explored by having participants drink a large bottle of water. Using water separates feelings of fullness, as also noted on a 10-point scale, from the effects of high caloric intake. We also emphasize that hunger and fullness are distinct physical processes, not just opposite ends of a scale; it is possible to eat something filling (such as popcorn) and still be hungry—or eat something calorically dense, like ice cream, but not feel very full. By Session 7, which includes a potluck meal, individuals are able to face a very challenging eating situation with a new set of skills and confidence. This meal proceeds with a set of guidelines: choosing foods for "quality over quantity"; returning for seconds; and leaving food on the plate. The meal is initially in silence, highlighting the challenge of eating mindfully after returning to talking.

Home practices parallel the group experiences (i.e., attention to hunger, taste, fullness, food choice), plus the expectation starting in Week 1 of eating one meal or snack mindfully each day, increasing to eating all meals and snacks mindfully. Over the program, individuals are also encouraged more and more to attend to thoughts and feelings before and throughout eating. After the potluck meal, they are asked to go to a commercial buffet, perceived as a singular challenge, but one which most individuals find, with surprise, that they can now manage very well.

Cultivating Emotional Balance

Eating meets emotional needs, more for some individuals than for others. We explore throughout the program how common such patterns are, and that awareness of these patterns is important to eating in a mindful, self-accepting way. Participants are also encouraged to explore alternatives to eating as ways to meet their emotional needs (see Fig. 15.1-B-3a); some individuals report virtually no other coping approaches. At the same time, they are also encouraged to identify and to savor their own preferred "comfort" foods, with a focus on quality rather than quantity, instead of adding to their distress by worrying about "being bad" or "losing control" when eating such foods (see Fig. 15.1-B-3b). We have also adapted a chain reaction exercise from Dialectical Behavior Therapy for eating disorders (Wisniewski & Kelly, 2003), to help participants explore the complexity of the patterns they have developed in using food to manage experiences such as stress, anger, or anxiety. The concept of the chain also addresses links between harsh self-judgment, overeating, and negative affect, along with addressing such common types of distorted thinking as the abstinence violation effect ("I've blown it, so I might as well keep going.") (Marlatt & Gordon, 1985). We emphasize that the "chain reaction" can be interrupted at any point, even in the midst of a binge. Of note, our research has found that even when binges continued to occur, they are notably smaller (Kristeller et al., 2013).

Cultivating "Outer Wisdom"

Most people come into the program with an "all or nothing" attitude toward food choices. Almost all have been on multiple diets, of all different types, and when asked to describe a "healthy" way of eating, they can generally do so—but with a caloric value (e.g., approximately 1,200 calories) that is usually far too restrictive for a maintenance level of eating. They readily acknowledge consuming large of amounts of "unhealthy" foods, such as cheese, pizza, doughnuts, or other sweets, while generally avoiding noting the caloric values of such foods, a task perceived as burdensome or self-punishing. They also express feeling overwhelmed by the amount of information bombarding them regarding nutrition, and acknowledge ignoring much of it.

Throughout the program, we introduce the value of engaging "outer wisdom"—a healthier yet flexible attitude toward making food choices—in combination with "inner wisdom." "Outer wisdom" is distinct from "outer knowledge," in

that "knowledge" is familiarity with relevant information, while "wisdom" is knowing how to make use of that information to suit particular needs and preferences. In the second week, we provide them with a calorie guide, and encourage them to check labels on packaged foods. We draw the analogy to financial management, asking the question "If you were on a budget, would you shop at a store that didn't have price tags on anything?" to emphasize that this caloric information is simply a way to inform choices, given reasonable limitations. We ask them to identify the caloric value of typical foods eaten during the week, and to begin considering which they might either take out of their regular diet or cut back on serving size. We ask them to take on these tasks both to inform themselves and in order to find ways to cut out approximately 500 calories from their daily pattern of eating (the "500 Calorie Challenge"), an amount that, on average, will initially result in a gradual weight loss of 1 lb/week (500 cal × 7 days = 3,500 cal). We continuously emphasize the need to be flexible, to experiment with different possibilities—and to only cut out foods entirely that they are willing to take out of their regular eating programs on a permanent basis—not just to "lose weight."

We also address both healthier nutritional patterns in general (i.e., introducing national guidelines such as "MyPlate"), and those specific to personal dietary needs such as diabetes or cardiac disease, but in a flexible way. For the potluck meal, we ask everyone to bring two dishes, one a favorite food that is "less healthy" but that they want to continue to eat in moderation (like macaroni and cheese), and the other that reflects "healthier" eating. We repeatedly emphasize the need for self-regulation in regard to meshing personal desires with knowledge-based guidelines.

Increasing exercise is another component of "outer wisdom." Many individuals coming into the program are extremely sedentary, avoiding physical activities as much as possible, related to lifelong patterns, or due to increasing issues with joint pain, lack of flexibility, or shortness of breath. Although we acknowledge the contribution of physical activity to weight management, we expand the discussion more broadly to cultivating better physical health and sense of well-being. In addition to gentle chair yoga, we emphasize increasing walking, both mindfully and for exercise. In the service of self-awareness and self-regulation, we provide pedometers to all participants, first asking them to establish a baseline, and then gradually to increase their walking by 10 % per week. Most people expand on this, becoming quite excited about using the pedometer to track their own improvement.

Cultivating Self-Acceptance

Cultivating self-acceptance is placed last in Table 15.1, not because it is least important, but in some respects most important. Critical self-judgment is a key target for mindfulness, in that self-judgment entails an emotionally valenced (and generally negative) reaction to experience, and is endemic to struggling with obesity and eating issues. For many individuals throughout the weight spectrum, self-identity becomes absorbed by preoccupation with eating, weight, and appearance. Therefore, an important aspect of the program is encouraging individuals to notice when such self-judgment has occurred and whether it is out of proportion to the trigger (for example, feeling like a failure after eating a small amount of a "forbidden" food). In general, the goal is to create a more accepting and flexible relationship with the self, in regard both to eating and broader self-identity.

Several exercises explicitly help individuals engage self-acceptance in relation to their bodies. A body scan exercise encourages distinguishing between experiencing and judging the body. Both gentle chair yoga in Session 5 and mindful walking in Session 8 further increase awareness of the body while cultivating an attitude of kindness and compassion. Chair yoga is used instead of floor yoga because heavier individuals may have difficulty getting down to—or up from—the floor; it is also easier to incorporate into usual daily routines (such as at a desk). Finally, a healing self-touch exercise[1] often has profound impact; participants

[1] The healing self-touch exercise was developed by Sasha Loring, MS, MEd, at Duke Integrative Medicine.

are asked to fill their hands with loving kindness, and place them on parts of their bodies, moving from areas they like and appreciate to areas of their body with which they struggle.

Self-acceptance is extended beyond the body to other aspects of the self. Throughout, the program encourages nonjudgmental exploration of thoughts, feelings, and physical experiences, including taking pleasure in eating, without swamping that experience with self-blame. This delicate balance between accountability and self-blame is explored in a forgiveness meditation in Session 5. It is not unusual that individuals recognize how anger at self and others drives overeating. As noted earlier, also core to engaging self-acceptance is encouragement in all sessions to explore their own "inner wisdom," including a values exercise to shift focus away from preoccupation with eating and weight as core elements of self-identity, and culminating in Session 10 with a guided wisdom meditation. The emphasis is on recognizing one's own inner wisdom, creating a path to wise choice, informed by general knowledge, but shaped by internal resources, and always in the service of supporting greater self-regulation (see Fig. 15.1-B-4).

Empirical Support for MB-EAT

Although the clinical development of MB-EAT included both men and women with a range of eating and weight issues, we focused the first systematic study on obese women who met criteria for BED. The original proof-of-concept study used a non-randomized, extended baseline/extended follow-up design (Kristeller & Hallett, 1999), well suited to exploratory clinical outcome research, in that if group results are not consistent, changes in individual responses can be validly analyzed as in an A-B-A design.

Treatment was delivered in a 7-session group program over 6 weeks. The sample was primarily middle aged (avg. age = 46.5) with a mean BMI of 40 (mean weight = 238 lbs). Experience with a pilot group had suggested to us the need to provide individual orientation sessions to address personal anxieties about the meaning and purpose of the required meditation practice, in that several individuals who dropped out almost immediately had shared concerns that a "Buddhist" practice was incompatible with their Christian beliefs and practices. We therefore emphasized that we were drawing on Buddhist psychology rather than on Buddhism as a religion, and ended up with a completion rate of 18 out of 20 individuals.

Results were consistent enough to analyze by group effects. Binges per week dropped from an average of over 4 to about 1.5, with the amount of food consumed during remaining binges decreasing substantially. Overall, scores on the Binge Eating Scale (BES) (Gormally, Black, Daston, & Rardin, 1982) fell from the "severe" range to just higher than having "little or no problem" with binge eating. Depression also decreased from clinical to subclinical levels. Individuals also tracked their meditation practice daily, including both sitting meditation and guided eating meditation practices. The strongest predictor of improvement in eating control was time spent using eating-related meditations.

Based on these results, we obtained funding from the National Center for Complementary and Alternative Medicine at NIH for a clinical trial with Duke University (Kristeller et al., 2013), expanding the sample to include men, but overall highly similar in weight and age to the pilot study. Participants (total $N = 140$; 15 % men) were randomized to three conditions: MB-EAT; a psycho-educational/cognitive behavioral (PECB) treatment based on the Duke Diet and Fitness Center obesity treatment program; or a waiting list control, with follow-up at 1 and 4 months. The treatment was expanded to nine sessions, with greater emphasis on self-compassion and cultivation of self-acceptance. The interventions were again primarily focused on improving relationship to eating, rather than on weight loss. As has been reported in other studies comparing interventions for BED to other active interventions, the two active interventions showed similar improvements in behavior and on the BES. However, the MB-EAT group improved more on other measures of self-regulated eating (e.g., the Hunger scale of the

Three-Factor Eating Questionnaire (TFEQ) (Stunkard & Messick, 1985)).

Depression improved in both groups but apparently for different reasons. In the PECB group, less depression was associated with decreased bingeing, and improvement on most other measures of self-control, suggesting that improved mood may have followed from a greater sense of self-efficacy. In contrast, the improvement on depression in MB-EAT was generally independent of other measures but was linked to amount of meditation practice, suggesting a broader nonspecific value of such practice. Again, amount of meditation practice, calculated as a total index of sitting, guided, and "mini-meditations," predicted improvement on other indicators of self-regulation, including amount of weight lost. However, to our concern, neither group showed any average weight loss, with some individuals gaining weight and others losing. Although no predictors of weight loss could be identified (other than meditation practice), interviews suggested that some individuals perceived the message (within either treatment) as being one of "permissiveness" around food and eating, as long as binges were decreased.

Based on this study, we expanded MB-EAT to include an increased focus on weight loss. The program was extended to ten sessions (as referred to in Table 15.1), with two follow-up sessions at 1 and 2 months (Kristeller & wolever, 2011). As discussed above, we systematically added elements that we refer to as cultivating "outer wisdom": i.e., helping participants engage with information about food energy (calories), nutrition, and exercise that is flexible, targeted to their personal needs, and likely to be sustainable. Because we wanted to evaluate the effects of such elements on individuals with significant weight issues, independent of binge eating patterns, we enrolled those with a BMI of 35 or above, a level at which a meaningful proportion of participants would meet criteria for BED. We wanted to address two complementary concerns: whether individuals with compulsive eating patterns might react adversely to tracking calories, perhaps perceiving that we were encouraging them in a dieting approach that had so often failed them, and whether individuals without such compulsive eating patterns, but still moderately to morbidly obese, would respond to approaches originally designed to modulate compulsive overeating patterns.

Individuals were randomized to the MB-EAT condition or to a waiting-list control. Preliminary analyses have been encouraging. Effects were highly parallel between the two sets of participants (those with BED and those without), and consistent with those observed in our previous research. Furthermore, both groups showed a weight loss of about 7 lbs at immediate post, largely sustained during follow-up. This was approximately one pound per week from when they were asked to begin cutting back 500 cal/day. Also encouraging was that only one individual (someone with BED) showed an increase in weight at immediate post. However, at the next follow-up point, she had lost this weight, noting that it had "taken her a little longer" to really "get it." Also consistent with introducing the "outer wisdom" components was more substantial improvement than in the previous study for both those with and without BED on the Cognitive Restraint scale of the TFEQ, primarily an indicator of "healthy restraint." Improvement on this measure was sustained through the 6-month follow-up.

A modified MB-EAT program is currently under investigation in an even broader range of individuals, with relatively lower levels of binge eating problems and obesity, and with more focus on the "stress management" effects of mindfulness meditation-based treatment. Pilot data provides preliminary evidence for this approach to this population, and for the specific value of addressing stress-related aspects of obesity (Adam & Epel, 2007; Daubenmier et al., 2011). Another group of investigators (Dalen et al., 2010) incorporated elements of MB-EAT into a 6-week program linking healthier eating with exercise, referred to as Mindful Eating and Living (MEAL), and also found significant improvement in healthy restraint, and decreases in weight and other indicators of dysregulated eating. Timmerman and Brown (2012) enrolled women who reported regularly overeating in

restaurants and focused their 6-week intervention, adapted from MB-EAT, solely on that context, showing improvement in weight and nutritional balance. Singh has reported several case studies (Singh et al., 2008, 2011) in which they very creatively incorporated mindful eating components, including meditation training, hunger awareness, and healthy nutrition, into treatment for adolescents with Prader-Willi syndrome with classic symptoms of mild intellectual disability, hyperphagia, and mild to morbid obesity. Each of them responded positively to the interventions, gradually losing substantial weight maintained over several years. Tapper (Tapper et al., 2009) has evaluated a workshop-based mindful eating intervention in a randomized trial for women with a wide range of weight levels, finding significant weight loss at 6 months mediated primarily by change in binge eating patterns.

MB-EAT has also been modified and adapted for use with an overweight/obese population with non-insulin-dependent diabetes (Miller, Kristeller, Headings, Nagaraja, & Miser, 2012). That study compared MB-EAT-D to a relatively intensive medical nutrition group program (Smart Choices). In general, both interventions showed improvement on most variables, with few differences between them. As might be expected, the Smart Choices program showed more specific nutritional improvements, consistent with the targeted goals. It may be that for some individuals the Smart Choices program followed by the MB-EAT-D program would be more effective. For heavier individuals with more mindless or compulsive overeating patterns, it might be advisable to provide the MB-EAT-D program prior to Smart Choices. For example, a morbidly obese woman with BED enrolled in one of our earlier trials lost little weight during the course of the MB-EAT program, but became much more aware of the emotional and social triggers contributing to her overeating. She then rejoined Weight Watchers, losing over 100 lbs during the following year, noting that she was now able to use those guidelines to meet her needs more flexibly and more effectively.

Conclusion

The MB-EAT program combines well-understood principles of food intake regulation and principles of mindfulness meditation to provide a novel approach to re-regulating eating behavior. While conceptually compatible with other effective approaches to treating eating disorders, it is unique in several respects. First, training in mindfulness meditation serves as a foundation for cultivating a capacity to bring nonjudgmental awareness to the complex processes involved in food choice, the decision to initiate eating, and the decision to stop eating. Second, the training appears to help people systematically re-engage innate abilities to use hunger and satiety signals. Third, the training purposefully cultivates drawing pleasure from eating, by emphasizing "quality over quantity" in doing so. Finally, MB-EAT encourages an attitude of nonjudgmental acceptance of self to daily living, body awareness, and emotional experiences, beginning with food-related experiences and expanding to the whole self.

Research has demonstrated the effectiveness of MB-EAT in treating compulsive eating patterns associated with BED. Ongoing research further suggests that MB-EAT can be adapted to address weight loss, without losing its effectiveness for treating the associated symptoms of binge eating. Further work is needed to explore its application to normalizing relationship to food and eating for the both compulsive and restrictive aspects of food intake associated with bulimia nervosa and anorexia nervosa.

References

Adam, T. C., & Epel, E. S. (2007). Stress, eating and the reward system. *Physiology & Behavior, 91*, 449–458.

Allen, H., & Craighead, L. (1999). Appetite monitoring in the treatment of binge eating disorder. *Behavior Therapy, 30*, 253–272.

Altman, D. (2002). *Art of the inner meal*. Los Angeles, CA: Moon Lake Media.

Appelhans, B. M. (2009). Neurobehavioral inhibition of reward-driven feeding: Implications for dieting and obesity. *Obesity, 17*, 640–647.

Apple, R. A., & Agras, W. S. (1997). *Overcoming eating disorders: A cognitive-behavioral treatment for bulimia and binge-eating disorder*. New York, NY: Psychological Corporation.

Baltes, P. B., & Staudinger, U. M. (1993). The research for a psychology of wisdom. *Current Directions in Psychological Science, 2*, 75–80.

Bays, J. (2009). *Mindful eating*. Boston, MA: Shambala Publications.

Bertalanffy, L. V. (1968). *General systems theory*. New York, NY: Braziller.

Bowen, S., Chawla, N., & Marlatt, A. (2011). *Mindfulness-based relapse prevention for addictive behavior: A clinician's guide*. New York, NY: Guilford Press.

Brondel, L., Romer, M., Van Wymelbeke, V., Walla, P., Jiang, T., Deecke, L., et al. (2007). Sensory-specific satiety with simple foods in humans: No influence of BMI? *International Journal of Obesity, 31*, 987–995.

Brown, A. J., Smith, L. T., & Craighead, L. W. (2010). Appetite awareness as a mediator in an eating disorders prevention program. *Eating Disorders: The Journal of Treatment and Prevention, 18*, 286–301.

Brownell, K. (2000). *The learn program for weight management*. Dallas, TX: American Health.

Cannon, W. (1932). *The wisdom of the body*. New York, NY: Norton.

Capaldi, E. D. (Ed.). (1996). *Why we eat what we eat: The psychology of eating*. Washington, D.C.: American Psychological Association.

Carver, C. S., & Scheier, M. F. (1982). Control theory: A useful conceptual framework for personality–social, clinical, and health psychology. *Psychological Bulletin, 92*, 111–135.

Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior*. New York, NY: Cambridge University Press.

Chua, J. L., Touyz, S., & Hill, A. J. (2004). Negative mood-induced overeating in obese binge eaters: An experimental study. *International Journal of Obesity, 28*, 606–610.

Cooper, Z., Fairburn, C., & Hawker, D. (2004). *Cognitive-behavioral treatment of obesity: A clinician's guide*. New York, NY: Guilford Press.

Craighead, L. W. (2006). *The appetite awareness workbook*. Oakland, CA: New Harbinger.

Cuthbert, B., Kristeller, J. L., Simons, R., Hodes, R., & Lang, P. J. (1981). Strategies of arousal control: Biofeedback, meditation, and motivation. *Journal of Experimental Psychology. General, 110*, 518–546.

Dalen, J., Smith, B. W., Shelley, B. M., Sloan, A. L., Leahigh, L., & Begay, D. (2010). Pilot study: Mindful eating and living (meal): Weight, eating behavior, and psychological outcomes associated with a mindfulness-based intervention for people with obesity. *Complementary Therapies in Medicine, 18*, 260–264.

Daubenmier, J., Kristeller, J., Hecht, F. M., Maninger, N., Kuwata, M., Jhaveri, K. et al. (2011). Mindfulness intervention for stress eating to reduce cortisol and abdominal fat among overweight and obese women: An exploratory randomized controlled study. *Journal of Obesity, 2011*, [vol], 651936-651936.

Daubenmier, J., Sze, J., Kerr, C., Kemeny, M., & Mehling, W. (2013). Follow your breath: Respiratory interoceptive accuracy in experienced meditators. *Psychophysiology, 50*, 777–789.

Davidson, R. J., Goleman, D. J., & Schwartz, G. E. (1976). Attentional and affective concomitants of meditation: A cross-sectional study. *Journal of Abnormal Psychology, 85*, 235–238.

Drewnowski, A. (1996). The behavioral phenotype in human obesity. In E. D. Capaldi (Ed.), *Why we eat what we eat*. Washington, D.C.: American Psychological Association.

Dunkley, D. M., & Grilo, C. M. (2007). Self-criticism, low self-esteem, depressive symptoms, and over-evaluation of shape and weight in binge eating disorder patients. *Behaviour Research and Therapy, 45*, 139–149.

Finlayson, G., King, N., & Blundell, J. E. (2007). Liking vs. Wanting food: Importance for human appetite control and weight regulation. *Neuroscience and Biobehavioral Reviews, 31*, 987–1002.

Geliebter, A., & Hashim, S. A. (2001). Gastric capacity in normal, obese, and bulimic women. *Physiology & Behavior, 74*, 743–746.

Geliebter, A., Hassid, G., & Hashim, S. A. (2001). Test meal intake in obese binge eaters in relation to mood and gender. *International Journal of Eating Disorders, 29*, 488–494.

Goldfield, G. S., Adamo, K. B., Rutherford, J., & Legg, C. (2008). Stress and the relative reinforcing value of food in female binge eaters. *Physiology & Behavior, 93*, 579–587.

Gormally, J., Black, S., Daston, S., & Rardin, D. (1982). The assessment of binge eating severity among obese persons. *Addictive Behaviors, 7*, 47–55.

Grosshans, M., Loeber, S., & Kiefer, F. (2011). Implications from addiction research towards the understanding and treatment of obesity. *Addiction Biology, 16*, 189–198.

Hanh, T. N., & Cheung, L. (2010). *Savor*. New York, NY: HarperCollins.

Heatherington, M. M., & Rolls, B. J. (1996). Sensory-specific satiety: Theoretical frameworks and central characteristics. In E. D. Capaldi (Ed.), *Why we eat what we eat* (pp. 267–290). Washington, D.C.: American Psychological Association.

Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive Affective and Behavioral Neuroscience, 7*, 109–119.

Kabat-Zinn, J. (1990). *Full catastrophe living*. New York, NY: Delacorte Press.

Kabatznick, R. (1998). *The Zen of eating*. New York, NY: Penguin Putnam.

Khalsa, S., Rudrauf, D., Damasio, A., Davidson, R., Lutz, A., & Tranel, D. (2008). Interoceptive awareness in

experienced meditators. *Psychophysiology, 45*, 671–677.

King, B. M. (2013). The modern obesity epidemic, ancestral hunter-gatherers, and the sensory/reward control of food intake. *American Psychologist, 68*, 88–96.

Kristeller, J. (1977). Meditation and biofeedback in the regulation of internal states. In S. Ajaya (Ed.), *Meditational therapy*. Glenview, IL: Himalayan International Institute Press.

Kristeller, J. (2016). The Joy of Half a Cookie. New York: Perigree/Penguin Books.

Kristeller, J. L. (2003). Mindfulness, wisdom, and eating: Applying a multi-domain model of meditation effects. *Constructivism in the Human Sciences, 8*, 107–118.

Kristeller, J. L. (2007). Mindfulness meditation. In P. Lehrer, R. Wookfolk, & W. E. Simes (Eds.), *Principles and practices of stress management* (3rd ed.). New York, NY: Guilford.

Kristeller, J. L., Baer, R. A., & Quillian-Wolever, R. (2006). Mindfulness-based approaches to eating disorders. In R. A. Baer (Ed.), *Mindfulness-based treatment approaches*. Burlington, MA: Academic.

Kristeller, J. L., & Hallett, C. B. (1999). An exploratory study of a meditation-based intervention for binge eating disorder. *Journal of Health Psychology, 4*, 357–363.

Kristeller, J. L., & Rodin, J. (1989). Identifying eating patterns in male and female undergraduates using cluster analysis. *Addictive Behaviors, 14*, 631–642.

Kristeller, J. L., & Wolever, R. Q. (2011). Mindfulness-based eating awareness training for treating binge eating disorder: The conceptual foundation. *Eating Disorders, 19*, 49–61.

Kristeller, J. L., & Wolever, R. (2016). *Mindfulness-based eating awareness training: A professional guide*. New York, NY: Guilford Press.

Kristeller, J. L., Wolever, R. Q., & Sheets, V. (2013). Mindfulness-based eating awareness training (MB-EAT) for binge eating: A randomized clinical trial. *Mindfulness, 5*(3), 282–297.

Lutz, A., Slagter, H. A., Dunne, J. D., & Davidson, R. J. (2008). Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences, 12*, 163–169.

Marlatt, G. A., & Gordon, J. R. (Eds.). (1985). *Relapse prevention: Maintenance strategies in the treatment of addictive behaviors*. New York, NY: Guilford Press.

Meeks, T. W., Cahn, B., & Jeste, D. V. (2012). Neurobiological foundations of wisdom. In C. K. Germer & R. D. Siegel (Eds.), *Wisdom and compassion in psychotherapy: Deepening mindfulness in clinical practice* (pp. 189–201). New York, NY: Guilford Press.

Miller, J. (1978). *Living systems*. New York, NY: McGraw Hill.

Miller, C. K., Kristeller, J. L., Headings, A., Nagaraja, H., & Miser, F. (2012). Comparative effectiveness of a mindful eating intervention to a diabetes self-management intervention among adults with type 2 diabetes: A pilot study. *Journal of the Academy of Nutrition and Dietetics, 112*, 1835–1842.

Ogden, J. (2010). *The psychology of eating* (2nd ed.). Chichester, UK: Wiley-Blackwell.

Ostafin, B., & Kassman, K. (2012). Stepping out of history: Mindfulness improves insight problem solving. *Consciousness and Cognition, 21*, 1031–1036.

Patel, C. H. (1977). Biofeedback-aided relaxation and meditation in the management of hypertension. *Biofeedback and Self-Regulation, 2*, 1–41.

Raynor, H. A., & Epstein, L. H. (2001). Dietary variety, energy regulation, and obesity. *Psychological Bulletin, 127*, 325.

Remick, A. K., Polivy, J., & Pliner, P. (2009). Internal and external moderators of the effect of variety on food intake. *Psychological Bulletin, 135*, 434–451.

Rodin, J. (1978). Stimulus-bound behavior and biological self-regulation: Feeding, obesity, and external control. In G. E. Schwartz & D. Shapiro (Eds.), *Consciousness and self-regulation* (Vol. 2, pp. 215–239). New York, NY: Plenum.

Rodin, J. (1981). Current status of the internal-external hypothesis for obesity: What went wrong? *American Psychologist, 36*, 361–372.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development and well-being. *American Psychologist, 55*, 68–78.

Safer, D. L., Telch, C. F., & Chen, E. Y. (2009). *Dialectical behavior therapy for binge eating and bulimia*. New York, NY: Guilford Press.

Schachter, S. (1971). Some extraordinary facts about obese humans and rats. *American Psychologist, 26*, 129–144.

Schachter, S., & Rodin, J. (Eds.). (1974). *Obese humans and rats*. New York, NY: John Wiley.

Schwartz, G. E. (1975). Biofeedback, self-regulation, and the patterning of physiological processes. *American Scientist, 63*, 314–324.

Schwartz, G. E. (1976). Self-regulation of response patterning: Implications for psychophysiological research and therapy. *Biofeedback and Self-Regulation, 1*, 7–30.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York, NY: Guilford Press.

Shapiro, S. L., & Schwartz, G. E. (2000). The role of intention in self-regulation: Toward intentional systemic mindfulness. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 253–273). San Diego, CA: Academic.

Singh, N. N., Lancioni, G. E., Singh, A. N., Winton, A. S. W., Singh, J., McAleavey, K. M., et al. (2008). A mindfulness-based health wellness program for an adolescent with Prader-Willi syndrome. *Behavior Modification, 32*, 167–181.

Singh, N. N., Lancioni, G. E., Singh, A. N. A., Winton, A. S. W., Singh, A. D. A., & Singh, J. (2011). A mindfulness-based health wellness program for individuals with Prader-Willi syndrome. *Journal of Mental Health Research in Intellectual Disabilities, 4*, 90–106.

Sobik, L., Hutchison, K., & Craighead, L. (2005). Cue-elicited craving for food: A fresh approach to the study of binge eating. *Appetite, 44*, 253–261.

Sørensen, L. B., Møller, P., Flint, A., Martens, M., & Raben, A. (2003). Effect of sensory perception of foods on appetite and food intake: A review of studies on humans. *International Journal of Obesity, 27*, 1152–1166.

Sternberg, R. J. (Ed.). (1990). *Wisdom: Its nature, origins, and development*. New York, NY: Cambridge University Press.

Stunkard, A. J., & Messick, S. (1985). The three factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research, 29*, 71–83.

Sysko, R., Devlin, M. J., Walsh, B. T., Zimmerli, E., & Kissileff, H. R. (2007). Satiety and test meal intake among women with binge eating disorder. *International Journal of Eating Disorders, 40*, 554–561.

Tapper, K., Shaw, C., Ilsley, J., Hill, A. J., Bond, F. W., & Moore, L. (2009). Exploratory randomised controlled trial of a mindfulness-based weight loss intervention for women. *Appetite, 52*, 396–404.

Timmerman, G., & Brown, A. (2012). The effect of a mindful restaurant eating intervention on weight management in women. *Journal of Nutrition Education and Behavior, 44*, 22–28.

Wansink, B. (2007). *Mindless eating: Why we eat more than we think*. New York, NY: Bantam.

Wansink, B., & Sobal, J. (2007). Mindless eating: The 200 daily food decisions we overlook. *Environment and Behavior, 39*, 106–123.

Wilfley, D. E., Welch, R. R., Stein, R. I., Spurrell, E. B., Cohen, L. R., Saelens, B. E., et al. (2002). A randomized comparison of group cognitive-behavioral therapy and group interpersonal psychotherapy for the treatment of overweight individuals with binge-eating disorder. *Archives of General Psychiatry, 59*, 713–721.

Wilson, G. T. (2004). Acceptance and change in the treatment of eating disorders: The evolution of manual-based cognitive-behavioral therapy. In S. C. Hayes, V. M. Follette, & M. M. Linehan (Eds.), *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition* (pp. 243–260). New York, NY: Guilford Press.

Wisniewski, L., & Kelly, E. (2003). The application of dialectical behavior therapy to the treatment of eating disorders. *Cognitive and Behavioral Practice, 10*(2), 131–138.

Wolever, R. Q., & Best, J. L. (2009). Mindfulness-based approaches to eating disorders. In F. Didonna (Ed.), *Clinical handbook of mindfulness* (pp. 259–288). New York, NY: Springer.

Mindfulness and Self-Regulation: A Medical Approach to the Mind and Mental Health

16

James Davis-Siegel, Moriah Gottman, and Daniel J. Siegel

In this chapter we explore how self-regulation and mindfulness form two cornerstones in the medical approach to the self and mental health. We examine how they can be applied to not only the traditional notions of the self and mind that lie within the skin but also how they can function in the interpersonal perspective of the relational self and mind. This chapter defines the fundamental psychological processes of self-regulation and mindfulness and their components such as the self, the mind, compassion, and empathy, and discusses how these relate to, and in fact arise from, each other. We then examine how these processes, when functioning optimally and harmoniously, create a more integrated mind and a better regulated self, resulting in well-being. This notion is expanded in a brief discussion of Antisocial Personality Disorder (formerly known as psychopathy or sociopathy)—the antithesis of an integrated mind (and the opposite of a mindful state) which characteristically exhibits interpersonal impairments and a lack of self-regulation. The chapter concludes by extrapolating aspects of self-regulation and mindfulness to offer a biological exploration of morality which can be looked at as a form self-regulation on a societal scale. Throughout this chapter, we suggest that mindfulness facilitates the integration of both interpersonal and intrapersonal systems resulting in improved self-regulation and mental health regardless of whether the self is defined narrowly as limited to the body or more broadly as also extending between individuals.

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The Self and Self-Regulation

Who am I? It is perhaps the simplest question we can ask ourselves, yet the answer can be infinitely complex. The underlying concept of self and its definition is embedded in this question, which naturally, varies from person to person. William James, a pioneering psychologist in the late nineteenth century, was one of the first scientists to examine this concept. He concluded there were

three components of the self-experience: the *material me* (the bodily self, along with surrounding physical objects), the *social me* (your awareness of how others view you), and the *spiritual me* (the self that monitors private thoughts and feelings). James believed that

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'everything that you associate with your identity becomes, in a sense, part of the self'. (as cited in Gerrig & Zimbardo, 2008, p. 439)

From this explanation, a curious concept of identity emerges: the self contains not only one's physical body with its neurological processes, but also one's mind and one's relationships. The notion of the threefold self can be applied to anyone we identify with or relate to, making the self inclusive of internal experience, interpersonal relationships, communities, and cultures.

The individual's experience of identity and self fits within a larger society, and its rules and standards. In order to meet societal expectations of competency for adulthood, proper self-regulation must be developed and utilized. This is studied in the field of psychopathology and forms a central role in approaches to psychotherapeutic intervention (Schore, 2012). Self-regulation is intertwined with achieving independence, and not only involves developing a "sense of self" and personal identity, but also is related to learning social rules and roles (Lightfoot, Cole, & Cole, 2009). Developing self-regulation entails learning to control one's thoughts, emotions, behaviors, and attentional states.

The most important aspect of self-regulation in cultivating the relational self is emotional control. Emotion regulation allows us to deal with the disappointments, frustrations, and injured feelings that are inevitable in everyday life. Furthermore, emotion regulation is essential for functioning and flourishing in a social world (Lightfoot et al., 2009). Socioemotional competence and intelligence are achieved when we behave well even in the face of intense emotional arousal. Developing adequate self-regulation requires increasing tolerance for emotional provocation; whereas the initial level of intensity may have brought out inappropriate responses, a better regulated self is now able to tolerate the same emotional stress and responds appropriately.

Self-regulation is an important part of abiding by social norms and learning to be a competent adult. This is why in nearly every society, there is a higher standard of acceptable behavior for adults than for children who have not yet fully developed the ability to self-regulate. As discussed in a later section in this chapter, we have institutionalized societal self-regulation in laws, based on philosophical principles of morality, which guide human interactions. Regulation of the self, is essential to create order and peace in our inner and interpersonal lives which can be achieved through mindfulness, as a later section will discuss.

What Is the Mind?

The mind is not often defined in the fields of medicine, psychology, anthropology, education, or even philosophy (Siegel, 2012a, 2012b). Statements that the mind is "simply" the activity of the brain do not embrace the reality that neural firing patterns are not the same as thoughts and feelings. Just as if a blind man was told which wavelengths in the electromagnetic field constitute the color purple, the perception and the experience of the color first hand would not be conveyed; the mind cannot be effectively reduced to simply the biological processes of the brain. Brain functions involve networks of interacting neurons with ions flowing in and out of their membranes and enabling communication between them with the release of neurotransmitters as a means of sending messages that propel functions in the rest of the body. However, the subjective experience of the mind is not merely the same as neural activity in the brain. Neural firing is not the same as a mental process such as a thought or feeling, consciousness or intention.

The mind commonly encompasses our feelings and thoughts, our dreams and hopes, and our beliefs and experiences which frame our perceptions of the world. Although mental processes can be described, a definition of the mind itself is missing from major fields of academic study. In the interdisciplinary field of Interpersonal Neurobiology (IPNB) a working definition of the mind and of mental health is offered. IPNB offers an overarching view of mental health, drawing from multiple independent scientific disciplines and focusing on cultivating a healthy mind through empathic relationships and an integrated brain. The field views the aspect of the mind

beyond our subjective experience and conscious awareness, and defines this facet of the mind as "an embodied and relational process that regulates the flow of energy and information" (Siegel, 2012a, p. 2). This definition views the mind as an emergent, self-organizing process that arises from within us and regulates energy and information flow internally and interpersonally. The self can be seen as a center of narrative gravity that forms our core awareness of information, bridging past, present, and future. Like the self, the mind is both embodied in physical form (in the brain and body) and is embedded in our connections to other people. The self and mind are intimately interdependent; one can view the mind as originating from the self, and a sense of self as being a mental process.

IPNB offers a synthesis of the universal findings across independent disciplines, an analytic process called "consilience" (Wilson, 1998). Such a perspective helps offer a definition of the mind and enables us to move to the practical issue of asking what a healthy mind is. Regulation involves the ability to monitor something and then to modify that thing in an adaptive manner. By defining the mind as regulatory, we can then begin to examine how to improve the capacity to monitor and modulate energy and information flow within and between ourselves, resulting, by definition, in a healthier mind.

Mindfulness and Self-Regulation

Although the concept of mindfulness has existed and been practiced in Eastern traditions for millennia (Germer, 2004), it is just now making its way into the arena of Western scientific study, modern medicine, and psychological treatment (Coelho, Canter, & Ernst, 2007; Germer, 2004; Hill & Updegraff, 2012; Siegel, 2007b, 2010b). As defined by Siegel (2010a), mindfulness is "intentionally focusing attention on moment-to-moment experience without being swept up by judgments or preconceived ideas and expectations" (p. XIV). Siegel goes on to define "experience" as being made up of two aspects: the subjective mental state (the feeling of fear, for example) and the objective physical state (the physical response to fear or anxiety such as increased heart and respiratory rates). Mindfulness practices are ancient and often involve meditation and other practices, such as yoga or Tai' chi. By practicing mindfulness, we become more attuned to our psychological needs and can accept things as they are. This acceptance turns to resilience and we can explore rather than react to the suffering we feel. This practice has numerous clinical and therapeutic benefits, such as reducing stress, increasing emotional regulation, and decreasing negative emotional experiences. One example of a mindfulness practice is found in the Mindfulness Based Stress Reduction (MBSR) program created by Jon Kabat-Zinn and studied extensively by his colleague, Richard Davidson (Davidson et al., 2003). Drawing on the insight-practices of Buddhist traditions, now simply called mindfulness meditation, these begin with a focus on the breath. When the practitioner's attention wanders, he then recognizes the distraction, releases it, and refocuses attention on the sensations of the breath. Over and over, this practice reinforces two abilities: to simply sense the breath and to monitor one's focus of attention. In this way, mindfulness can be seen as including the differentiation and strengthening of these two capacities. When they are linked within the repeating practice of sensing the breath, detecting distraction, refocusing on sensation, and on and on, a state of "integration" is created in which these capacities are differentiated and then linked, the definition of integration (Farb et al., 2007; Siegel, 2007a, 2007b).

From an IPNB perspective, integration is the fundamental mechanism of health. In this way, the integrative state created with mindfulness sets the stage for both internal integrative states to be achieved and for interpersonal integration to occur (Parker, Neslon, Epel, & Siegel, in press). Mindfulness and integration go hand in hand internally and interpersonally—just as the mind itself is emerging both from within and between individuals.

Western clinicians have been increasingly drawn to the intersection of mindfulness and psychotherapy (Brown & Ryan, 2003; Germer, 2004) because impaired integration is at the root of impairments to mental health. Mindfulness, as

an integrative practice, finds efficacy across a range of mental health issues (Siegel, 2010a, 2010b, 2012a, 2012b). Current research has focused on integrating mindfulness into psychotherapeutic interventions. This trend can be seen as early as 1990 in Kabat-Zinn's work with MBSR, as well as in Marsha Linehan's 1993 work treating patients with Dialectical-Behavioral Therapy. Segal, Williams, and Teasdale (2002) explained how mindfulness-based treatment was effective in preventing relapse in chronic depression. Siegel (2010a) discusses how physicians who are more mindful of themselves and others are more attuned to their patients. Their patients recover more quickly from common and mild illnesses and have more robust immune functions to fight infections (Barrett et al., 2008). In addition to merely augmenting the doctor-patient connection, a clinical intervention study with cancer patients demonstrated correlations between increases in mindfulness over time and declines in mood disturbance and stress (Brown & Ryan, 2003, p. 843). This research paved the way for the study of the relationship between mindfulness and health (Coelho et al., 2007; Goldin & Gross, 2010). As academia has begun to embrace the benefits of mindfulness-based therapy, empirical study on this subject continues to grow. The research has shown that mindfulness integrates the body, the mind, and our social relationships with positive effects on health.

As discussed above, integration is seen as the heart of health. Impairments to health lead to states of chaos or rigidity, which can be seen in a careful analysis of symptoms in each disorder listed in the DSM-IV-TR (American Psychiatric Association [APA], 2000). As the mind is both embodied and relational, these integrative mental states shape both our bodily health (telomerase levels (Jacobs et al., 2011) and immune function (Davidson et al., 2003)). With energy and information our fundamental "element" of the system of the mind, we can see how the separation of body from mind, or mind from relational world is artificial. The mind emerges from and shapes both our inner physiological states and our interpersonal relationships. Studies of the epigenetic control of the genetic expression regulating disease prevention (Fredrickson et al., 2013) have found that our eudaemonic state of mind, that has been shown to be created with mindfulness practice (Urry et al., 2004), is directly optimized by how our minds function. Body, mind, and relationships are three aspects of one reality, like the heads, tails, and sides of a coin. That one reality is energy and information flow. When that flow is integrated through the practice of mindfulness, body, mind, and relationships thrive.

An Expanded View of "Self" and "Self-Regulation"

Defining the mind as a regulatory self-organizing process, allows the definitions of the mind and the self to extend beyond the boundaries of the skin. Thus, as the mind and self extend beyond the individual level, self-regulation and mindfulness also have impacts on an expanded level. This view can be embraced by a range of disciplines, enabling us to create a consilient framework that blends insights from anthropological studies of culture with neurobiological research on brain function. Energy and information flow are the essential features of mental life, whether this life is viewed on the neurobiological, psychological, relational, or societal level of analysis.

The self is an outcome of mental life which occurs both within a person and between multiple people. Similarly, the mind's creation of a sense of self is also not constrained by the somatic world from which it partly emanates. We, as selves, emerge both from within the body and between the body and its interactions with others and the environment. For simplicity, we shall call these interactions "relationships." An example of how the self expands from the personal, inner individual to the interactive, extended world of relationships is an expectant mother. The new life starts off as a cluster of cells completely contained within the mother, which eventually grows

to become a baby. When the mother and child are separated, and the umbilical cord is cut, the sense of their unified relational self is not lost with the physical separation. Therefore, we can see how the self is both related to a relational reality in the womb, and later shaped by a sense of being defined by the body. An infant's capacity to regulate his or her physiology is dependent upon the relationship with the caregiver, and thus self-regulation is a dyadic state at first, which ultimately develops an additional more autonomous capacity as the infant matures into a young child (Siegel, 2012a).

This adjustment is generally referred to as self-regulation, the ability to control thoughts, emotions and behaviors (Lightfoot et al., 2009) by monitoring and attuning to them, and is the fundamental way in which we create coordination and balance of the systems within and between us from which the self emerges. These include internal bodily systems, such as the cardiovascular, immune, endocrine, and nervous systems, as well as mental and social systems that modify psychological processes and intrapersonal interactions. Ultimately, coordination and balance within systems—both internal physiology and interpersonal relationships—arises from integration, the linkage of different aspects of a system (Siegel, 2012b). Within the body, the coordination and balance of differentiated elements of these physiological and neurological systems emerge from integrative processes. Just as with our interpersonal relationships, our bodies combine separate processes so that homeostasis is maintained. Integration, the linkage of differentiated parts, is the core mechanism beneath adaptive regulation and health (Siegel, 2012a, 2012b).

The placement of "self" and "mind" conceptually in both embodied and relational systems, permits us to explore the notion of health as an example of optimally functioning integration. When integration is not achieved, chaos and rigidity emerge (Siegel, 2012b). In the case of mental illness, these two conditions can be seen as the common ground of all symptoms of each of the major psychiatric disorders listed in the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM IV-TR*) (Siegel, 2012b). Practicing mindfulness is one way to bring harmony to the chaos and flexibility to the rigidity. Integration created through mindfulness practice thus provides the foundation to ease mental suffering and supports the development of healthy self-regulation both within and between ourselves. Mindfulness practice literally stimulates the growth of the integrative fibers in the brain that support adaptive regulation at the heart of health (Siegel, 2007a, 2007b).

Compassion and Mindsight

The ability of one person to sense the internal experience of another and to attune to his/her internal state is the root of both empathy and compassion. These terms have a range of definitions that embrace concepts such as cognitive and emotional understanding and caring for and feeling with another. Studies have revealed how the capacity to "see the mind" of another has important correlations with personal and relational well-being (Siegel, 2012a). Just as in practicing mindfulness, where we attune to our individual internal experience, compassion and empathy use the same principles and practices and apply them to others. In this sense, the ability to empathize and practice compassion is mindfulness extended beyond the individual person's inner subjective experience and body to the relational self and relational mind.

In interpersonal neurobiology, the ability to mindfully sense the internal subjective experience of the self and others, to have insight into one's own inner life, and to understand and care for the internal life of another is called "mindsight." Mindsight is a learnable skill that allows not only the perception of the internal mental state of the individual as well as others, but also the regulation of the self or others towards integration and well-being. Mindsight involves insight, empathy, and integration. Mindsight has been described as the core mechanism beneath emotional and social intelligence (Goleman, foreword: Siegel, 2010b) and embraces the way we can learn to become mindfully aware of the present moment.

The capacity for mindsight appears to be a part of our human legacy that is shaped by our experiences (Siegel, 2010a). Mindfulness would be one example of a mindsight practice as it involves insight, empathy and integration. Here is the basic notion of how mindful awareness may catalyze integration in the brain. Mindfulness training allows an individual to develop the interoceptive monitoring capacity to be aware of his/her inner world (Siegel, 2007a). Within this practice, two distinct neural circuits become differentiated and then linked (Farb et al., 2007; Siegel, 2007b). One is the sensing circuit; the other is the observing circuit. These circuits enable direct sensory experience and the capacity for observation that allows us to be a witness to and narrator of our experiences The linkage of these differentiated circuits enables us to keep track of tasks by paying attention to intentions and being aware of awareness, the two fundamental processes of all mindfulness approaches (Siegel, 2007a). These aspects of self-monitoring redirect attention and strengthen modifying skills, which are the two aspects of the regulatory function of the mind. Mindfulness essentially catalyzes the integration necessary for effective self-regulation. Thus, mindfulness is a form of self-regulation training that strengthens both mind and self.

In many ways, an outcome of self-regulation and the pinnacle of integration is kindness and compassion. When the internal state of oneself is connected to another, compassion occurs and the self broadens. Accepting the vulnerability in oneself and others, by expressing care and concern in a way that alleviates their suffering, is the core of kindness. At the heart of these positive states is the process of integration, which is how we respect one another's differences and promote compassionate, caring linkages. Kindness and compassion emerge from integration between individuals, a process that expands the experience of self from merely the individual, to the individual in relationship with the other. This is the source of coordination and balance in the relationship that is generated by self-regulation on the broader level of the relational self. Just as the traditional experience of self as an individual requires cooperation between body and mind to be well regulated, a relational self can only function optimally when there is kindness and compassion between these interacting social systems.

In a medical approach to self-regulation, kindness and compassion are essential for healthy regulation to emerge on the relational level. Mindfulness practice supports the maintenance of compassionate care and empathy in primary care physicians (Krasner et al., 2009) and can also be seen as the heart of remaining present in interpersonal relationships (Parker et al., in press). Such presence has been shown to elevate the levels of telomerase, the enzyme that repairs and maintains the ends of chromosomes to improve cellular health and longevity (Jacobs et al., 2009). Therefore, we see that there are not only psychological benefits to mindfulness practices but physiological ones as well.

Compassion emerges from the relational self. It is a process that speaks to a very basic concept within humanity, one of bringing out the best in all of us and forges intimate, healing relationships, expanding and strengthening the self. Peter Hosking explained several of its modern denotations in his 2007 essay "Compassion: What is in a Word?":

"The word compassion is defined in various but similar ways as: (a) a feeling of sorrow or pity for the pain or misfortunes of another that inclines one to help; (b) feeling deep sympathy for another's suffering or misfortune accompanied by a desire to alleviate the pain and remove its cause; (c) the feeling of emotion when one is moved by the suffering of another and by the need to relieve it, and (d) sympathetic consciousness of another's distress with a desire to alleviate it." (Hosking, 2007, p. 2)

While Hosking's comments allow us to derive a definition of the word compassion, the process goes beyond this. Compassion is something we can do, something we can feel, and something we can receive. By alleviating suffering in others, we are regulating our relational self: a process that by its very nature requires mindful awareness of others' emotional states.

Several studies have been conducted which address the phenomenon of compassion and

offer us several definitions of the concept. A study by Wray-Lake, Flanagan, and Maggs (2011) operationalized their definition when comparing messages communicating values to children. They defined compassion messages as any message that emphasized caring for others. In looking at this operational definition, it is important to note that compassion requires more than just a feeling or a desire, as is implied by Hosking's definitions; it requires (or at least results in) constructive *action*. Another study, by Pauley and McPherson (2010), took this idea further, exploring what it means to experience compassion and self-compassion. Through a series of interviews, the authors derived a definition of compassion that came from the participants' everyday understanding of the word. It was determined that compassion is a kind and active process that has subordinate themes of (1) being kind towards people and (2) requiring action.

Both these studies suggest that compassion is an action, yet it is also a relationship. "Compassion requires us to listen to the story of another with a willingness to allow ourselves to be affected" (Hosking, 2007, p. 8). In order to truly be affected, we must broaden our sense of self and truly identify with others, not only as separate people but as extensions (or even other parts) of ourselves. In this way, compassion requires empathy—the ability to connect with the internal experience of others. As we experience compassion both for and from others, we move towards a mindful understanding of and integration with that other individual. Thus, we are differentiated and we are linked. This is integration on the interpersonal level. Therefore, just as practicing mindfulness results in a more attuned self, accepting the sensing self-circuit by the observing self-circuit, compassion visibly engages the relational self through action to promote interpersonal attunement and the seeing and acceptance of the internal state of another (Gilbert, 2009; Neff, Kirkpatrick, & Rude, 2007). In many ways, mindful awareness promotes both internal attunement and interpersonal attunement, each a form of the integration of energy and information flow within us, and between us.

Empathy and Neurobiology

Another key aspect of regulating the relational self is empathy, which is the necessary first stage in having compassion and understanding between individuals. If we are to move towards alleviating the suffering we see in others, we must first be able to understand what this suffering is; this requires empathy and at least some form of mindful awareness of others' emotional experiences. This basic form of monitoring the different parts of the relational self is essential for mindfulness on the relational domain and is embedded in the neural circuitry of the brain. Thus, there is neurobiological basis for empathy which enables the expansion of self and allows us to be mindful of others which will be discussed in this section.

Empathy has been defined as "the recognition and sharing of another's emotional state," (Preston & de Waal, 2002), which links (and thus expands) the self as an individual to the self as a relationship. There is a subtle difference between empathy and compassion; empathy does not require action as compassion does, and is only the recognition and experience of emotions in others. It is perceiving and experiencing the emotions of those around us. When we see someone crying or injured, our chest tightens and our heart rate increases. We cringe when we hear a bone break in a movie; we flinch at the sound of a cracking whip during a play. Even in situations where we know the emotions we see and hear are just dramatizations, we still feel a bodily response to portrayed fear, disgust, anger, and even happiness. Thus, we see that in any healthy relationship we are mindful of the emotional states of those around us and seek to soothe (or regulate) our relational self by understanding what the other part of that extended self is feeling by empathizing (Decety & Ickes, 2009).

Empathy works to expand and regulate the relational self, and is an essential mechanism in psychosocial interaction; there is evidence that it is hardwired into the neural circuitry. The neurobiological system of empathy consists of the limbic system (primarily the amygdala and the insula) in conjunction with the anterior cingulate

cortex and the prefrontal cortex, which are all involved in imitation and in the activation of pain circuitry in oneself when observing another in pain (Jackson, Brunet, Meltzoff, & Decety, 2006). The limbic system is the primary brain region for emotional processing and the amygdala in particular is activated by fear and stress as a part of the hypothalamic–pituitary–adrenal (HPA) axis which controls "fight or flight or freeze" response as well as mediating brain responses to emotional ambiguity and arousal. The insula carries information between the cortex and subcortical regions and the body (Craig, 2009). Besides regulating negative arousal by controlling information flow between the thalamus and the limbic system, some studies suggest that the insula also mediates negative emotional arousal (disgust, pain, and hunger) (Berntston, Norman, & Bechara, 2011; Gray, Harrison, & Wiens, 2007). The anterior cingulate cortex is activated by social and physical distress as well as error and conflict processing (Shirtcliff et al., 2009). In fact, Lieberman and Eisenberger (2005) have demonstrated that the anterior cingulate mediates both the registration of bodily pain as well as the pain of social rejection. We therefore have the capability to respond empathetically to both kinds of pain from the same neural circuit. These are the neurological mechanisms revealing how our minds experience an individual bodily and a relational level of emergence.

The HPA axis also plays a role in the empathy network. When functioning normally, the hypothalamus is stimulated by incoming signals from the amygdala, which are triggered by seeing someone in distress or experiencing distress directly (Buchanan, Bagley, & Stansfield, 2012). The hypothalamus, via corticotropin releasing hormone, triggers the pituitary gland to stimulate the adrenal cortex via adrenocortotocotropic hormone (ACTH) (Kudielka, Schommer, & Hellhammer, 2004). Finally, the adrenal cortex produces a stress-related hormone, cortisol, which stimulates a cascade of physiological changes, making it easier for one to run from danger or attack a predator (Kudielka et al., 2004).

The next important part of the empathy system for us to address is oxytocin. Also known as the "love hormone," the neuropeptide oxytocin is released from the posterior pituitary after orgasm and induces feelings of closeness that support pair-bonding (Ditzen, Schaer, & Gabriel, 2009; Ross & Young, 2009). Barraza and Zak (2009) studied oxytocin levels in the context of emotionally provocative videos and a philanthropic exercise to see if the effect of oxytocin extends to empathic action. They discovered a link between a self-reported empathy after watching an emotional video and higher cortisol levels as well as higher self-reported distress. Oxytocin levels increased in response to greater self-reported empathy, supporting the general notion that oxytocin is released as a part of the empathic experience.

Although research in this field still continues, it is clear that oxytocin plays a role in enhancing empathic and compassionate functions of the brain (Bora, Yucel, & Allen, 2009). When oxytocin is given, generosity and empathy increase (Bartz et al., 2010). Oxytocin levels have a direct correlation with trust and positive emotions and an inverse correlation to anxiety and other negative emotions (Ditzen et al., 2009). Oxytocin given intranasally has been shown to increase the amount of time participants spend gazing at faces (Guastella, Mitchell, & Dadds, 2008); further studies have shown that given intravenously, oxytocin increases the ability of individuals to infer mental states from the eyes accurately (Bartz et al, 2010). Bora and colleagues (2009) state, "…oxytocin induces its behavioral effects, such as promoting attachment and trust, by modulating affiliation-related brain networks and inhibiting brain regions associated with aversive behavior" (p. 322). By this, we see how the release of oxytocin in the brain, is a chemical form of self-regulation which has the behavioral (and relational) effects of better integrating the broader self and mind.

Much of this internalization of another person's emotional state is accomplished with a neurological process called mirroring which may be mediated by a system of mirror neurons

(Pfeifer, Iacoboni, Mazziota, & Dapretto, 2008). A mirror neuron is characterized by the ability of a single neuron to have both perceptual and motor functions. Scientists have now discovered that mirror neurons may play a role in the empathic process. First, anterior and parietal mirror neuron regions perceive physical signals from others and anticipate the immediate next motion of the other's action. This process then stimulates non-mirror areas in the superior temporal sulcus in conjunction with mirror neuron areas. This synchronous stimulation enables a neural representation of the anticipated action of another to be mapped out (Simon, Herold, & Fekete, 2007). This mapping is postulated to be the neural basis for representing another's intention, or the mental state of the other that drives the direction of motion (Simon et al., 2007). Next, mirror neurons engage the anterior insular cortex to drive cortical firings downward into subcortical limbic, brainstem, and bodily regions to enable us to "resonate" within our bodies with what we see in others (Buk, 2009; Pfeifer et al., 2008).

This emotional resonance then moves upward, by way of the right anterior insula, toward various aspects of the prefrontal region (Simon, et al., 2007). The linkage of these areas to the anterior cingulate by way of neural spindle cells enables a fast-acting relay between the interoceptive signals of the insula with the complex integration of bodily input, emotion, and social interactions mediated by the cingulate region. Pfiefer and colleagues propose (2009) that this mechanism underlies how bodily states activated by mirror neurons transmit impulses to the insula and then to the medial prefrontal regions which translate "what is going on in me?" to the empathic query of "what may be going on in you?" We come to feel what is happening in someone else because of the resonant feelings we experience in our own worlds. Thus, we see how on a basic level, the brain and the mind and the self all interact to give us a more mindful understanding of our surroundings and the emotional experiences of others in those surroundings; as well as providing us with tools for a more integrated relational mind and a better regulated self.

Psychopaths and Antisocial Personality Disorder

In the previous sections we discussed mindfulness, self-regulation, compassion, and empathy. We turn now to their antithesis—psychopathy—in order to further explore the processes of self-regulation and mindful awareness. There is some debate about what it means to be psychopathic, but what we see in nearly all definitions of the word, is an extremely limited form of self and the inability to relate and give value to the minds of others. We see in psychopaths a lack of self-regulation on the individual level as well as a complete disregard for any notion of a relational self or mind. As we explore in this section, the result of this type of personality is often unhealthy and dysfunctional social and emotional relationships that appear to be deficient in mindful awareness of both others and themselves.

Psychopaths are often portrayed in popular culture as the embodiment of evil, having nearly superhuman abilities. This notion is supported by the etymological roots of the word which translate to "a sickness/corruption of the soul" (Walker, 2009). The DSM-IV-TR brings these pseudo-religious definitions into more scientific terms by describing psychopaths as suffering from Antisocial Personality Disorder (ASPD). ASPD is generally defined as "a pervasive pattern of disregard for, and violation of, the rights of others that begins in childhood or early adolescence and continues into adulthood" (APA, 2000). The overall prevalence of this disorder in the US general population is around 3 % in men and 1 % in women (APA, 2000). The degree of psychopathy a person suffers from can be determined quantitatively by using Hare's Psychopathy Checklist-Revised which quantifies the disorder into the 20 features of a psychopath (Haycock, 2012).

By its very definition in the DSM-IV-TR, Antisocial Personality Disorder is associated with criminal and callous actions. Although only twenty percent of criminals qualify as psychopathic, this group accounts for fifty percent of the most severe crimes as well as comprising over half of serial murderers and rapists (Hare, 1993, pp. 25–30). Psychopaths lack functioning in critical areas that

control basic empathic functions which supports the commonly held belief that psychopathic individuals are not compassionate or empathic—making them callous and egotistical.

Shirtcliff and his research team (2009) sought to explain the neurobiology of empathy by retrospectively analyzing studies on psychopathy and brain activity/anatomy. He defines psychopathy as a combination of a "failure to respond to the distress cues of others," impulsivity, and "a lack of emotional responsiveness" (Blair et al., 2004). In his research, Shirtcliff looked for a lack of empathy and its manifest criminal behaviors in psychopaths. The psychopathic model, he posited, cannot be purely viewed as an expression of empathy shutdown but as a more complex disordered emotional functioning leading to aberrant social actions.

While this information is helpful in determining if and to what severity people are psychopathic, it says nothing about how psychopathy develops. Explanations as to why this disorder exists in an individual draw from a wide variety of psychological sources ranging from biological to social. Recent biological studies of ASPD have shown that people classified as antisocial, especially those who are unusually hostile and rash, display lower serotonin activity than the typical individual. Other studies further indicate people suffering from antisocial personality disorder display lower activity in their frontal lobes (Morgan & Lilienfeld, 2000). Serotonin dysfunction is also one of the most researched possible mechanisms proposed to be a part of major depression, but its exact role in ASPD is still unclear. Other research reveals that "people with antisocial personality disorder respond to warnings or expectations of stress with low brain and bodily arousal, such as slow autonomic arousal and slow EEG waves," making them unaffected by threatening or emotional situations (Comer, 2010, p. 522). This biological difference could explain why antisocial individuals are more likely to take risks and seek thrills: they are compensating for their under-arousal.

Brain abnormalities inherent to psychopathy are located in the frontal and prefrontal cortex, where emotional signals from the limbic system are integrated and lead to behavior. The prefrontal cortex (PFC) generally regulates emotional responses and mood in typical individuals and also is the area of the brain where complex cognitive patterns such as making plans to solve problems and resolve conflicts occur. Within the PFC is the orbitofrontal cortex, which is intimately tied to the amygdala and promotes both stimulus and reinforcement learning. When the amygdala is hyporesponsive, as it is in psychopathic individuals, one theory proposes that the orbitofrontal cortex is also less active because it has no emotional stimulation with which to form emotional memories (Blair et al., 2004). The ventromedial PFC, another area important to the empathy system and our capacity to have theory of mind, integrates emotional information from the amygdala during decision-making tasks so that people respond to emotional as well as physical cues (Koenigs et al., 2007). However, these typical processes are not the case in people with ASPD.

Circulating cortisol levels in psychopaths are much lower than in non-psychopathic criminals, suggesting a biological underproduction of this "distress" hormone secreted from the adrenal cortex rather than an over-exposure to it in childhood (Cima, Smeets, & Jelicic, 2008). As cortisol has been linked to feelings of stress and anxiety, lower cortisol levels may be related to both the psychopath's propensity toward risk-taking and imperviousness to the distress of others. Normal empathy, thus, relies upon a healthy level of stress upon seeing another's distress (Eisenberg, 2007). Psychopaths are impaired in this response and therefore lack the ability to experience empathy.

Individuals expressing high levels of callousness and lack of emotion display a decrease in amygdala activity in conjunction with reduced anterior cingulate and insula functioning, which has been noted in studies of cooperation between tested psychopaths. The amygdala in healthy individuals tends to be active in response to one's own fear and to fear in others, as measured by amygdala activation when participants see images of fearful facial expressions. In psychopaths, the amygdala responds in the same way to neutral facial expressions as it does to fearful facial expressions (Blair et al, 2004). Shirtcliff

et al. (2009) posits that psychopathy involves an inability to empathize with fear in others because psychopaths do not experience fear themselves.

Other researchers believe that much of what lies at the root of ASPD stems from social and cognitive problems. Comer (2010) cites Sperry (2003) in his arguments that the "absence of parental love during infancy, leading to a lack of basic trust" is one social and developmental explanation for psychopathy. Comer (2010), citing Martens (2005) and Paris (2001), then goes on:

> In this view some children—the ones who develop antisocial personality disorder—respond to their early inadequacies by becoming emotionally distant, and they bond with others through the use of power and destructiveness. In support of this psychodynamic explanation, researchers have found that people with this disorder are more likely than others to have had significant stress in their childhoods, particularly in such forms as family poverty, family violence, and parental conflict or divorce. (p. 521)

One can sense that psychopathy is an example of impaired self-regulation and is a limiting perspective of the perceived self. Psychopaths lack the ability to engage in interpersonal joining and thus limit their sense of self to an identity only defined by the boundaries of their skin. With a diminished arousal in response to the affective states of others that make emotional understanding available in a healthy brain and mind, psychopaths lack the ability to give meaning to the minds of others. Here we see a failing on the part of the psychopath to take a mindful perspective of others, and of himself, and this results in extremely individualistic behavior. One aspect of self-regulation that is not present in this condition, and fundamental to how we live in our social worlds, is how we regulate our behavior. This regulation of action for the greater good in the context of societal living is called morality.

Self-Regulation and the Biology of Morality

From the above discussions of empathy, compassion and the lack thereof in psychopathy, it seems natural that we now turn our attention to a topic which draws from these central concepts: morality. A sense of morality not only stems from the ability to empathize, but also relies on an individual's theory of mind (ToM) (defined in a previous section) which speaks to viewing the mind as an interpersonal regulatory process and more generally as a single relational mind between individuals. Theory of mind functions when a person decides on a course of action based on the perception of another person's predicted behavior. This is mindfulness on a relational level—as an individual becomes part of a larger self and is mindful of another part of that self's thoughts, feelings and state of mind before taking a course of action.

As a prosocial species, humans need ToM in order to respond appropriately in a group setting to both nonverbal and perceived cues. ToM also includes applying another's potential actions to a framework of cultural edicts that give context to prediction. ToM allows us to empathize with others by understanding and appreciating what another person is feeling such that one can envision oneself "as" the other person emotionally: this capacity is the essence of both empathy and relational mindfulness. Empathy, combined with ToM and cultural norms of compassionate behavior (stemming from mindfulness on the relational level), forms the basis for personal morality. Culture alone is not enough to dictate what is a right or wrong way to treat another; one needs to be able to embody another person's emotional and logical perspectives in order to decide whether he/she would act similarly in the same situation. As this applies to general rules of behavior across all members of a culture, or a single, distributed, "cultural self," we must be able to relate to and be mindful of potential actions of all parts affected. Thus we see that the relational mind of a society acts as a regulatory process which governs individual actions based on moral imagination, reasoning, decision-making, and actions; and the only healthy way to regulate actions on such a broad level requires mindfulness of the feelings and situations of all individuals that make up the extended cultural self. This is "self-regulation" on the cultural level that embeds integration—the honoring of differences

and the promotion of compassionate linkages—that enables harmony to emerge within a community or a society.

On an individual level, theory of mind is the basis for what can be developed into a relational mind. Theory of mind begins to develop in early childhood and can be tested through a simple false beliefs task (Lightfoot et al., 2009). In the false belief task, a child watches a scene in which a character plays with a toy and then leaves the room. While the character is absent, the location of the toy is changed by a third party. The character then reenters the room and the scene is paused. At this point the child is asked where the character "thinks" the object is. If ToM is developed, the child will respond that the toy is in the initial location rather than the new location; if it is not however, the child will assume that the character has all the same information that he/she has and will answer that it is in the new location. The ability to understand why other people act the way that they do in certain situations, sets the stage for us to ask ourselves which actions (and their accompanying preceding situational factors) are allowable and forgivable. This, when widened to the societal level, then leads to a universal code of behavior among people with whom we identify and understand by being part of the relational self; morality is merely a very broad concept of theory of mind where the mind in question is one of a relational self, comprised of all interconnected and interdependent members of that society.

In 1985, Thomson came up with a basic paradigm by which morality could be assessed. The paradigm asks participants to imagine standing next to a stranger on a bridge which is over a train track. The train's brakes fail and it is careening towards a wall; all five people on the train will be killed unless you push the stranger next to you onto the path of the train to slow it down, killing him/her. Participants are asked: would you kill one person to save five? Most participants say no even though the rational decision would be to consider one life lost worth the cost of saving five. The act of killing is so instinctually antagonistic to empathic and social sensibilities that the rational application of an instrumental ToM loses out to the emotional one.

When this paradigm is coupled with MRI testing, the limbic system as well as the orbitofrontal and the anterior cingulate cortex activate, indicating the importance of emotion, executive function, and empathy in deciding what moral action to engage in (Aoki, Funane, & Koizumi, 2010). Furthermore, when participants read descriptions in the first person of moral transgressions committed on purpose, there are high levels of activity in their amygdala. This is contrasted by the fact that the amygdala is not activated significantly over baseline when participants read scenarios in which the moral transgression is committed by them by *accident* or when the descriptions are in *third person*, indicating that another person is responsible in the hypothetical situation (Berthoz, Grezes, & Armory, 2006). Amygdala involvement, in either case, leads to a strong negative emotional reaction to the implication that one *hypothetically* committed a crime that is known as immoral and non-empathetic. Here we see a self-regulating response in the form of an emotional/neurological reaction in a single person to an action disrupting the homeostasis of the relational self.

To capture a spectrum of values rather than a binary yes-no of moral decisions, scales began to be used for rating moral blameworthiness versus praiseworthiness of actions. Participants read statements that are either morally upright or represent depravity and have to rate the degree of praiseworthiness or blameworthiness for each statement. Praiseworthiness was shown to be associated with increased activity in the orbitofrontal cortex and blameworthiness with activity in the superior temporal sulcus (Takahashi et al., 2008). The orbitofrontal cortex is involved both in facial processing and the pleasure response to seeing a person one considers attractive; its similar activation in response to a moral action may be due to a conditioned social response of pleasure to admirable behavior (Takahashi et al., 2008). This region plays a key role in creating maps of others' intentions by processing social cues such as gesture, posture, and facial expressions. These regions act as agents supporting ToM processing that extends beyond verbal communication

(Iacoboni, 2009; Simon et al., 2007) allowing us to make moral assessments of situations.

As such, a very important part of moral judgment appears to lie in the intent of an action rather than only its outcome. The outcome versus intent calculation guides the sentencing of many serious and petty crimes in the USA as well as in other countries (Takahashi et al., 2008). The use of character witnesses and psychological assessments in the adjudication of crimes attests to the fact that intent and empathic potential hold the key to perceived responsibility for immoral action. When presented with four scenarios of outcome versus intent, the temporo-parietal junction of the brain, or the seat of ToM (Saxe, 2006; Young, Camprodon, Hauser, Pascual-Leone, & Saxe, 2010), is activated in the two options where guilt is unclear: when someone commits a crime without intent or someone intends to commit a crime and fails (Young et al., 2010). When in the grey zone of morality, our ToM and mindfulness of others' situations and intentions puts us in the shoes of the alleged criminal so that we can balance intent and outcome when deciding whether an action is wrong. However, when it comes to our own behavioral output, our ability to act morally with self-regulation in the face of intense stress requires impulse control.

Impulse Control

Impulse control is the psychological mechanism related to decision-making that balances short-term benefits with long-term costs. The regulation of behavior requires people to put a temporal and functional space between impulse (or urges with high emotional payoffs) and action in order to avoid unsatisfactory consequences in the short or in the long run. In order to effectively control one's impulses, self-regulation and mindful awareness of emotions and urges are required. According to Lightfoot et al. (2009), "*Impulse control, inhibition*, and *persistence* are among the main features of emotional regulation, and they underlie abilities to 'down-regulate' negative emotions and 'up-regulate' positive ones" (p. 546). A facet of self-regulation, impulse control is a mental function that significantly increases during puberty and continues to grow throughout emerging adulthood. This mental space or pause is an essential element in emotional intelligence (Goleman, 1996; Siegel, 2010a). Impulse control has roots in both biological processes, such as brain development (mainly the frontal lobe), and social contexts, such as interpersonally mediated expectations for societal and family obligations and interactions (Lightfoot et al., 2009). As regulation entails monitoring and modifying, we can view impulse control as having both internal and interpersonal levels of "self-regulation." Thus, impulse control requires mindful monitoring and modulating of energy and information flow in both the intrapersonal and interpersonal processes of selves, leading to regulation on the individual and relational levels.

In a closer examination of impulse control, let us first discuss the biological processes that are related to its development. As children progress into adolescence, there are two significant processes that occur with regards to emotional regulation. One is that levels of the reward neurotransmitter, dopamine, shifts in ways that may promote a drive toward novelty and risk-taking behavior and be a part of something called "hyper-rational thinking" in which the limbic regions seem to place more evaluative weight on the potential positive outcomes of an action and de-emphasize the risks such that the reasoning cortex "decides" to engage in risk-taking behaviors (Siegel, 2013). The second process is the onset of brain remodeling, which continues on through late adolescence into the mid-twenties (Pharo, Sim, Graham, Gross, & Hayne, 2011). The presence of neural reconstruction in the integrative prefrontal regions responsible for impulse control may, in part, explain why young adolescents have more trouble controlling impulsive behaviors than adults do. This combined with shifts in the dopamine reward system and hyper-rational thinking may also be reasons why even older adolescents, no longer impulsive, engage in dangerous behaviors with serious negative consequences.

As stated above, during adolescence the brain goes through its last period of intense transformation, with the pruning and myelination that ultimately create more differentiation and linkage, one that involves the prefrontal regions whose integrative role is responsible for impulse control and the emergence of more adaptive self-regulation. The healthy maturation of the brain toward integration in the adolescent years supports the ability to control potentially harmful impulses and think in ways that lead to more balanced evaluative capacities to carry out less risky behaviors. Impulse control and more integrated thinking are vital for competent adults' self-regulation in any culture. The prefrontal cortex's central role in coordinating and balancing a wide array of differentiated regions into an integrated whole continues to develop through adolescence and is a neural capacity important for decision-making, inhibition of thoughts and behavior, and the regulation of affect or emotional expressions (Bechara, Tranel, & Damasio, 2000; Passingham, 1993; Reyna, Chapman, Dougherty, & Confrey, 2012; Romer, 2010; Spear, 2010; Stuss & Knight, 2002). The orbitofrontal aspect of the prefrontal cortex is especially important for balancing risk and reward and shaping our response to impulses (Kelley, Schochet, & Landry, 2004). Second only to infancy, adolescence is the most active period of growth in human development, and consequently a period of high vulnerability to toxic substances that can chemically impede healthy development; yet adolescents commonly participate in high risk activities, including physically dangerous behaviors and the excessive use of psychoactive substances (Spear, 2010).

Pharo and colleagues (2011) expand on this concept and offer a biological explanation:

"[The] prefrontal cortex is a critical component in performing and maintaining inhibitory behaviors and thoughts (Kelley et al., 2004; Dahl, 2004; Spear, 2010). Although adolescents conceptually understand the risks associated with their behavior by the age of 14, the inhibitory mechanisms required to resist those risky behaviors are not equivalent to that of adults until approximately 20 years of age (Giedd, 2004; Giedd et al., 1999; Sowell, Thompson, Holms, Jernigan, & Toga, 1999)" (p. 971)

While most researchers agree that frontal lobe maturity plays a large role in controlling impulses (Pharo et al., 2011), some also believe that the brain's limbic system, "which is involved with motivation, emotion, and memory processes" is also a contributing factor (Gerrig & Zimbardo, 2008) to maturity. Pharo et al. (2011) write, "under conditions of high emotional arousal, adolescents may be more likely to engage in risky behavior because their limbic system 'takes over' and they do not have the sufficient prefrontal cortical mechanisms in place to suppress their behavior." Without the inhibitory mechanisms of the prefrontal cortex, the adolescents are driven by the motivating and emotional signals from the limbic system, and may at times engage in risky behavior that is not rationally and completely thought through. Such reasoning depends on an engaged prefrontal cortex that enables neural integration to coordinate and balance many areas into a functional whole, which is not present in early adolescence. Future research is needed to support this proposal, but from a practical viewpoint, teaching mindsight skills through mindfulness training theoretically may help support the growth of integrative capacities that can help increase self-awareness and prefrontal capacities that can promote more optimal choices driven by an adolescent's positive values and innate but often untapped drive to move toward health (Siegel, 2013).

Certainly biological processes play a significant role in the developing adolescents' situational assessment and decision-making process, but perhaps equally significant are social factors. Adolescence is a time of broadening capability and autonomy, and teenagers will often test the boundaries of their new-found aptitudes. Often, this testing means new opportunities for risky acting on impulse.

Beyond the adolescent years, examples of impaired impulse control are common in a range of psychiatric conditions that are not a part of typical development. Regulation of impulses is impaired in mental disorders such as pyromania (the deliberate and repeated setting of fires to

achieve intense pleasure or relief from tension), kleptomania (a recurrent failure to resist the impulse to steal), intermittent explosive disorder (having periodic aggressive outbursts in which the individual may seriously attack people and destroy property), trichotillomania (repeatedly plucking hair from various parts of the individual's bodies, particularly the scalp), and pathological gambling (the persistent and repeated gambling behavior that disrupts one's life at home or at work).

The introduction of mindfulness training may enhance present functioning and cultivate healthy development in many people. Mindfulness practices can be seen as a way of creating the "space of the mind" in which individuals learn to focus attention on their intention and become more aware of the experience of being aware (Siegel, 2007a). This mind training supports the increased ability to hold the contents of awareness in the form of thoughts, emotions, impulses, memories, and images. This enhanced stability of awareness can permit a mental space to be created between impulse and action. Holding an internal sensation to act—an impulse—in mind but inhibiting its execution as a behavioral action is the heart of impulse control. Mindfulness directly shapes the functioning of the mind to enhance this important aspect of self-regulation. Research now indicates that impulse control and emotional regulation are traits that can be taught and learned as a part of mindfulness training (Davidson & Begley, 2012; Siegel, 2010a, 2012a). Mindfulness techniques, which empower the individual to take the time to focus his/her attention on his/her intentions, creates the important pause between impulse and action and results in self-control through emotional and behavioral regulation.

Conclusion

In conclusion, the topics discussed in this chapter, fundamental to the field of mental health, combine to reveal a complex relationship between self, brain, and our social world. This view also provides a road map revealing the importance of mindfulness in the journey toward well-being and integration. In our examination of the self and mind, we discovered that these two entities are in many ways a tautology: two terms that represent overlapping concepts and core processes. We have defined the mind as a process that regulates the flow of information and, like the self, is both embodied within the skin and extends between individuals. Ultimately, a healthy, relational view of the self and mind reveals how the process of integration results in both well-being and in the cultivation of kindness and compassion. In this way, healthy self-regulation would be seen to involve self-compassion and other-directed compassion as well. When such integrative states do not arise in the course of development, a constricted self emerges that is prone to the antithesis of compassion: psychopathy. The key to cultivating a healthy and interconnected self and mind, and ultimately maximizing compassion, is self-regulation. Mindfulness offers one approach to creating the internal and the interpersonal foundations for integration at the heart of healthy self-regulation. When behaviors are enacted with others' minds in mind, when a sense of the greater good is embedded in the intention driving our actions, we call such reasoning and behavior, moral. Our thesis in this chapter is that self-regulation is interwoven with morality because the self and the mind are both embodied as well as relational processes. The self and mind do not arise in isolation but are created, in part, from our social embeddedness. Regulating the self in an integrated way emerges from a mind that embraces this interdependence of the self as being a part of the larger whole—it is both embodied and it is relational. Thus we see how a more integrated self and mind not only benefit the individual's mental state of well-being but serve to enhance society as a whole.

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

Aoki, R., Funane, T., & Koizumi, J. (2010). Brain science of ethics: Present status and the future. *Mind Brain and Education, 4*, 188–195.

Barraza, J. A., & Zak, P. J. (2009). Empathy towards strangers triggers oxytocin release and subsequent generosity. *Values, Empathy, and Fairness Across Social Barriers: Annals of the New York Academy of Sciences, 1167*, 182–189.

Barrett, B., Rakel, D., Hoeft, T., Chewning, B., Craig, B., & Niu, M. (2008). Practitioner empathy and duration of the common cold. *Brain, Behavior, and Immunity, 22*, 2–2.

Bartz, J. A., Zaki, J., Bolger, N., Hollander, E., Ludwig, N. N., Kolevzon, A., et al. (2010). Oxytocin selectively improves empathic accuracy. *Psychological Science, 21*, 1426–1428.

Bechara, A., Tranel, D., & Damasio, H. (2000). Characterization of the decision-making deficit of patients with ventromedial prefrontal cortex lesions. *Oxford Journals, 123*, 2189–2202.

Berntston, G. G., Norman, G. J., & Bechara, A. (2011). The insula and evaluative processes. *Psychological Science, 22*, 80–86.

Berthoz, S., Grezes, J., & Armory, J. L. (2006). Affective response to one's own moral violations. *NeuroImage, 31*, 945–950.

Blair, R. J. R., Mitchell, D. G. V., Peschardt, K. S., Colledge, E., Leonard, R. A., Shine, J. H., et al. (2004). Reduced sensitivity to others' fearful expressions in psychopathic individuals. *Personality and Individual Differences, 37*, 1111–1122.

Bora, E., Yucel, M., & Allen, N. B. (2009). Neurobiology of human affiliative behaviour: Implications for psychiatric disorders. *Current Opinion in Psychiatry, 22*, 320–325.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.

Buchanan, T. W., Bagley, S. L., & Stansfield, R. B. (2012). The empathic, physiological resonance of stress. *Social Neuroscience, 7*, 191–201.

Buk, A. (2009). The mirror neuron system and embodied simulation: Clinical implications for art therapists working with trauma survivors. *The Arts in Psychotherapy, 36*(2), 61–74.

Cima, M., Smeets, T., & Jelicic, M. (2008). Self-reported trauma, cortisol levels, and aggression in psychopathic and non-psychopathic prison inmates. *Biological Psychology, 78*, 75–86.

Craig, A. D. (2009). How do you feel-now? The anterior insula and human awareness. *Nature Reviews Neuroscience, 10*, 59–70.

Coelho, H. F., Canter, P. H., & Ernst, E. (2007). Mindfulness-based cognitive therapy: Evaluating current evidence and informing future research. *Journal of Consulting and Clinical Psychology, 75*, 1000–1005.

Comer, R. J. (2010). *Abnormal psychology*. New York: Worth Publisher.

Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F., et al. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine, 65*(4), 564–570.

Davidson, R. J., & Begley, S. (2012). *The emotional life of your brain: How its unique patterns affect the way you think, feel, and live—And how you can change them*. New York: Penguin.

Decety, J., & Ickes, W. J. (2009). *The social neuroscience of empathy*. Cambridge, MA: MIT Press.

Ditzen, B., Schaer, M., & Gabriel, B. (2009). Intranasal oxytocin increases positive communication and reduces cortisol levels during couple conflict. *Biological Psychiatry, 65*, 728–731.

Eisenberg, N. (2007). *Empathy-related responding: Links with self-regulation, moral judgment, and moral behavior*. Herzlyia symposium on personality and social psychology (pp. 1–22), American Psychological Association (2010), AZ.

Farb, N. S., Segal, Z. V., Mayberg, H., Bean, J., McKeon, D., Fatima, Z., et al. (2007). Attending to the present: Mindfulness meditation reveals distinct neural modes of self-reference. *Social Cognitive and Affective Neuroscience, 2*, 313–322.

Fredrickson, B. L., Grewen, K. M., Coffeya, K. A., Algoe, S. B., Firestine, A. M., & Ma, J. (2013). A functional genomic perspective on human well-being (B. H. Singer, Ed.). *Proceedings of the National Academy of Sciences, 110*(33), 13684–13689. Retrieved from http://www.pnas.org/search?author1=Barbara+L.+Fredrickson&sortspec=date&submit=Submit

Germer, C. K. (2004). What is mindfulness. *Insight Journal, 2004*(Fall), 24–29. Retrieved from http://www.mbcttrainingen.nl/Resources/What%20is%20Mindfulness.pdf.

Gerrig, R. J., & Zimbardo, P. G. (2008). Understanding human personality. In S. Frail (Ed.), *Psychology and life* (pp. 439–442). New York, NY: Pearson.

Gilbert, P. (2009). *The compassionate mind*. London: Constable.

Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*, 83–91.

Goleman, D. (1996). *Emotional intelligence: Why it can matter more than IQ*. London: Bloomsbury.

Gray, M. A., Harrison, N. A., & Wiens, S. (2007). Modulation of emotional appraisal by false physiological feedback during fMRI. *PloS One, 2*, e546.

Guastella, A. J., Mitchell, P. B., & Dadds, M. R. (2008). Oxytocin increases gaze to the eye region of human faces. *Biological Psychiatry, 63*, 3–5.

Haycock, D. (2012). Hare psychopathy checklist. *Encyclopedia of mental disorders*. Retrieved from http://www.minddisorders.com/Flu-Inv/Hare-Psychopathy-Checklist.html

Hare, R. D. (1993). *Without conscience: The disturbing world of the psychopaths among us*. New York: Pocket Books.

Hill, C. L. M., & Updegraff, J. A. (2012). Mindfulness and its relationship to emotional regulation. *Emotion, 12*, 81–90.

Hosking, P. (2007). Compassion: What is in a word? In M. Kostanski (Ed.), *The power of compassion: An exploration of the psychology of compassion in the 21st century* (pp. 1–13). Newcastle, UK: Cambridge Scholars Publishing. Retrieved from http://www.c-s-p.org/Flyers/9781847181152-sample.pdf

Iacoboni, M. (2009). Imitation, empathy, and mirror neurons. *Annual Review of Psychology, 60*, 653–670.

Jacobs, T. L., Epel, E. S., Lin, J., Blackburn, E. H., Wolkowitz, O. M., Bridwell, D. A., et al. (2011). Intensive meditation training, immune cell telomerase activity, and psychological mediators. *Psychoneuroendocrinology, 36*(5), 664–681.

Jackson, P. L., Brunet, E., Meltzoff, A. N., & Decety, J. (2006). Empathy examined through the neural mechanisms involved in imagining how I feel versus how you feel pain. *Neuropsychologia, 44*(1), 752–761.

Kelley, A. E., Schochet, T., & Landry, C. F. (2004). Risk taking and novelty seeking in adolescence: Introduction to Part I. *Annals of the New York Academy of Sciences, 1021*(1), 27–32. doi:10.1196/annals.1308.003.

Koenigs, M., Young, L., Adolphs, R., Tranel, D., Cushman, F., Hauser, M., et al. (2007). Damage to the prefrontal cortex increases utilitarian moral judgments. *Nature, 446*, 908–911.

Krasner, M. S., Epstein, R. M., Beckman, H., Suchman, A. L., Chapman, B., Mooney, C. J., et al. (2009). Association of an educational program in mindful communication with burnout, empathy, and attitudes among primary care physicians. *JAMA, 302*(12), 1284–1293.

Kudielka, B. M., Schommer, N. C., & Hellhammer, D. H. (2004). Acute HPA axis responses, heart rate, and mood changes to psychosocial stress (TSST) in humans at different times of day. *Psychoneuroendocrinology, 29*, 983–992.

Lieberman, M. D., & Eisenberger, N. I. (2005). A pain by any other name (rejection, exclus``ion, ostracism), still hurts the same: The role of dorsal anterior cingulate in social and physical pain. In J. T. Cacioppo, P. Visser, & C. Pickets (Eds.), *Social neuroscience: People thinking about people* (pp. 167–187). Cambridge, MA: MIT Press.

Lightfoot, C., Cole, M., & Cole, S. (2009). *The development of children*. New York: Worth.

Morgan, A. B., & Lilienfeld, S. O. (2000). A meta-analytic review of the relation between antisocial behavior and neuropsychological measures of executive function. *Clinical Psychology Review, 20*, 113–136.

Neff, K. D., Rude, S. S., & Kirkpatrick, K. L. (2007). Self-compassion and adaptive psychological functioning. *Journal of Research in Personality, 41*(1), 139–154.

Parker, S., Nelson, B., Epel, E., & Siegel, D. J. (in press). The science of presence. In K.W. Brown & C. D. Creswell (Eds.), *Handbook of mindfulness: Theory and research*. New York: Guilford Press.

Passingham, R. E. (1993). *The frontal lobes and voluntary action*. New York, NY: Oxford University Press.

Pauley, G., & McPherson, M. (2010). The experience and meaning of compassion and self-compassion for individuals with depression or anxiety. *Psychology and Psychotherapy: Theory, Research and Practice, 83*, 129–143.

Pfeifer, J. H., Iacoboni, M., Mazziota, J. C., & Dapretto, M. (2008). Mirroring others' emotions relates to empathy and interpersonal competence in children. *NeuroImage, 39*, 2076–2085.

Pharo, H., Sim, C., Graham, M., Gross, J., & Hayne, H. (2011). Risky business: Executive function, personality, and reckless behavior during adolescence and emerging adulthood. *Behavioral Neuroscience, 125*, 970–978.

Preston, S. D., & de Waal, F. B. M. (2002). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences, 25*(1), 1–72.

Reyna, V. F., Chapman, S. B., Dougherty, M. R., & Confrey, J. (2012). *The adolescent brain: Learning, reasoning, and decision making*. Washington, DC: American Psychological Association.

Romer, D. (2010). Adolescent risk taking, impulsivity, and brain development: Implications for prevention. *Developmental Psychobiology, 52*(3), 263–276. doi:10.1002/dev.20442.

Ross, H. E., & Young, L. J. (2009). Oxytocin and the neural mechanisms regulating social cognition and affiliative behavior. *Frontiers in Neuroendocrinology, 30*, 534–547.

Saxe, R. (2006). Uniquely human social cognition. *Current Opinion in Neurobiology, 16*(1), 235–239.

Schore, A. N. (2012). *The science of the art of psychotherapy*. New York: W.W. Norton.

Shirtcliff, E. A., Vitacco, M. J., Graf, A. R., Gostisha, A. J., Merz, J. L., & Zahn-Waxler, C. (2009). Neurobiology of empathy and callousness: Implications for the development of antisocial behavior. *Behavioral Sciences and the Law, 27*, 137–171.

Segal, Z. V., Williams, J. M., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York: Guilford Press.

Siegel, D. J. (2006). An interpersonal neurobiology approach to psychotherapy. *Psychiatric Annals, 36*, 248–256.

Siegel, D. J. (2007a). *The mindful brain: Reflection and attunement in the cultivation of well-being*. New York: W.W. Norton.

Siegel, D. J. (2007b). Mindfulness training and neural integration. *Journal of Social Cognitive, and Affective Neuroscience, 2*, 259–263.

Siegel, D. J. (2010a). *Mindsight: The new science of personal transformation*. New York: Random House.

Siegel, D. J. (2010b). *The mindful therapist: A clinician's guide to mindsight and neural integration*. New York: W.W. Norton.

Siegel, D. J. (2012a). *The developing mind: How relationships and the brain interact to shape who we are* (2nd ed.). New York: Guilford.

Siegel, D. J. (2012b). *Pocket guide to interpersonal neurobiology: An integrative handbook of the mind*. New York: W.W. Norton.

Siegel, D. J. (2013). *Brainstorm: The power and purpose of the teenage brain*. New York: Tarcher Penguin/ Random House.

Simon, M., Herold, R., & Fekete, S. (2007). Mirror neurons—novel data on the neurobiology of intersubjectivity. *Psychiatria Hungarica, 22*, 418–429.

Spear, L. P. (2010). *The behavioral neuroscience of adolescence*. New York, NY: W.W. Norton.

Stuss, D. T., & Knight, R. T. (2002). *Principles of frontal lobe function*. Oxford: Oxford University Press.

Takahashi, H., Kato, M., Matsuura, M., Koeda, M., Yahata, N., & Suhara, T. (2008). Neural correlates of human virtue judgment. *Cerebral Cortex, 18*, 1886–1891.

Thomson, J. J. (1985). The trolley problem. *The Yale Law Journal, 94*, 1395–1415.

Urry, H. L., Nitschke, J. B., Dolski, I., Jackson, D. C., Dalton, K. M., Mueller, C. J., et al. (2004). Making a life worth living: Neural correlates of well-being. *Psychological Science, 15*, 367–372.

Walker, I. (2009). *I, psychopath* [Documentary]. Australia: Screen Australia, & New South Wales Film and Television Office.

Wilson, E. O. (1998). *Consilience: The unity of knowledge*. New York: Vintage Books.

Wray-Lake, L., Flanagan, C. A., & Maggs, J. L. (2011). Socialization in context: Exploring longitudinal correlates of mothers' value messages of compassion and caution. *Developmental Psychology, 48*, 250–256.

Young, L., Camprodon, J. A., Hauser, M., Pascual-Leone, A., & Saxe, R. (2010). Disruption of the right temporoparietal junction with transcranial magnetic stimulation reduces the role of beliefs in moral judgments. *PNAS, 107*, 6753–6758.

Mindfulness as a General Ingredient of Successful Psychotherapy

17

James Carmody

Introduction

The Common Goal Mindfulness Training Has with Psychotherapy

While a complete list of psychotherapy's goals, and the means therapists have employed to facilitate these would be long and diverse, the overarching themes are increasing quality of life and reducing emotional suffering; goals that are shared by all Buddhist schools of thought, even as they vary in their approaches and practices. But while Buddhism and psychotherapy have broadly similar ends, and even share some techniques to foster beneficial change, historically their approaches stood in contrast. Western therapeutic systems focused principally on modifying cognitions and behavior and/or developing an intellectual understanding of the dynamics of the internal narrative. Buddhist approaches, while including the standard religious admonishments to ethical behavior and positive cognitions in their systematic path, offered in addition, exercises to cultivate insight into the moment to moment construction of personal identity in the mind and the degree of suffering/well-being resulting from patterns of responding to these constructions. Mindfulness, as well as the range of mind-training exercises designed to facilitate it, occupies an important place in the development of this experiential insight.

Recognizing the overlapping goals of Buddhist and Western approaches, and particularly the therapeutic opportunities represented by the Buddhist mind training exercises, mindfulness instruction was introduced into clinical settings, principally through the work of Kabat-Zinn (1982). Subsequent randomized trials have provided solid evidence for the effectiveness of mindfulness training in reducing stress and distress in both clinical (Hofmann, Sawyer, Witt, & Oh, 2010), and nonclinical populations (Chiesa & Serretti, 2009; Fjorback, Arendt, Ørnbøl, Fink, & Walach, 2011). The positive benefits that relate directly to the goals of psychotherapy include: increased subjective well-being, reduced psychological symptoms and emotional reactivity, improved behavioral regulation, and improved interpersonal coping skills (Davis & Hayes, 2011; Keng, Smoski, & Robins, 2011). Studies of the mechanisms of change indicate that increases in mindfulness mediate and precede (Baer, 2009; Bränström, Kvillemo, Brandberg, & Moskowitz, 2010; Carmody, Baer, Lykins, & Olendzki, 2009; Kuyken et al., 2010) reductions in distress

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(Baer, Carmody, & Hunsinger 2011), and longer term trials show that improvements in well-being from the training are enduring when compared to an educational control program (Pbert et al., 2012).

This range of benefits to psychological well-being (Hofmann et al., 2010) has led to mindfulness training being creatively adapted to Western therapeutic models and successfully integrated into a growing variety of clinical treatment modalities, both exclusively as in Mindfulness-Based Stress Reduction (MBSR), and in parallel with practices such as self-reflection, journal writing, skills training, affect tolerance, and reframing (Sanders, 2010) in programs such as Dialectical Behavior Therapy (DBT) (Linehan, 1993), Mindfulness-Based Cognitive Therapy (MBCT) (Teasdale, Segal, & Williams, 1995), and Acceptance and Commitment Therapy (ACT) (Hayes, Strosahl, & Wilson, 1999). Trials of each of these programs have shown that the training does indeed improve outcomes in their clinical populations (Vøllestad, Nielsen, & Nielsen, 2011). Reports of studies of the effect of mindfulness in the more traditional psychotherapeutic process have also proliferated in recent years, including its role in the therapeutic encounter (Davis & Hayes, 2011). While the evidence in this area is less solid, mindfulness does appear to contribute to therapists' self-care (Christopher et al., 2011) and to make for more compassionate and empathetic therapists, although it does not necessarily translate into their having better therapy outcomes (Davis & Hayes, 2011).

The Challenges of Integrating Mindfulness into Clinical Settings and Empirical Systems

Even as there is broad acceptance of the clinical utility of mindfulness, there remain a number of knowledge gaps that are important to fill if it is to find more widespread integration into psychotherapy. These include both the lack of a testable theoretical model to serve as an integrative foundation for comparative studies (Sedlmeier et al., 2012) and, related to this, significant variation in the literature on how the construct is best understood (Chiesa & Malinowski, 2011; Langer & Moldoveanu, 2000; Ludwig & Kabat-Zinn, 2008) and how to determine valid criterion references for self-report measures of mindfulness (Davidson, 2010). Disagreements extend even to whether it is possible to conceptually define and measure mindfulness without loss of its essential nature; asserting that it must be experientially understood within the larger Buddhist framework from which it is derived (Grossman, 2008; Harrington & Pickles, 2009). More particular to the process of integrating mindfulness into psychotherapy is the dearth of evidence related to both the minimum amount of training and practice time required for patients to derive benefits from mindfulness training (Carmody & Baer, 2009), and the amount of training and experience in mindfulness practice therapists need to have in order to be able to represent and integrate it "correctly" (Davis & Hayes, 2011).

There are a number of reasons that such differences and knowledge gaps are to be expected in this field: First, the construct of mindfulness is extracted from a larger and more comprehensive Buddhist religious system. In the original Pali texts "samma-sati" is one of eight factors to be cultivated in order to understand the momentary creation of mental states, and to reduce life's suffering. "Mindfulness" has come to be the accepted translation of "sati," and "samma-sati" is generally understood as skillful mindfulness. Sati can also be understood as awareness however, and in a clinical context "skillful awareness" may be a preferable term to mindfulness because awareness is a mental function within patients' existing realm of experience, and so immediately conceptually accessible. It also avoids the possible confusion that can arise by objectifying a term like "mindful" that has a pre-existing conceptual meaning in Western literature.

A second reason for differences is the wide variation that exists among different Buddhist traditions and teachers in the understanding of mindfulness (sati), and how it is most skillfully cultivated and integrated into the broader

system. In Soto Zen traditions for example, great emphasis is placed on directing effort to maintain correct posture during formal meditation (zazen) and typically refrains from abstract instructions for the cultivation of mindfulness; that it is cultivated through awareness of ones actions and surroundings. In the Theravada South Asian traditions, on the other hand, formal meditation involves more explicit instruction in mental exercises to facilitate a more wide-ranging exploration of mental activity.

Finally, and perhaps most significantly, important variations in emphases and understanding are bound to occur when an approach to the cultivation of well-being moves from conceptions of suffering in the traditional Eastern cultures the system developed within, into the enshrined Western pursuit of happiness and the diversity of cultural and personal aspirations associated with well-being in a market society. In the Buddhism of traditional Eastern cultures an accepted truth was that suffering was to be expected, and that efforts to escape from it will lead only to further suffering. It should be kept in mind also that these were typically socially static societies when compared with the aspirational culture we are socialized into, in which ubiquitous advertising offers the promise of escape from our circumstances.

Even so, most descriptions of mindfulness in the clinical literature have used some variation on Kabat-Zinn's definition of paying attention in a particular way: on purpose, in the present moment, and non-judgmentally (Kabat-Zinn, 1994; Shapiro, Carlson, Astin, & Freedman, 2006). While such a description is intriguing as to what may follow by way of its cultivation, it is unlikely on the face of it to mean much to most clients and patients not already familiar with mindfulness practice. At worst, it may be perceived as sufficiently cryptic, challenging, and inaccessible to discourage further exploration. In this regard, patients are often asked to suspend their need for a conceptual understanding in favor of grasping it through experience with one of the training exercises.

Bypassing the Definition Problem: Understanding Mindfulness Through the Training Exercises

To weave a way through these differences in understanding, and to make the construct more immediately accessible than the usual clinical definition, I describe in this chapter a conceptual model that draws upon forty-odd years of personal practice in the three major Buddhist traditions; professional experience as a therapist; clinical research studying the outcomes and mechanisms of mindfulness training; and from teaching mindfulness to patients and clinicians. It is based on the skills taught in clinical mindfulness training exercises, and describes how those exercises support the experiential recognition of three features of mental activity not normally discerned, and how this recognition affects the individual's lived experience. As such it revolves around facility in the use of attention, together with recognizing components of mental experience and their conditioned associations that the attentional facility and increased awareness make possible.

In subsequent sections I expand on and discuss the features of the model concretely, including its usefulness in psychotherapy by providing a parsimonious and accessible conceptual framework for presenting and discussing mindfulness with patients and clients (Carmody & Baer, 2009). But briefly, and rather abstractly, they can be described as follows:

1. Our everyday experience, while apparently seamless, is in fact constructed from three phenomenological components which form associational cycles. Those components are: thoughts/images, impressions arriving through the senses, and the pleasant/unpleasant feeling tone associated with these. The richness of our experience; memory, imagination and emotion, are the result of the symphonic interplay of these fundamental elements.
2. Because attention is normally preoccupied with the content of these components, their nature goes unrecognized, thereby sustaining their associational cycles. If it is a thought for example,

attention is occupied with what the thought is about, or means. With training, these components can be recognized as events (mind objects) occurring in the field of awareness, thereby disrupting the associational cycle that relies on preoccupation with content and meaning.

3. Attention is adapted to highlight novelty and possibilities for/threats to fulfillment of needs (including safety) but the movement of attention itself is not normally noticed. Rather, the object of attention is noticed, and arousal levels and affects follow the degree of threat/delight represented by that content. These principles are explained more fully below.

The Utility of a Functional, Evolutionary Approach

While these features become evident upon reflection, in everyday life their rapidity and automaticity results in experience being perceived as seamless, and so presenting to the patient no apparent opening for some measure of control in the face of distress. This perception results in a sense of powerlessness that exacerbates the stress/distress. The relatively simple mindfulness training exercises (meditations) are designed to facilitate recognition of these three features in everyday experience by developing self-regulation of attention, and cultivating curiosity about, and observation of, internal experience. Acquisition of this learning represents a helpful resource for patients to approach the seamlessness of everyday felt experience, and represents an important feature of the clinical utility and therapeutic value of mindfulness (Teasdale et al., 2002). This functional model has a number of advantages in the psychotherapeutic setting for both therapists and patients.

First, psychotherapy, like mindfulness, relies on a certain kind of introspection grounded in the phenomenology of perception. By explicating the qualities of attending to experience that are embedded in mindfulness training exercises, and the effect those can be expected to have on the individual's felt experience, the model makes already familiar psychological processes central to the explanation rather than lab-based neural and biological processes. Second, by using constructs already familiar to both therapists and their clients, it provides a relatively simple conceptual framework that can be individually adapted both to introduce mindfulness to patients in psychotherapy who are naïve to it, and used as a basis for discussing mindfulness in the ongoing therapeutic process. Also, taking it out of the commonly used descriptions and customary mindfulness meditation language avoids the definition problem, and makes mindfulness seem less perplexing and more conceptually straightforward and accessible to patients. Third, it reveals the elements of mindfulness training that have been employed in systems such as cognitive therapy for many years to make features of internal experience accessible to patients. As such, it provides a conceptually unifying foundation that shows both the common ground, and the contrast, mindfulness has with what patients are already learning in therapy.

Lastly, an evolutionary explanation for the stubborn default attending mechanisms that patients encounter when first attempting the mindfulness attention exercises reveals an inherent, if dysfunctional, intelligence in those patterns adapted for survival and reproductive success. An appreciation of the adaptive function of this mechanism can help patients to better understand and contextualize the frustrations they encounter, and that often test their resolve to persist in endeavoring to make changes, than the somewhat more pejorative craving, aversion/clinging, attachment explanations derived from Buddhist conceptualizations.

The Three Principles of the Functional Conceptual Model

The following sections develop and explain these features and illustrate their role in clinical outcomes.

First Principle

Our apparently seamless experience is constructed from a limited number of components (thoughts/images, sensations, and their pleasant/

unpleasant feeling tone) which form associational cycles. The richness of experience including memory, imagination and emotion are symphonies of these fundamental elements.

This three-way network linking related mental components in an automatic and unconscious way to form cycles that are experienced as distress is described also by Damasio (2003). In these cycles, a thought/image gives rise to an associated bodily sensation and feeling tone which through associative patterns of memory gives rise to more thoughts related to the sensations and feelings. The cycles can begin with any of the components, as they form and re-form very rapidly outside of awareness in daily life, the associations are not readily apparent.

Attention is central to the recognition of this principle for two reasons: First, arousal levels follow the object of attention. Thus, when attention is on the content of a sequence of associated fearful thoughts, sensations of constriction, and unpleasant feeling tone, then the body's arousal level follows. Second, when attention is not intentionally directed/regulated it can become fixated on a particular sequence, forming a relatively closed loop that maintains the automatic cycle experienced as distress. Anxiety, for example, results when the attention becomes fixated on a fear-related cycle of components. This is illustrated in Fig. 17.1. Depending at least partly upon temperament, some patients will report the distress of this cycle in terms of feeling tone ("I feel bad"), while others will report the cognition component ("I'm worried"). Still others will be more aware of the sensations ("I feel tense").

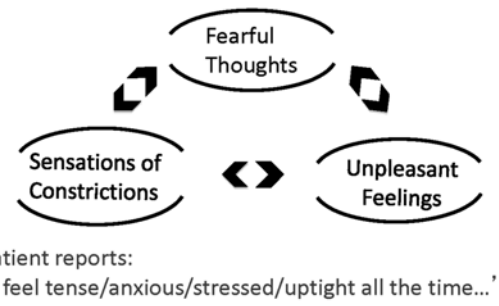

Fig. 17.1 Automatic maintenance of distress when attention is unregulated or compelled

The First Principle in Mindfulness Practice: Conscious Redirection of Attention Affects the Cycle of Arousal/Distress

As I describe in the following section, an important function of the beginning mindfulness exercises is to support patients in learning to discriminate between thoughts, sensations, and their feeling tone. In association with that learning, the recognition that their attention is fixated or compelled by a cycle of associations that is creating distress, opens an opportunity to redirect attention to some other object available to experience that is not being noticed. Commonly used to this end are the sensations associated with respiration; sensations that are arousal-neutral for most people. When attention is directed toward them, the reduced arousal attendant upon an affect-neutral sensation [mental object] naturally follows.

Breath-related sensations have the added clinical utility of being immediately and continually available to patients as an attentional object, and as such, provide an ideal means for invisibly reducing distress and lowering arousal levels in the course of events in everyday life. In Fig. 17.2, the closed cycle resulting in the experience of distress illustrated in Fig. 17.1, is opened to the possibility of change as the patient learns to discriminate between the components, and recalls that the sensations of breathing are an arousal-neutral mental object available to their attention.

When, as in Fig. 17.2, attention is redirected towards the sensations of breathing, the cycle of associations that were maintaining distress are interrupted, with accompanying change in affect, and reduced arousal. The principle is exemplified in the instructions for beginning mindfulness practitioners to deliberately redirect their attention to the sensations of respiration (chosen mental object—neutral stimulus) in the face of distressing thoughts, sensations or emotions.

Attention invariably wanders away from the breath sensations for the reasons outlined in principle three, but as long as it is kept on, or repeatedly redirected back to the breath, arousal and the affect attendant upon a neutral sensation naturally

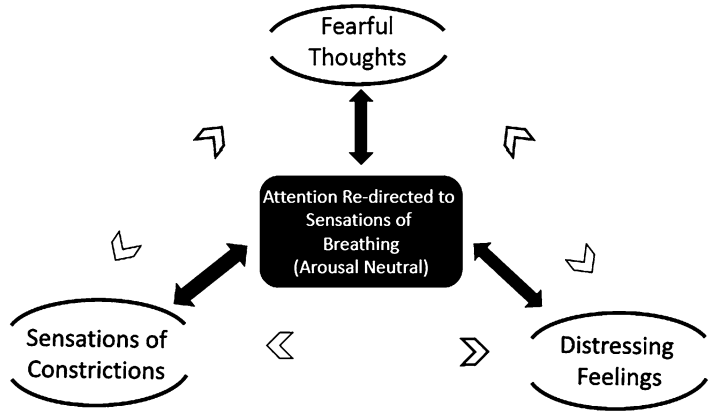

Fig. 17.2 With mindfulness training patient recognizes (1) components of the cycle maintaining distress, (2) availability to attention of arousal-neutral sensations of breathing, and (3) redirecting attention to breath interrupts cycle maintaining distress

follow. Facility in the use of attention in this way, together with the capacity to discriminate between the components of experience, provides an opportunity for less emotional reactivity to symptoms in the midst of other activities, and a greater sense of control and confidence in dealing with distress. In mindfulness training for depression for example, the focused attention required to sustain a negative stream of thought (with its attendant distress) is diverted, preventing its escalation into ruminative patterns which in turn can lead to increases in ongoing negative psychological states and mental distress (Teasdale et al., 1995, 2000).

This strategy can also account for the clinical benefits from mindfulness treatments for anxiety (Kabat-Zinn et al., 1992; Patel, Carmody, & Simpson, 2007). These attention regulation processes may also account for at least some of the demonstrated reductions in psychological distress from participation in other mind-body training programs (Bertisch, Wee, Phillips, & McCarthy, 2009; Manzoni, Pagnini, Castelnuovo, & Molinari, 2008) which entail some measure of attention regulation to an arousal neutral or affect-positive mind object such as; focusing on breathing exercises, symptom monitoring, guided imagery, prayer, mantra, and the focus on bodily sensations in progressive muscle relaxation, tai chi, and yoga.

Second Principle

The components of experience (thoughts/images, sensations, and their pleasant/unpleasant feeling tone) are referred to as mind objects in some Buddhist training traditions, and to be recognized as events occurring in the field of awareness. In current therapeutic parlance this skill is often referred to as re-perceiving, or metacognitive awareness (Safran & Segal, 1990; Teasdale et al., 2002).

The therapeutic challenge is that attention is normally and naturally preoccupied with the content of the components (what they are about/mean) thereby sustaining their associational cycles and attendant distress. So, having learned to distinguish between thoughts and the attendant sensations and feelings, mindfulness training instructions often include the activity of labeling the component ("this is a thought") to support this perceptual shift. With the recognition that the mental components are events occurring in the mind, and can be perceived as such, the attention on their content required to maintain the cycle of

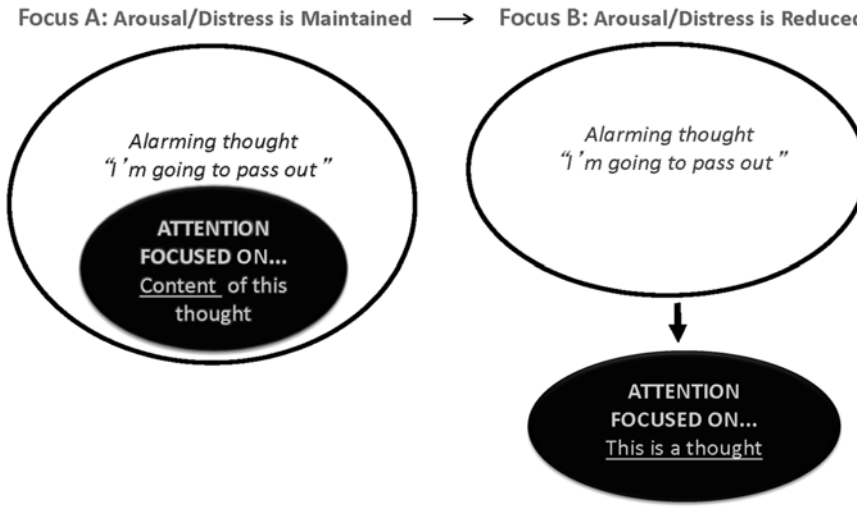

Fig. 17.3 Re-perceiving: attentional/perceptual shift from thought's *content*… To the thought as an *event* in awareness

distress is diluted. The difference between these two orientations is illustrated in Fig. 17.3.

Evidence for the Importance of the First Two Principles in Mindfulness Training

Several lines of evidence support the importance of attention and re-perceiving/metacognitive awareness in the reductions in distress associated with mindfulness training. Self-reports of patients who have completed a mindfulness training program show that attentional redirection is one of the most important skills they continue to use in coping with their symptoms and to increase their well-being. In a 4-year follow-up study (Kabat-Zinn, Lipworth, Burney, & Sellers, 1987) of participants in an MBSR program, nearly all reported using redirection of attention to the sensations of breathing to some extent in their daily life situations, and 74–94 % reported it to be moderately, or very useful, in coping successfully with stressful situations. Similarly, in a study of MBSR for women with severe hot flashes (Carmody, Crawford, & Churchill, 2006) found clinically significant improvements in menopause-related quality of life, perceived stress, and sleep quality, exit interviews showed that most women reported using redirection of attention to the sensations of the breath to help them cope in the face of their hot flashes and night sweats. In this way they developed a greater sense of control and confidence in dealing with their symptoms.

The importance of re-perceiving in the reductions in distress from mindfulness training was shown by Teasdale and colleagues, who found that it was a central component in reducing relapse in patients with major depressive disorder (Teasdale, 1999; Teasdale et al., 2002). In addition, an observational study of mechanisms of change over the course of an 8-week MBSR program found large effect size increases in re-perceiving (Carmody et al., 2009); larger than the increases in mindfulness.

These self-reports showing the importance of attention regulation to well-being are supported by laboratory studies of attentional processes that relate directly to mindfulness practice instructions. Jha, and others, have found improved volitional orienting of attention with mindfulness training that appeared to be associated with the extent of mindfulness practice (Chan & Woollacott, 2007; Jha, Krompinger, & Baime,

2007). In addition, Valentine and colleagues (Valentine & Sweet, 1999) found that mindfulness practitioners had superior performance on a sustained attention task (Wilkins counting test), especially when the stimulus was unexpected, and performance was related to length of experience with practice.

Mindfulness practice also supports the allocation of attentional resources. In the phenomenon known as attentional blink, subjects presented with two targets (pictures or numbers) imbedded in a rapid series of distractor stimuli (non-target numbers or pictures) tend to miss the second stimulus if it is presented within a half second of the first. This is thought to occur because attentional resources are limited, and if those resources are consumed in processing the first stimulus, the second stimulus is missed. Further, Slagter and colleagues (Slagter et al., 2007) found that the more experienced mindfulness meditation practitioners exhibited a smaller attentional blink effect and attributed this to their more efficient allocation of attentional resources resulting from the training. In other words, their attention was less caught up by the first stimulus and available for a different stimulus.

Finally, building upon the findings of Ellenbogen and colleagues (Ellenbogen, Schwartzman, Stewart, & Walker, 2006), where subjects trained to deliberately direct attention to the neutral word of a neutral-negative word pair reported less negative affect to a subsequent mental stressor, Ortner and colleagues (Ortner, Kilner, & Zelazo, 2007) found that mindfulness training was associated with more rapid disengagement from emotionally provocative stimuli.

Third Principle

Attention highlights in awareness selected features of available experience, and is adapted to highlight novelty, and objects perceived even indirectly, as leading to the satisfaction of, or threats to the fulfillment of, needs and longings. The movement of attention itself is not normally noticed however, and learning to regulate attention to facilitate the process of recognition of these principles presents several obstacles. First, evolutionary processes have resulted in default movements of attention that are adapted to serve survival and reproduction. Second, this default movement of attention itself is not normally noticed; rather the content of the object that the moving attention is highlighting is noticed, together with the arousal levels and affect tone associated with the degree of threat/delight represented by that content. This automatic process can result in delight in moments when things are going well, such as a new relationship, or opportunity. More commonly however, attention is in its adapted role of monitoring for threats to need fulfillment.

Self-Regulation of Attention Is Important to Well-Being, But Getting Started in the Face of Distress Is Challenging

As long ago as the nineteenth century William James famously wrote that "my experience is what I agree to attend to" (James, 1890). The centrality James gave to attention in shaping our experience continues to find support in a number of therapeutic systems that address self-regulation (Baumeister & Heatherton, 1996; Kirschenbaum, 1987). Further, an assumed capacity for attention self-regulation is contained in the familiar encouragement given to children to "pay attention" when learning something for which they have no immediate affinity. Nevertheless, although James' declaration is conceptually straightforward, and intuitively apparent, children, and patients are not normally encouraged or taught to attend to attention itself. Moreover, James' own ongoing struggle with depression in his life points to the challenge of putting attention regulation into practice in the face of psychological difficulties and distress. Even a century later, psychotherapeutic systems had not developed systematic methods of cultivating attentional self-regulation as a generic capacity in the service of well-being; a deficiency that was successfully addressed in the mindfulness training exercises derived from Buddhist practices.

Nevertheless, while these exercises build a foundation for the well-documented opportunities for increased self-regulation and well-being, they require some practice (Carmody & Baer, 2008), and patients commonly report some level of difficulty in learning to regulate attention in this way (Segal, Williams, & Teasdale, 2002). When first beginning the foundational mindfulness exercise of attending to the sensations of respiration, the typical report is along the lines of "Gosh, I never realized how much my mind wanders—it seems to have a mind of its own." A typical response from many instructors is to reassure the trainee that this initial frustration is to be expected, that everyone experiences the same challenge, and encouragement to persist in the face of it. A more meaningful response may be to give patients a conceptual introduction that clarifies some of the embedded mental dynamics they face in getting started, and framed within the question of why this simple attempt at attention regulation should be associated with any difficulty at all.

How Evolutionary Pressures Have Resulted in Attentional Defaults: This Biological Imperative Makes Attentional Self-Regulation Challenging to Cultivate

In a way the mind does have "a mind of its own," and the reasons this seemingly straightforward attentional regulation activity, so foundational to well-being, should be such a challenge are often not addressed in mindfulness instruction. As stated above, the instructor may respond with the assurance that everyone has difficulty, as indeed they do, or resort to a traditional Buddhist explanation that the mind is "clinging" or "attached," but such explanations are thin conceptual gruel and do not place the patient's difficulty in a readily understandable framework. An evolutionary approach provides a recognizable explanatory frame that lets beginners appreciate that this feature of their mind is not an enemy to their desire for greater well-being, but an important, if sometimes less than functional feature, of a mental ecology evolved to meet their most basic needs of survival and reproductive success.

Attention's immediate, automatic, and precognitive movement toward physical threats to safety has obvious survival value. Furthermore, its universality and automaticity suggest an adapted neural mechanism responsible for it. Compared with our remote ancestors, however, our need for the necessary sense-based scanning of the environment for acute physical threats has become minimal. The relative physical security of modern life means that when not deliberately or sensationally directed elsewhere, attention now largely monitors for threats and opportunities for the fulfillment of other needs, particularly those for power, status, and relationship; needs that require considerable cognitive activity in the form of planning and strategizing. This is apparent in the way attention repeatedly favors the cognitive accompaniment of this monitoring which is subjectively experienced as the all too familiar personal narrative. Attention defaults to this internal monologue of unending commentary and evaluation in preference to the broader landscape of sensory experience available in the immediate physical surroundings, or to routine bodily sensations.

Given the essentially social nature of human life, this default movement of attention should not be unexpected. As physical threats diminish, there is survival and reproductive value in attention now defaulting to a mental process that weaves together a narrative related to appraising possible threats to relationship, status, and power. And given the needs this internal monologue serves, it typically manifests as preoccupation with worries about family, work, money etc., or to plans to move toward satisfying these and other needs and longings, together with imagined threats and allies in their fulfillment. Because the movement of attention itself typically happens largely outside of conscious awareness, we take this preoccupation for granted; referring to it sometimes as "wandering mind" or more formally as "stimulus-independent thought" (Buckner, Andrews Hanna, & Schacter, 2008). And when attention is left to this default state (i.e., when it is not actively directed), this cycle

can be self-sustaining, with felt experience being dictated by whatever is the current concern.

The phenomenological dilemma is that even as this default functions to protect and move us to the satisfaction of important needs, its recurrent orientation toward threat monitoring and solutions means that it is, by its nature, more or less fear-related. And since arousal levels and downstream physiological processes follow the threat/delight represented by the object of attention, this fixation on forming and re-forming threat-related associational cycles, either from habit or from the present intensity of an experiential component such as pain, results in some elevated level of arousal. Over time, this attentional default results in everyday life being experienced as less than pleasant, and has a profound effect upon the development and maintenance of mental suffering. It is the familiar human malaise that Buddhism refers to as the first and second noble truths; that life is characterized by suffering, or stress, resulting from craving and aversion.

It is the felt experience of these adaptive default processes that brings many patients to therapy, and also makes the attention regulation in mindfulness training and other mind-body exercises the challenge that patients almost universally report ("My mind [attention] wanders"; "I'm bored").

Instructions for Mindfulness Training Exercises Are Designed to Facilitate Recognition of These Three Principles

The initial exercise often used to begin mindfulness training is one now commonly referred to as the body scan; a practice from the Burmese Buddhist tradition. In this exercise attention is initially brought to notice the sensations of respiration. Once awareness of these as affect-neutral mind objects always available to attention is established, attention is then moved systematically through all parts of the body. The instruction is just to notice whatever sensations happen to be present in each part, including noticing if no sensation is present. No effort is made to change the sensations, or the pace or depth of the respiration; just noticing whatever sensation happens to be present in that body part, and the feeling tone (pleasant/unpleasant/neutral) associated with it.

Attention sooner or later inevitably wanders to its default objects, typically the internal monologue, or the sensations and feelings related to it. When this wandering is noticed, the instruction is to return the attention to exploring the sensations in the body. If powerful experiences emerge during the process, the breathing sensations are available as arousal-neutral objects to which the attention can be returned.

Once some facility in noticing sensations is established, instruction is extended to noticing cognitions, including any that may be associated with the sensations and feelings. Intrusive cognitions are a good place to start since they are most readily identifiable and labeled as thoughts (re-perceiving/meta-awareness). While initially practiced with the body lying or sitting still, these exercises can be extended to being done while moving by practicing them during walking, or stretching as a way of supporting their integration into everyday life.

Some facility in just these relatively simple skills results in reductions in distress for many patients, and with some practice the fluidity of attention that results can create a real possibility for greater freedom. Nevertheless, the amount of training and practice that is required has not been systematically studied (Carmody & Baer, 2009). Initial assumptions have been based on a typical traditional Buddhist monastic practice period of around 45 min. An ongoing time commitment such as that is neither feasible nor desirable for many patients. It may also not be necessary to result in clinical gains; a 4-year follow-up study of MBSR participants (Kabat-Zinn et al., 1987) found that many of the post-program clinical gains were maintained even though only 30 % of the respondents described themselves as "regular meditators." And other studies (Arch & Craske, 2006; Zeidan, Gordon, Merchant, & Goolkasian, 2010) indicate that instruction and practice can be brief enough to integrate into a typical 15 min primary care appointment. The pervasive and ubiquitous cognitions foundational to personal identity that interest committed practitioners are

more subtle and challenging to recognize, however, and require a particular kind of sustained curiosity that the therapist or patient may, or may not, have.

The field of sensation is the starting place in mindfulness training for a number of reasons. First, in the face of the apparent seamlessness of experience, sensation is readily perceptible and distinguishable for most people. Second, even though it is the realm through which we initially experience delight, in the process of socialization sensation becomes neglected by attention in favor of cognitions, including thoughts experienced as memories and imaginings triggered by the sensations. Third, for most the world of sensation, including the senses of sight and hearing, is the realm through which we connect most immediately, intimately, and satisfyingly with others and the world around us. It is a realm of consensus and sharing that stands in contrast with the cognitively based internal monologue with which attention is so often preoccupied, and which is experienced as a place of separation, endless explanation, alienation and worry. Cultivating an interest in attention itself and its movement in this way, reveals to the patient just how much their attention defaults to this internal monologue, subverting sensory life in the process, and the delight and satisfaction that can arise with it.

It can be seen from these relatively simple instructions that patients have an opportunity to learn and recognize a number of therapeutically valuable things in the process of doing the exercises. These include self-regulation of attention, discriminating sensations from thoughts and feelings, becoming aware of the movements of attention, experiencing how feeling tone follows the object of attention, recognizing that rather than being focused on their content, thoughts can be seen as events in awareness, and rediscovering a neglected realm of experience in which delight and connection are more accessible. The practice of the exercises also predictably increases emotion regulation through exposure and affect tolerance, and acceptance is implicit in the willingness to engage in these acts of attending and perceiving.

The Role of the Internal Monologue, Its Discontents, and the Complementary Roles of Mindfulness in Psychotherapy

While the internal monologue is critical to our functioning in the world, and to the satisfaction of both our needs, and the needs of those we love and care about, the tendency for attention to default to this commentary on the experience arriving through our senses is observably the source of a great deal of trouble. It is characterized by a constant stream of judgments and comparisons as it expresses our beliefs, and attempts among other things, to serve our needs for relationship and status. But being threat-based the attendant arousal results in some level of ongoing suffering, all the while drawing attention away from the world of sensation with its attendant opportunities for delight; a dilemma that brings more than a few into therapy.

And while for some, simply learning that they can redirect their attention to an arousal-neutral or positive mind object at times of stress or distress will be sufficient to their needs and interest, in some circumstances even this will be a challenge. For when important components of the needs-related internal narrative are in conflict, the need for resolution results in ruminative patterns that compel attention to their themes. It is worth noting in this regard that some practitioners attempt to use mindfulness to avoid dealing with the monologue's content, themes and conflicts particularly, when these appear too painful or distressing to even approach; attempting to use the principles to dismiss these as just "events in the mind," and using regular practice in redirection of attention to maintain some level of mental calm. This avoidance has been referred to as the "spiritual bypass" and leads to a restricted life in which the practices are maintained as a way of keeping the lid on things. So rather than an opportunity for liberation and greater ease, a kind of attentional vigilance is required as the need for resolution keeps pressing attention back to the conflicting issues.

But as conflicting themes and patterns are recognized in therapy, worked through, and resolved

by the development of a more coherent narrative that the patient recognizes is supporting them in moving in a functional way toward satisfaction of the needs they hold most dear, attention is no longer compelled by their content. As a result it becomes more fluid, and the patient can choose which among the constant stream of cognitions and sensations s/he will entertain in the interest of satisfying their larger needs and goals.

Mindfulness can however support the role of psychotherapy in this exposition. For while treatments such as psychodynamic and cognitive psychotherapy effectively improve mood and reduce distress by supporting patients in gaining insight into the themes of the narrative or world view, and challenging and replacing self-defeating cognitions and behaviors with more functional ones, they each to some extent rearrange the content of mental activity—the mental furniture. Without insight into the way all experience, both functional and dysfunctional, is constructed in the mind from moment to moment, the patient remains vulnerable to a similar malaise resulting from a new set of self-referential negative judgments and comparisons arising from some new set of life circumstances. Integrating mindfulness into the therapeutic process by whatever means can provide the patient with the additional wisdom and resilience that is gained through experientially recognizing this fact. Patients and therapists will choose the level of insight they regard as sufficient to address their needs and circumstances, but this integration is used effectively in ACT, MBCT, and DBT which each in their own ways support these recognitions to good clinical effect, and inoculate the patient at a more systemic level.

References

Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy, 44*, 1849–1858.

Baer, R., Carmody, J., & Hunsinger, M. (2011). Weekly change in mindfulness and perceived stress in a mindfulness-based stress reduction program. *Journal of Clinical Psychology, 68*, 755–765.

Baer, R. A. (2009). Self-focused attention and mechanisms of change in mindfulness-based treatment. *Cognitive Behaviour Therapy, 38*, 15–20.

Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological Inquiry, 7*, 1–15.

Bertisch, S. M., Wee, C. C., Phillips, R. S., & McCarthy, E. P. (2009). Alternative mind-body therapies used by adults with medical conditions. *Journal of Psychosomatic Research, 66*, 511–519.

Bränström, R., Kvillemo, P., Brandberg, Y., & Moskowitz, J. T. (2010). Self-report mindfulness as a mediator of psychological well-being in a stress reduction intervention for cancer patients—A randomized study. *Annals of Behavioral Medicine, 39*, 151–161.

Buckner, R. L., Andrews Hanna, J. R., & Schacter, D. L. (2008). The brain's default network. *Annals of the New York Academy of Sciences, 1124*, 1–38.

Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine, 31*, 23–33.

Carmody, J., & Baer, R. A. (2009). How long does a mindfulness-based stress reduction program need to be? A review of class contact hours and effect sizes for psychological distress. *Journal of Clinical Psychology, 65*, 627–638.

Carmody, J., Baer, R. A., Lykins, E. L. B., & Olendzki, N. (2009). An empirical study of the mechanisms of mindfulness in a mindfulness-based stress reduction program. *Journal of Clinical Psychology, 65*, 613–626.

Carmody, J., Crawford, S., & Churchill, L. (2006). A pilot study of mindfulness-based stress reduction for hot flashes. *Menopause, 13*, 760–769.

Chan, D., & Woollacott, M. (2007). Effects of level of meditation experience on attentional focus: Is the efficiency of executive or orientation networks improved? *Journal of Alternative and Complementary Medicine, 13*, 651–658.

Chiesa, A., & Malinowski, P. (2011). Mindfulness based approaches: Are they all the same? *Journal of Clinical Psychology, 67*, 404–424.

Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. *Journal of Alternative and Complementary Medicine, 15*, 593–600.

Christopher, J. C., Chrisman, J. A., Trotter-Mathison, M. J., Schure, M. B., Dahlen, P., & Christopher, S. B. (2011). Perceptions of the long-term influence of mindfulness training on counselors and psychotherapists. *Journal of Humanistic Psychology, 5*, 318–349.

Damasio, A. R. (2003). *Looking for Spinoza: Joy, sorrow, and the feeling brain*. Orlando, FL: Harcourt.

Davidson, R. J. (2010). Empirical explorations of mindfulness: Conceptual and methodological conundrums. *Emotion, 10*, 8–11.

Davis, D. M., & Hayes, J. A. (2011). What are the benefits of mindfulness? A practice review of psychotherapy-related research. *Psychotherapy, 48*, 198–208.

Ellenbogen, M. A., Schwartzman, A. E., Stewart, J., & Walker, C. D. (2006). Automatic and effortful emotional information processing regulates different aspects of the stress response. *Psychoneuroendocrinology, 31*, 373–387.

Fjorback, L. O., Arendt, M., Ørnbøl, E., Fink, P., & Walach, H. (2011). Mindfulness based stress reduction and mindfulness based cognitive therapy—A systematic review of randomized controlled trials. *Acta Psychiatrica Scandinavica, 124*, 102–119.

Grossman, P. (2008). On measuring mindfulness in psychosomatic and psychological research. *Journal of Psychosomatic Research, 64*, 405–408.

Harrington, N., & Pickles, C. (2009). Mindfulness and cognitive behavioral therapy: A rebuttal. *Journal of Cognitive Psychotherapy, 23*, 333–335.

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behaviour change*. New York: Guilford Press.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*, 169–183.

James, W. (1890). *The principles of psychology*. New York: H. Holt.

Jha, A., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective and Behavioral Neuroscience, 7*, 109–119.

Kabat-Zinn, J. (1982). An out-patient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*, 33–47.

Kabat-Zinn, J. (1994). *Wherever you go there you are*. New York: Hyperion.

Kabat-Zinn, J., Lipworth, L., Burney, R., & Sellers, W. (1987). Four-year follow-up of a meditation-based program for the self-regulation of chronic pain: Treatment outcomes and compliance. *The Clinical Journal of Pain, 2*, 159–173.

Kabat-Zinn, J., Massion, A., Kristeller, J., Peterson, L., Fletcher, K., Pbert, L., … Santorelli, S. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *American Journal of Psychiatry, 149,* 936–943.

Keng, S. L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review, 31*, 1041–1056.

Kirschenbaum, D. S. (1987). Self-regulatory failure: A review with clinical implications. *Clinical Psychology Review, 7*, 77–104.

Kuyken, W., Watkins, E., Holden, E., White, K., Taylor, R. S., Evans, A., … Dalgleish, T. (2010). How does mindfulness-based cognitive therapy work? *Behaviour Research and Therapy, 48,* 1105–1112.

Langer, E. J., & Moldoveanu, M. (2000). The construct of mindfulness. *Journal of Social Issues, 56*, 1–9.

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York: Guilford Press.

Ludwig, D. S., & Kabat-Zinn, J. (2008). Mindfulness in medicine. *JAMA, 300*, 1350.

Manzoni, G., Pagnini, F., Castelnuovo, G., & Molinari, E. (2008). Relaxation training for anxiety: A ten-years systematic review with meta-analysis. *BMC Psychiatry, 8*, 41.

Ortner, C. N. M., Kilner, S. J., & Zelazo, P. D. (2007). Mindfulness meditation and reduced emotional interference on a cognitive task. *Motivation and Emotion, 31*, 271–283.

Patel, S., Carmody, J., & Simpson, S. (2007). Adapting mindfulness based stress reduction for the treatment of obsessive compulsive disorder: A case report. *Cognitive and Behavioral Practice, 14*, 375–380.

Pbert, L., Madison, J. M., Druker, S., Olendzki, N., Magner, R., Reed, G., . . . Carmody, J. (2012). Effect of mindfulness training on asthma quality of life and lung function: A randomised controlled trial. *Thorax, 67,* 769–776.

Safran, J. D., & Segal, Z. V. (1990). *Interpersonal process in cognitive therapy*. New York: Basic Books.

Sanders, K. M. (2010). Mindfulness and psychotherapy. *Focus, 8*, 19–24.

Sedlmeier, P., Eberth, J., Schwarz, M., Zimmermann, D., Haarig, F., Jaeger, S., et al. (2012). The psychological effects of meditation: A meta-analysis. *Psychological Bulletin, 138*, 1139–1171.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York: Guilford.

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*, 373–386.

Slagter, H. A., Lutz, A., Greischar, L. L., Francis, A. D., Nieuwenhuis, S., Davis, J. M., et al. (2007). Mental training affects distribution of limited brain resources. *PLoS Biology, 5*, e138.

Teasdale, J. (1999). Metacognition, mindfulness and the modification of mood disorders. *Clinical Psychology and Psychotherapy, 6*, 146–155.

Teasdale, J. D., Moore, R. G., Hayhurst, H., Pope, M., Williams, S., & Segal, Z. V. (2002). Metacognitive awareness and prevention of relapse in depression: Empirical evidence. *Journal of Consulting and Clinical Psychology, 70*, 275–287.

Teasdale, J. D., Segal, Z., & Williams, J. M. G. (1995). How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help? *Behaviour Research and Therapy, 33*, 25–39.

Teasdale, J. D., Segal, Z. V., Williams, J. M. G., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by

mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68*, 615–623.

Valentine, E. R., & Sweet, P. L. G. (1999). Meditation and attention: A comparison of the effects of concentrative and mindfulness meditation on sustained attention. *Mental Health, Religion and Culture, 2*, 59–70.

Vøllestad, J., Nielsen, M. B., & Nielsen, G. H. (2011). Mindfulness- and acceptance-based interventions for anxiety disorders: A systematic review and meta-analysis. *British Journal of Clinical Psychology, 49*, 281–288.

Zeidan, F., Gordon, N. S., Merchant, J., & Goolkasian, P. (2010). The effects of brief mindfulness meditation training on experimentally induced pain. *Journal of Pain, 11*, 199–209.

Section 4

Buddhist Perspectives

Buddhist Styles of Mindfulness: A Heuristic Approach

18

John D. Dunne

Over the last several years, various authors have examined contemporary conceptions of mindfulness in relation to Buddhist notions. Some authors maintain that contemporary approaches to mindfulness deviate significantly from the authentic Buddhist approach, while others see more alignment between contemporary approaches and some traditional styles of practice. The differing opinions in this regard can be confusing, and the aim of this chapter is to lessen that confusion by offering an overview of key Buddhist approaches to mindfulness in a manner that enables researchers to make appropriate use of Buddhist sources. In particular, this chapter presents heuristic categories that sort Buddhist theories and practices into two distinct styles, the "Classical" and the "Nondual," and compares them to contemporary approaches to mindfulness, especially in relation to three crucial aspects of formal practice: ethics, judgment, and present-centered awareness.

Why Examine Buddhist Sources?

There are three reasons why it is useful for mindfulness researchers and clinicians to be familiar with Buddhist accounts. The first and most obvious is simply that most clinical adaptations of mindfulness are explicitly based at least partially on Buddhist practices, with the most obvious case being Mindfulness-Based Stress Reduction (Kabat-Zinn, 2011). Hence, to understand the features of a clinical use of mindfulness that are based on Buddhist sources, it makes sense to examine the Buddhist practices and theories that inspired them. A second reason for examining Buddhist approaches to mindfulness is that the rich theoretical literature of various Buddhist traditions can provide insights or suggest lines of research that might not otherwise be obvious. For example, many contemporary accounts of mindfulness recognize a feature of mindfulness whereby one experiences a thought (such as the memory of a stressful conversation) as just a mental event. When experienced this way, the thought is no longer taken to be the actual event (the stressful conversation) that it represents. This phenomenon is variously called "decentering" (Safran & Segal, 1990), "reperceiving" (Shapiro, Carlson, Astin, & Freedman, 2006), "cognitive insight" (Chambers, Gullone, & Allen, 2009), "mindful awareness" (Papies, Barsalou, & Custers, 2012), "defusion" (Hayes, 2003), and so on. As shown below, Buddhist materials offer a detailed theoretical account of how this phenomenon occurs, and examining that account may suggest avenues of scientific research into the mechanisms that underlie the phenomenon.

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A third reason to examine Buddhist sources is more complex. In brief, Buddhist traditions promote multiple approaches to mindfulness, and these approaches involve different techniques that occur with different theoretical accounts. Certain kinds of techniques and theories tend to occur together, and this tendency toward coherence can prove helpful in examining the coherence of one's own approach. For example, some Buddhist styles of mindfulness require the suspension of all judgment, including ethical judgment, during formal practice. For these styles, if during formal practice, one is seeking to make judgments such as "This mental state is wholesome," or "This mental state is unwholesome," then one has deviated from the practice instructions (see below and also Dunne, 2011b). In Buddhist texts, these practice styles tend to occur with theoretical discussions about the aforementioned capacity for decentering. In contrast, practice styles that require explicit judgment or ethical discernment during formal practice do not tend to discuss decentering explicitly in their traditional texts. This suggests some coherence between the suspension of ethical judgment in formal practice and the use of decentering as a clearly theorized contemplative technique. In contrast, if one's own contemporary approach requires ethical judgment during formal practice but also emphasizes decentering, then one is challenging the usual paradigms in Buddhist sources. In this way, this third reason for examining Buddhist sources is essentially that they can help one to detect the ways in which contemporary approaches either align with or depart from typical Buddhist practice styles and theoretical accounts. In cases where there is alignment, appreciating the varieties of Buddhist approaches can help one to determine which particular Buddhist tradition will be most helpful for prompting possible avenues of further inquiry. And where there is no such alignment, it may suggest that contemporary approaches are assuming some other kind of coherence that stands in clear contrast to typical Buddhist approaches.

Methodological Issues

The approach to Buddhist sources suggested here requires one to acknowledge that there is no single authoritative Buddhist account of mindfulness. Methodologically, this way of using Buddhist sources stands in contrast to some recent work (for example, Rapgay & Bystrisky, 2009; Wallace, 2006) that adopts what can be called a "rhetoric of authenticity" whereby contemporary approaches are compared to "original," "authentic," or "authoritative" Buddhist sources that allegedly provide the true account of mindfulness. These claims to authenticity are highly problematic for a number of reasons. First, on the basis of Buddhist texts and observable Buddhist practices, it is clear that there is not just one traditional Buddhist version of mindfulness (Table 18.1) (Gethin, 2011, 2015; Sharf, 2014). Each Buddhist tradition might claim that it harbors the correct version of mindfulness, but from the standpoint of academic scholarship on Buddhism, no tradition can claim that its practice is identical to some original, authentic practice taught by the Buddha. Instead, scholarly research shows that Buddhist traditions necessarily change over time, largely in response to changes within their own cultural contexts (Braun, 2013; Harvey, 1990; Sharf, 1995; Van Schaik, 2004). Thus, to

Table 18.1 Traditional sources of mindfulness with geographical origin

Classical
Vipassanā (mainstream Theravāda in Thailand, Burma, and Sri Lanka)
Śamatha (Tibetan; especially Gelugpa approach)
Mind Training (as formal practice; Tibetan)
Nondual
Chan (China)
Zen (Japan; derived from Chan)
Seon (Korea; derived from Chan)
Mahāmudrā (Tibetan)
Dzogchen (Tibetan)
Thai Forest Tradition (Thailand; Nondual with Classical features)

produce some single, authentic, and authoritative account of mindfulness in Buddhism, not only must one ignore the diversity of views across Buddhist traditions, but one must also ignore the historical development of individual traditions themselves.

Another problem with the notion of "authenticity" is that it assumes that Buddhist practices and theories have a direct, linear relationship to contemporary accounts of mindfulness. The reality is far more complex, as Kabat-Zinn (2011) has shown. Throughout history, whenever Buddhism emerges in new cultural contexts, new forms of Buddhism arise that draw in complex ways on multiple Buddhist traditions (Gethin, 1998), and this certainly applies to the forms of Buddhist practice that are emerging in Europe and North America (Goldstein, 2002; McMahan, 2008; Tweed, 1992). Although MBSR, for example, is not a Buddhist tradition, its relationship to Buddhist sources is similarly complex. Multiple contemplative traditions, some of them not Buddhist, have been important sources for the development of MBSR (Kabat-Zinn, 2011). Similarly, multiple sources led to the emergence of Buddhist practices such as modern forms of Buddhist mindfulness practice in Burma (Braun, 2013) or the emergence of Chan dialogs in medieval China (McRae, 2003). Claiming that MBSR, medieval Chinese Chan, or modern Burmese Vipassanā are somehow "inauthentic" because they emerge from multiple influences requires one to deny the historical reality of change and transformation that characterizes all contemplative traditions.

A final methodological issue concerns the use of Buddhist texts. In brief, what a text says about a practice does not necessarily reflect the way a community actually engages in that practice. In many cases, textual accounts are meant to be normative—they do not necessarily *describe* what practitioners *actually* do; instead, they often *prescribe* what practitioners *should* do (see, for example, the famed *Stages of Meditation* discussed in Adam, 2003). Likewise, one might assume that theoretical accounts about the features of contemplative practices are rooted in careful observations of those practices themselves. However, some theorizing may be driven even more strongly by a need to present a systematic and easily defended account. The upshot is that one cannot assume that a Buddhist theoretical account of mindfulness is just about the actual practice of mindfulness itself; the need to defend a tradition against critics and the urge toward scholastic systematicity may be equally strong motivations.

Does all this mean that we cannot resort to Buddhist sources if we wish to deepen our understanding of mindfulness? This would be an overreaction. We can still use these sources, but we must do so with care. In particular, these sources are best engaged along with the practical expertise of an actual practice community. Texts ideally should be read in relation to the living practices of such communities, and those practices should likewise be studied independently of textual interpretations through methods such as ethnography. Likewise, multiple traditions should participate in the conversation with texts and practices in dialog across languages, cultures, and contexts. At this point in the development of Contemplative Studies, however, this type of research is not yet available; indeed, undertaking that research will require much collaborative work across multiple disciplines. Until this lacuna is filled, our examination of mindfulness in Buddhism will be problematic, but this chapter nevertheless attempts to embrace the basic principle that texts, traditions, and actual practice stand in a complex relationship.

Heuristics for Mindfulness: Contemporary, Classical, and Nondual

With these methodological issues in place, we can now move on to the main goal of this chapter: the heuristic presentation of two overall styles of Buddhist practice that align—or misalign—with contemporary approaches to mindfulness, especially in relation to the role of ethics, judgment,

and present-centered awareness in formal practice. To proceed, however, we must first sketch the heuristic categories that enable this type of analysis. The first is "Contemporary Mindfulness," a category that seeks to capture the main features of contemporary approaches in clinical contexts. Of course, even within clinical circles, the term "mindfulness" has a broad range of application. Mindfulness-Based Stress Reduction (MBSR), for example, presents a style of mindfulness that differs in important ways from Acceptance and Commitment Therapy and Dialectical Behavior Therapy (Chambers et al., 2009). Nevertheless, one can point to some features that are consistent across these various contexts. We refer to this cluster of features with the general rubric "Contemporary Mindfulness."

The widely accepted features of Contemporary Mindfulness can be gleaned by reviewing the common elements in formal training according multiple sources (including Bishop et al., 2004; Kabat-Zinn, 2013; Segal, Williams, & Teasdale, 2002; Shapiro et al., 2006). The initial stages involve bringing the attention to an object, most commonly the breath. The modality of this attention and the type of object selected must both be present-centered. For example, one does not take as one's object a past or future event, and one attends to the object in such a way that attention remains in the present. This is commonly accomplished by using the sensations of breathing or some other sensory stimulus as an object, since sensory stimuli occur uniquely in the present. When one attempts to remain attentive to such an object, distractions arise, especially for novice practitioners. When distractions occur, one notices the distraction in a non-judgmental fashion that neither elaborates conceptually nor judges the moment of distraction as good or bad, and so on. Having non-judgmentally noticed that one has been distracted, one simply disengages from the distractor and reorients attention to the target object

As described above, the basic skills cultivated through formal training in Contemporary Mindfulness include: (1) holding an object in sustained, present-centered attention; (2) monitoring awareness for distractions in a non-judgmental fashion; (3) non-reactively disengaging from distractors; and (4) reorienting attention to the target object. These general features of formal training in Contemporary Mindfulness relate to some other aspects common to programs such as MBSR. Commensurate with the emphasis on remaining present-centered while suspending frameworks for judgment, the MBSR approach does not expect practitioners to learn evaluative or ethical frameworks to use as a tool of formal mindfulness practice, nor are practitioners provided with any normative goals, not even the simple goal, "MBSR will reduce your stress" (Kabat-Zinn, 2013). These features appear to be broadly typical of Contemporary Mindfulness, and they are especially appropriate to a comparison with Buddhist traditions.

To compare Contemporary Mindfulness to Buddhist approaches, we sort Buddhist practice styles and theories into two heuristic categories: "Classical" and "Nondual." As heuristics, these terms are not meant to refer to single Buddhist traditions or lineages of practice. Rather, they point to general trends that apply across a broad range of practices and traditions that can be usefully distinguished in this way. The term "Classical" (Cf. Rapgay & Bystrisky, 2009) evokes the styles of contemplative practice that are rooted most directly in the *Abhidharma* (Pali, *Abhidhamma*)[1], *a* group of scholastic traditions whose earliest texts belong to the formative period of Buddhist history. Among living traditions, the Theravāda lineages and their practice styles (such as Vipassanā) acknowledge the *Abhidharma* to contain the most precise and detailed accounts of meditative practices (Anālayo, 2003; Bodhi, 2011; Gethin, 2011). Within Tibetan traditions, the relevant "Classical" styles are found in the literature on Mind Training (Gźon nu rgyal mchog & Dkon mchog rgyal

[1] Because Sanskrit has the broadest range of application, technical Buddhist terms are given in Sanskrit. However, because discussions of mindfulness often involve Pali (the language used by Theravāda traditions), it is occasionally cited with its Sanskrit equivalent. Terms drawn from Tibetan contexts are cited in Tibetan.

mtshan, 2006) and *śamatha*, especially as practiced by the Tibetan Gelugpa school (Tsong kha pa, 2002) and as presented by Alan Wallace (2006). In these contexts as well, the *Abhidharma* approach is generally considered indispensable in the analysis of meditative states, and the practice techniques for mindfulness overlap considerably with Theravāda approaches. Several centuries after the formation of the *Abhidharma*, however, other styles of practice emerged in India, from where they later spread to Tibet and China (and then to other Asian cultures such as Korea and Japan that initially draw on Chinese Buddhism). Some of these later practices required a stance that departed in key ways from the *Abhidharma* paradigm. In particular, some traditions emphasized meditative practices that were mean to be "nondual," in that the meditator paradigmatically cultivates states without any subject–object duality. As discussed below, this emphasis on nondual states required a departure from some aspects of the Classical approach of the *Abhidharma* and led to contemplative styles, including traditions still active today, that can be collectively characterized as "Nondual."

Classical Mindfulness[2]

Classical Mindfulness is a heuristic category that points to certain shared features of a range of Buddhist practices that mostly closely and explicitly align with the *Abhidharma* paradigm. The shared features of the Classical approach are especially rooted in a model of mind whereby, in ordinary persons, mental moments arise with a number of different "mental facets" (*caitasika*) including affective features (such as attraction and aversion) and intentions (*cetanā*) that can themselves be expressed in subsequent mental activities or vocal or physical actions. This model is developed in the context of Buddhist concerns about the "suffering" (*duḥkha*) or fundamental dissatisfaction that is understood to characterize ordinary life, and the model likewise explains how contemplative practices can address this problem.

According to the Classical model suffering arises primarily due to intentions (*cetanā*) that induce suffering (*duḥkha*) because they are produced by distorted cognitions that lead to dysfunctional actions and mental states. These cognitions are distorted in that they misinterpret their objects to be conducive to pleasure or happiness (*sukha*), whereas they are actually conducive to pain or suffering (*duḥkha*). Likewise, these cognitions interpret things that are actually impermanent (*anitya*) to be permanent (*nitya*). They also falsely cognize their objects to be somehow related to an autonomous self (*ātman*), but those objects are actually "selfless" (*anātman*) in that they are not related to or constitutive of any such self. These distorted intentions and cognitions also induce—and are perpetuated by—negative mental states (*kleśa*) such as attachment and aversion that also produce suffering. A primary goal of Classical Buddhist contemplative practice is thus to put an end to distorted intentions by realizing, in a state generally known as "insight" (*vipaśyanā*), that the objects of sensory experience and the conditioned aspects of the mind are, in fact, by their nature characterized by three marks: they are impermanent, selfless, and conducive to suffering.

The Abhidharma analysis points to several mental facets and capacities that must be cultivated in order to achieve insight, but two are especially important: they are *smṛti* (Pali, *sati*) and *samprajanya* (Pali, *sampajañña*). The term *smṛti* is usually translated as "mindfulness," and although it has a wide range of application, in technical Abhidharma accounts it concerns especially the stability and focus that are required for the practitioner to see the true nature of objects as the three marks of impermanence and so on. *Samprajanya*, although also variable in its usage, is usually translated in Classical contexts as "clear comprehension" so as to evoke its primary cognitive role in the clear apprehension of the aforementioned three marks.

[2] An abundance of sources is available for exploring what is here called the Classical style. This section is based on the following: (Anālayo, 2003; Anuruddha & Bodhi, 2000; Asanga, 2001; Bodhi, 2011; Buddhaghosa & Ñāṇamoli, 1976; Gethin, 2011, 2015; Tsong kha pa, 2002; Vasubandhu, 2012).

Ethics in Classical Practice

To achieve the requisite degrees of mindfulness and clear comprehension for insight, the practitioner must employ contemplative techniques such as "mindfulness of breathing" (Pali, *ānāpānasati*) that involve focus on a specific object such as the breath. These techniques, however, cannot be used if the mind is chaotic, and since mental chaos arises from an abundance of negative mental states (*kleśa*) in the mind, the practitioner must also adopt a lifestyle that reduces negative mental states. This lifestyle is regulated by *śīla*, an ethical code that is designed to reduce the abundance and influence of negative mental states in the practitioner's mind. The practice thus involves an additional mental capacity: *apramāda*, the "heedfulness" that keeps track of one's ethical vows, spiritual intentions and goals. This capacity, especially prominent in later Tibetan accounts in the Classical style (for example, Tsong kha pa, 2002), requires practitioners to be vigilant in their awareness of their mental lives so as to detect when distorted intentions and negative mental states are about to lead to vocal or physical actions that violate the ethical code. This attentiveness to mental life also draws on and enhances both mindfulness and clear comprehension, since they are required for one to notice and properly understand what is happening in one's mind. In the context of formal practice, the ethical framework provided by *śīla* also provides the means to recognize the valence of one's mental states as either "to be adopted" (*upādeya*) because they are wholesome or "to be abandoned" (*heya*) because they are unwholesome.

Informal Practice in the Classical Style

The features of Classical mindfulness presented thus far concern the context of formal meditation practice, but all Buddhist traditions recognize a distinction between formal practice contexts and informal or "between session" contexts. In formal practice, the practitioner is meant to implement an instruction set of specific contemplative techniques for the cultivation of mindfulness, while during informal of or between-session contexts, that instruction set is replaced with some other paradigm that seeks to prepare the practitioner for the next formal session, often by implementing mindfulness in ordinary activities. Paradigmatically, Buddhist traditions also generally seek to cultivate in practitioners the capacity to sustain in all contexts the key features targeted by contemplative training, both during formal practice in a meditation session and during other activities between sessions. Thus, for the advanced practitioner, the distinction between formal and informal practice begins to collapse.

In the Classical style, both formal and informal practice require the practitioner to maintain a heedful awareness of their activities in ethical terms. Two strategies for maintaining ethical restraint in informal practice are common. As the Sanskrit author Śāntideva (ca. 650 C.E.) puts it, if necessary one "remains like a piece of wood" when one notices that one is about to engage in unethical behaviors (Śāntideva, 2008). Here, regulation of behavior essentially amounts to a "veto" of distorted intentions and negative mental states that have been heedfully detected before they actually result in unethical vocal or physical acts. Another strategy employed by more advanced practitioners is to prevent unethical behaviors by no longer having the distorted intentions that are said to motivate all unethical action. To do so, the practitioner must see objects and conditioned mental events as conducive to suffering, impermanent, and selfless, since intentions are distorted only when one fails to recognize these three marks. For example, using the first strategy, a monk might see an attractive person, and seeing that person as an object of pleasure, he might experience lust (a negative mental state) that occurs with or induces an intention to act in a way that would violate his vows. Having heedfully noticed this lustful intention before it results in a behavior, the monk would recall his vows and exercise restraint. But following the second strategy, when the monk sees the attractive person, he would no longer experience that person as an object of pleasure because he would recognize that what he is experiencing is in fact not conducive to pleasure, but rather to suffering.

Here, there is no need to exercise a veto on action because the distorted intentions that would lead to unethical or unwholesome behavior simply do not arise.

Contemporary Mindfulness and Classical Buddhist Styles: Ethics, Judgment, Memory

Some contemplative techniques used in Contemporary Mindfulness align closely with Classical Buddhist approaches. For example, the cultivation of mindfulness and clear comprehension through formal Buddhist practices involve some skills also developed by formal training in Contemporary Mindfulness. These include the cultivation of sustained attention on an object, the capacity to detect distractors, and the ability to drop distractors and reorient to the target object in a way that does not perturb the mind further. However, as Rupert Gethin, Bhikkhu Bodhi, Alan Wallace, and others have noted, Contemporary Mindfulness differs from Classical Buddhist practices in significant ways. Perhaps most obvious is the prominent role played by ethics in the Classical paradigm.

In contrast to Classical practices, Contemporary Mindfulness does not emphasize a paradigmatic ethical framework that must be strictly adopted by each practitioner. Certainly, core values such as loving kindness and compassion, which are also essential to the Buddhist paradigm, are central to Contemporary Mindfulness (Shapiro et al., 2006), but these are not presented as constituting a specific ethical code that each practitioner must adopt. One reason for this difference may be that requiring a particular ethical approach would prove problematic in secular clinical contexts, where it seems far more workable to allow participants to address ethical issues from their own, personal perspectives (Kabat-Zinn, 2013). Likewise, certain cultural factors surrounding religion and spirituality within modernity often favor an individualistic and personal approach to ethics, rather than strict adherence to an institutionally imposed code (McMahan, 2008). In any case, it is clear that Contemporary Mindfulness styles do not train practitioners to lead their lives in heedful adherence to an ethical code involving specific vows, nor does one, during formal practice, use an ethical framework to assess one's mental states so as to identify some states as "to be abandoned" while others are "to be adopted."

The Classical Buddhist approach also differs from Contemporary Mindfulness in its emphasis on judgment. The Classical practitioner is ideally trained in the elaborate *Abhidharma* typology that delineates various aspects of the mind and categorizes them especially in ethical terms. In both formal and informal contexts, the Classical practitioner uses this typology to clearly judge what is occurring in the mind. For example, when a distraction arises during the practice of Mindfulness of Breathing, Classical practitioners do not simply recognize that a distraction is occurring; additionally, they clearly identify the mental state as, for example, motivated by intentions occurring with lust, and in this act of discernment, they also clearly know that lust is something to be abandoned. Likewise, Classical practice trains the practitioner in other key judgments, namely, that any conditioned object of experience is conducive to suffering, impermanent, and selfless. In short, the Classical paradigm requires the practitioner to employ judgment in a manner that explicitly connects to an ethics of what one seeks to abandon or cultivate.

In contrast, Contemporary Mindfulness emphasizes a non-judgmental approach. For example, when in formal practice a distraction occurs, practitioners are not taught to evaluate the mental state as something to be abandoned or cultivated, nor does one deploy some typology to analyze that mental moment. Instead, one simply recognizes that one is distracted and returns to the focal object (such as the sensations of breathing) without any further conceptual elaboration (typical instructions are found in Kabat-Zinn, 2013; Segal et al., 2002). Even if one argues that there is still some type of "discernment" about one's mental life that is trained through Contemporary Mindfulness, there is clearly no attempt to guide practitioners toward the full-blown deployment of ethically charged judgment found in the Classical Buddhist paradigm. In particular, there is no

explicit attempt to foster in the practitioner a judgment of objects or thoughts as conducive to suffering, impermanent, or selfless.

Smṛti and the Role of Memory

Another point of divergence between Classical Buddhist styles and Contemporary Mindfulness is the role played by memory (Dreyfus, 2011). To address this question, however, it is first important to note some confusion about *smṛti*, the Buddhist term translated as "mindfulness" itself. As various authors have shown, *smṛti* has a wide range of application, some of which bear on its literal meaning, which is indeed "memory." For example, in one important early text, the *Milindapanha*, the term *smṛti* is at one point used in a manner that evokes the "heedfulness" mentioned above, whereby to be "mindful" is to recollect and keep in mind one's vows, ethical commitments, and spiritual goals (Wallace, 2006). Rupert Gethin (Gethin, 2015) further points out that *smṛti* (or more precisely, its Pali form *sati*) "…is most frequently defined in the Pali Nikāyas with reference to someone who is 'mindful, possesses perfect mindfulness and understanding, one who remembers, one who recollects things done and things said long before.'" Nevertheless, despite the use of *smṛti*/sati in a manner that equates strongly with a straightforward sense of "memory," the technical *Abhidharma* definition of *smṛti* (i.e., "mindfulness") does not have this meaning. Instead, the sense of *smṛti* as literally "memory" is here apparently used in a metaphorical sense. That is, technical *Abhidharma* definitions of *smṛti* note that it functions so as to prevent one from "losing" (*sampramoṣa*) the object (Anuruddha & Bodhi, 2000; Asanga, 2001; Bodhi, 2011; Buddhaghosa & Ñāṇamoli, 1976; Gethin, 2011; Vasubandhu, 2012). The metaphor here appears to be that losing focus on an object is akin to "forgetting" the object, and thus the mental facet that prevents one from losing that focus can be metaphorically referred to as "remembering" (*smṛti*), since "to remember" is "not to forget." Thus, during Mindfulness of Breathing, for example, to maintain the mental facet *smṛti* does not mean that one "remembers" the sensations of breathing; instead, it means that one sustains attention on those sensations without becoming distracted away from them.

Even though the technical *Abhidharma* definition of the mental facet *smṛti* thus should not be understood as "memory" in any literal sense, the Classical Buddhist styles of practice nevertheless clearly involve a form of memory, especially when this is understood in contrast to the emphasis on non-judgmental, present-centered awareness in Contemporary Mindfulness. As mentioned earlier, a central theme of formal training in Contemporary Mindfulness is the need to sustain awareness in the present in a way that does not stray to thoughts of the past or future, and one is likewise not to recollect any elaborate conceptual apparatus or keep in mind any predetermined goals. This emphasis on "remaining in the now" without conceptual elaboration cannot be overstated. For Classical Buddhist styles of practice, however, memory is crucially important, especially when memory is understood in the sense of "recollecting" or "keeping in mind" a conceptual apparatus and one's spiritual goals. In the context of formal practice, the ideal Classical practitioner must recollect the Abhidharma typology that enables one to monitor and recognize the various mental states as they arise, especially in terms of those states that are to be abandoned or cultivated. And this means that one's overall spiritual goals—in terms of which mental life is to be shaped—must also be kept in mind. Thus, although the Classical styles of formal practice can be considered present-centered in that they generally do not prompt the practitioner to focus on memories of past events or future actions, they nevertheless require the retention or recollection of an elaborate conceptual apparatus. And clearly, in the context of informal practice, the Classical Buddhist style of the mindful life requires an even more intensive recollection of vows, ethics, and goals.

While Contemporary Mindfulness and Classical Buddhist styles clearly diverge on the role of memory, one point of convergence is worth noting here. Even for the practitioner of

Contemporary Mindfulness who cultivates a present-centered awareness without conceptual elaboration, a kind of recollective memory must be operative at times. This occurs most obviously at the time of distraction in formal practice, when to recognize the mental state as distracted, the practitioner must recall at least that one is to be undistracted. Or, more elaborately, one must recall that one intends to focus on the task at hand, such as remaining aware of the sensations of breathing in the present moment. This form of recollection seems akin to recollective memory in Buddhist Classical styles, but in the latter context this form of memory plays a much broader role.

As noted previously, various scholarly works have discussed the ways that Contemporary Mindfulness differs from Classical Buddhist approaches, and when one examines the issues of ethics, judgment, and memory, those divergences are indeed clear. One might thus conclude that Contemporary Mindfulness has little in common with its allegedly Buddhist roots or that it is some "watered-down" version of Buddhist meditation. Such conclusions, however, would be premature because other styles of Buddhist practice—those that cultivate "nondual" experiences—align more closely with Contemporary Mindfulness, albeit only in the context of formal practice.

Nondual Buddhist Styles

As Buddhism developed in India during the first millennium (C.E.), new philosophies and contemplative approaches emerged, and some departed in important ways from the core *Abhidharma* paradigm. These styles can be grouped under the rubric "Nondual" because they seek to induce in the practitioner a state in which the subject–object structure of ordinary experiences has subsided. As this later form of Buddhism spreads, it strongly informs the Mahāmudrā and Dzogchen traditions of Tibet and the Chan traditions of China; and through Chinese Chan, Nondual styles appear in Japanese Zen and Korean Seon Buddhism. As we shall see, several aspects of these Nondual styles align more favorably with Contemporary Mindfulness in the context of formal practice, and as Jon Kabat-Zinn notes (2011), these styles have had a direct historical impact on the development of MBSR, more so than any Classical style. To more easily understand the overall rubric of the "Nondual Style," we examine the issue of subject–object duality and then survey a set of philosophical tools that emerge along with this insight.

Subject–Object Duality and Suffering[3]

Some time near the beginning of the Common Era, various developments within Buddhism led to the emergence of the Mahāyāna or "Great Vehicle," and this brought important changes to theories and practices around suffering and its solution. By around the third or fourth century (C.E.) a new philosophical approach emerged that reconceptualized the fundamental problem of suffering. This new approach still embraced many features of the *Abhidharma* model, especially the insight that eliminating suffering requires one to uproot the fundamental causes that make dysfunctional behavior possible. Unlike the Classical *Abhidharma* approach, however, these new thinkers claimed that the root problem lies even deeper than distorted intentions and their concomitant negative mental states. Instead, this deeper structure is what makes it even possible to have any intentions whatsoever as an agent acting on a world that, from the standpoint of an agent's subjectivity, is "out there" (*bāhya*). In short, the subtler distortion in experience is this distinction between self and world, or more precisely, the structure of a distinct subjectivity standing over against distinct objects of experience. Articulated in a philosophical approach known as *Yogācāra* ("Practice of Yoga") by thinkers such as Asaṅga and Vasubandhu (both fourth century C.E.), this theoretical account of suffering also promotes a

[3] Two useful, if competing accounts of the issues discussed in this section are Gold (2014) and Lusthaus (Lusthaus, 2002).

contemplative solution to this fundamental problem: the practitioner must cultivate an experience in which this false distinction between subject and object disappears in a nondual (*advaya*) experience.

A Key Philosophical Tool: Phenomenal Forms[4]

The notion of subject–object duality as the root of suffering emerged and developed along with new philosophical tools (arising from the third to seventh centuries C.E.) that were not available during the early formation of the *Abhidharma*. One crucial new tool was the analysis of experience as involving "phenomenal forms" (*ākāra*). Specifically, Buddhist epistemologists in the Yogācāra tradition maintained that, in ordinary experience, a "phenomenal form of subjectivity" (*grāhakākāra*) always arises simultaneously with a "phenomenal form of the object" (*grāhyākāra*). On this model, a moment of visual consciousness, for example, is always divided into these two phenomenal forms, even though both forms are actually just mind itself. A visual experience of an object is thus not a direct apprehension of a thing external to consciousness; instead, what one directly contacts is a mental representation (i.e., the phenomenal form of the object) that arises through a causal process. This model thus permits one to perform a type of phenomenological reduction, such that the phenomenological form of the object may be experienced not as representing what caused it, but rather as an element in experience itself. Thus, when one experiences the color blue, that color can be experienced not as an object "out there" in the world, but rather as "just a representation" (*vijñaptimātra*) that is not actually separate from the visual consciousness itself. Likewise, the sense of subjectivity that occurs with the visual experience of blue also is just a phenomenal form that is in fact not distinct from the phenomenal form of the object, in that both are simply features of a single moment of visual awareness.

[4] For resources to explore this issue, see Dreyfus (1997), Dunne (2004), Arnold (2012) and Coseru (2012).

Concept Formation[5]

Another crucial philosophical tool that emerged along with the nondual approach was a robust account of concept formation known as the *Apoha* theory. Developed by Buddhist epistemologists such as Dharmakīrti (seventh century C.E.) who follow the Yogācāra philosophy, only three of this complex theory's details are relevant. First, since this theory draws on the notion of phenomenological forms, it presents concepts as also involving mental representations. Thus, the thought of an "apple" arises with a phenomenological content that is ordinarily experienced as somehow referring to or identical with actual apples. However, the phenomenological form or "mental representation" of an apple that arises when one thinks "apple" is actually just a feature of consciousness itself. Thus, as with the visual consciousness of a color, the phenomenological presentation that appears when one thinks "apple" can be experienced as what it truly is, namely, just a feature of consciousness itself. This theory enables a contemplative method whereby the disturbing thought of, for example, a stressful event can be experienced not as the object it represents (i.e., the stressful event), but rather as just a phenomenological form in consciousness. As noted above, this is the Buddhist theory that underlies the contemplative technique known in Contemporary Mindfulness by numerous terms, such as decentering, cognitive insight, mindful awareness, and defusion.

A second relevant feature of the *Apoha* theory of concept formation is the notion that all concepts are necessarily formed in an approach/avoidance context. As Dharmakīrti puts it, we do not use concepts simply out of some "bad habit"; rather, we do so because we are organizing our experience in terms of what we seek to obtain (*heya*) or what we seek to avoid or eliminate (*upādeya*). If an object is not taken into this approach/avoidance framework, the mind will not conceptualize it because it is not relevant to our actions in the world. An irrelevant object of this kind might appear as a fleeting sensory impression, but it will not go through the full-

[5] The account given here is based on Dunne (2004, 2011a).

blown process of conceptualization described by the *Apoha* theory. Importantly, this means that concepts are always tied to a sense of oneself as a goal-oriented agent acting in the world. And for this reasons, when one uses concepts, one is necessarily operating through the dualistic self/world or subject/object structure described above.

Finally, a third relevant feature of the *Apoha* theory is that concepts necessarily involve an association of the present mental content with some previous experience. The thought of an "apple," for example, always draws on previous experience, such that the phenomenological content presented in the thought is construed as the same kind of thing as the phenomenological content that occurred when we saw something we called an "apple" yesterday. Concepts thus necessarily draw one out of the present, at least to the extent that present experience is being associated with past experiences. Likewise, concepts often connect to anticipated future experiences, such that the phenomenological content in the present thought of an "apple" is imaginatively associated with the apples that will be bought at the store tomorrow. In the psychological literature, perhaps the most striking example of this aspect of conceptual thought is Mental Time Travel: the projection of oneself into the past or future during the mental simulations that constitute episodic memory (Suddendorf & Corballis, 2007). Thus, when I imagine myself walking through the aisles of the supermarket in search of the best apples, I am engaged in a conceptually constructed simulation that fully pulls me out of the present moment. Likewise, when I ruminate by imaginatively reliving my failure to find good apples yesterday, this "time traveling" feature of conceptual thought is operative.

Reflexive Awareness[6]

Another crucial philosophical tool that arose in support of Nondual contemplative approaches was the notion that, even in ordinary consciousness, a form of nondual awareness is already occurring. Known by the technical term "reflexive awareness" (*svasaṃvitti*), this aspect of consciousness is nondual in the sense that when information is obtained through reflexive awareness, it does not mean that a phenomenal sense of subjectivity is focusing on that information's source as an object. Consider, for example, the experience of an intensely beautiful sunset. During the experience, one is fully focused on the visual object, yet if asked later how one felt, one can report reliably on one's subjective sense of awe and so on. The claim here is that one has a capacity to make a reliable report *without turning inward* and observing the features of the experience that concerned oneself as a subject. One need not make this turn because, even without having introspected in a way that makes one's own subjectivity an object of observation, some aspect of consciousness was already aware of those subjective features. Likewise, in at least a minimal way, the sense of oneself as the subject seeing that object is already presented in the experience, even without turning inward and observing, "I am the one seeing this sunset."

For Nondual styles of practice, reflexive awareness is important in two ways. First, reflexive awareness does not employ a subject–object structure, and second, it is present in every moment of ordinary, dualistic consciousness. On this view, it must be present because it is what accounts for the fact that dualistic experience always includes a sense of subjectivity. In the context of contemplative practice, this means that inducing a nondual state does not require developing some new capacity of awareness. Rather, it involves enhancing an innate feature of consciousness while also using techniques that make the dualistic structures subside.

Reflexive Awareness and Monitoring

The theory of reflexive awareness has an important implication: namely, that one can cultivate a capacity to "monitor" awareness even while one is still focused on an object. It would seem that, even for Classical approaches, some type of monitoring capacity is necessary so that, especially at

[6] This section is based on the account given in the third chapter of Dharmakīrti's *Pramāṇavārttika* as presented in Dunne (2012). See also Arnold (2012).

more advanced stages of practice, one can recognize the quality of awareness and make appropriate adjustments without losing the object of awareness. For example, it is acknowledged that advanced practitioners notice when agitation is arising and can adjust accordingly even before mindful focus on an object is actually lost. The notion of reflexive awareness provides a model whereby this monitoring can be accomplished without dropping one's focus on the object. Importantly, the historical development of reflexive awareness in the Buddhist epistemological tradition occurs along with a reinterpretation of *samprajanya*, a key faculty in the Classical model noted above. Whereas in earlier Classical materials *samprajanya* connotes a kind of "clear comprehension," it becomes reinterpreted as precisely this type of monitoring function. A clear example is found in the work of the Classical author Śāntideva (active c. 700 C.E.). Even though he explicitly rejects the Yogācāra account of reflexive awareness, he nevertheless interprets *samprajanya* as "the moment by moment examination of the state of mind and body" (Śāntideva, 2008: 5.108, *kāyacittāvasthāyāḥ pratyavekṣā muhurmuhuḥ*) that is cultivated alongside mindfulness (*smṛti*). From the Nondual perspective, the reflexive monitoring that is employed during meditation on an object could initially be cultivated in that context. Later, one drops the object such that one remains in just the "monitoring" state, provided that the term "monitoring" does not imply a subject–object structure.

Mahāmudrā in Contrast to the Classical Style

Nondual Buddhist styles of contemplative practice arose historically in the context of the theoretical developments sketched above, and they spread from India to other parts of Asia along with Mahāyāna Buddhism. In Tibet, Nondual approaches are found in Mahāmudrā and Dzogchen (Tibetan *rDzogs Chen*, "Great Perfection"), and in China, the various Chan traditions emerge from this style. From China, Chan then leads to Zen in Japan and Seon in Korea. In terms of direct historical influence, the Tibetan, Japanese, and Korean Nondual styles are those that have been especially important in the development of Contemporary Mindfulness. However, it is crucial to note that even within Theravāda Buddhism, whose textual lineages are depicted as rooted in the Classical *Abhidharma* approaches, Nondual features also appear. Most notably, the Thai forest tradition as articulated in the works of the twentieth century luminary Buddhadāsa Bhikkhu, has clear elements of a Nondual approach (see, for example, Buddhadāsa Bhikkhu, 1997).

In India, where Nondual styles appear to have originated, the clearest example of a Nondual contemplative style is found in Mahāmudrā, a tradition that emerges at the end of the first millennium from various sources, including developments within the epistemological approach to Yogācāra and tantric contemplative methods. The Mahāmudrā literature is especially useful for the way it strikes a deliberate stance in opposition to the Classical *Abhidharma* paradigm. This stance is important because the rhetoric of Nonduality—and some key instructions for contemplative practice—can only be understood through its opposition to some aspects of the Classical paradigm. For example, one important rhetorical theme (and an explicit instruction in formal practices) is that Mahāmudrā does not involve anything to be abandoned (*heya*) or anything to be accomplished or adopted (*upādeya*). This attitude does not make sense if one does not understand that it stands against the Classical approach whereby the practitioner deliberately seeks to abandon unwholesome or unethical mental states while cultivating or adopting virtues such as compassion and insight.

Maitrīpa (eleventh century C.E., also known as Advayavajra) is an especially important Indian exponent of Mahāmudrā whose works often exhibit this "othering" of the Classical paradigm. In an especially telling example of such an inversion, he claims that what one is to cultivate is not mindfulness (*smṛti*), but "non-mindfulness" (*asmṛti*) (Higgins, 2008; Mathes, 2008). Philosophically, the point here is that in the Abhidharma account, mindfulness is a mental

facet that prevents the mind from losing track of its object. Employing some of the philosophical tools discussed earlier, one must conclude that mindfulness in this sense could only occur when there is subject–object duality, since the phenomenal presentation of an object necessarily occurs with the phenomenal presentation of a phenomenal subject. And since duality is the primary source of delusion, this type of mindfulness is still caught within it. If nondual experiences are what one elicits in practice, then one should not seek to cultivate mindfulness; practice should instead elicit "non-mindfulness," which is often conceptualized as an objectless "mindfulness of mere non-distraction" (Tibetan, *ma yengs tsam gyi dran pa*).

While striking, this type of rhetoric can be misunderstood, for it may seem to imply a wholesale rejection of the Classical paradigm. This is clearly not the case, especially because the paradigm for informal practice between sessions often involves the same type of ethical heedfulness found in the Classical style (Wallis, 2003). Likewise, this type of Nondual rhetoric implies certain contemplative techniques, but the way Maitrīpa's rhetoric maps onto actual practice in India remains unclear. As with early Chan sources in China (Sharf, 2014), the Indian sources on actual practice are often laconic at best. To examine the issue of practice in comparison with Contemporary Mindfulness, we will turn to a later formulation of Mahāmudrā in Tibet.

Practice in Tibetan Mahāmudrā

This brief foray into the instructions for Mahāmudrā practice aims to demonstrate how a Nondual style aligns in important ways with Contemporary Mindfulness, especially in terms of the approach to judgment, memory, and ethics during formal practice. To be as specific as possible, we examine a single, widely used text, *The Ocean of Definitive Meaning* by the 9th Karmapa Wangchûg Dorjé (Karma Dbang Phyug Rdo Rje, 2006). There are two advantages to examining this text. First, presented as a manual for meditation instructors, it records many of the practice instructions and "practical aphorisms" (*man ngag*) that continued to be used by Tibetan teachers. Second, it presents these instructions in a clear, extensive, and systematic way that is somewhat atypical in this tradition. In *Ocean,* Wangchûg Dorjé gathers together instructional materials from various sources, including perhaps some that were previously only passed through an oral tradition, and he addresses the entire scope of the Mahāmudrā ending in the full realization of "nondual primordial wisdom" (*gnyis su med pa'i ye shes*). For our purposes, we need examine only the instructions for the beginner, since they are most suited to a comparison with Contemporary Mindfulness.

Ocean begins with a presentation of "preliminary practices" (*sngon 'gro*) that draw on the larger ethical and spiritual framework of the Classical approach. The beginner is thus presumed to be thoroughly trained in that framework prior to formal Mahāmudrā practice. The formal practice itself starts with the cultivation of *śamatha* or "Calm Abiding," which then proceeds to the cultivation of the *vipaśyanā* or "Insight" through which one realizes dualistic experiences to be delusional and actually attains nondual experience. A peculiar feature of Mahāmudrā, however, is that the basic training in Calm Abiding can lead directly to Insight, and for this reason, even the beginner's instructions are couched in a nondual rhetoric that draws on the philosophical tools discussed earlier.

Basic Mahāmudrā Instructions for Formal Practice

In *Ocean,* the instructions for beginners are presented as "General" (*spyi*) and then "Specific" (*bye brag*). Both sets of instructions seek to cultivate "mental stability" (*sems gnas*) through "mindfulness consisting in mere non-distraction" (*ma yengs tsam gyi dran pa*) in a way that, paradigmatically, is not focused on any object. The General Instructions teach this directly, such that the beginner attempts a form of objectless meditation at the outset. Because the unusual beginners who fully succeed in implementing the

"general" instructions can proceed directly to a nondual awareness, it is said that they have already "realized Mahāmudrā" (*phyag chen rtogs pa*); that is, they have already achieved a degree of Insight. Others, however, must proceed through the Specific Instructions that teach meditations on various objects and then lead the practitioner to objectless practice.

In keeping with the rhetorical style of such traditions, the basic "General Instructions" are strikingly simple: "Do not chase the past; do not invite the future; rest the awareness occurring now in a clear and nonconceptual state." As these instructions are unpacked, it is clear that for beginners, the main obstacle to advancement is the tendency to become caught in thoughts. Thus, when one "chases after the past," a thought of the past does not just occur on its own, but rather leads to an entire chain of thoughts. Likewise, in "inviting the future," the same tendency to become ensnared in a chain of thoughts pertains. This ensnarement in thought keeps the practitioner in a dualistic state because, as mentioned above, conceptual consciousness is necessarily dualistic. The practitioner is thus instructed to remain in the present, since as long as awareness remains in the present, it cannot "time travel" in the manner required for thought to operate.

"Let Go, Don't Correct, Be Free of Expectation"

To aid in cultivating present-centered awareness, the novice is given other tools that also inhibit another requirement for thought to operate, namely, the approach/avoidance stance of an agent acting in the world. Three instructions are especially frequent in this regard. First, one must "let go" (*lhod kyis glod*). Rather than direct the mind toward an object or compel it to enter into a particular state, one releases any such deliberate effort. This instruction is often accompanied by another: do not attempt to correct, adjust, or "repair" (*bcos*) the mind. And this admonition is frequently amplified by noting that one should be free of expectations especially about what one seeks to obtain or abandon. A typical passage along these lines reads:

> Thus, do not give your mind work to do. Let it go, and without meditating on anything, rest it in a relaxed, open and clear way in a state of mere non-distraction without making any adjustments at all. Relax openly into a state without expectations or judgments. In that state, do not chase the past, do not invite the future. Place awareness in the present without correction or expectation …

The overall effect of these instructions is to encourage in practitioners the attitude that they are not engaged in anything, not even meditation. One is not to hope that will obtain something laudable or fear that something undesirable will not be abandoned. The task is not to evaluate what is occurring in the mind, nor to focus on an object. One simply remains undistracted in the present, where "mere non-distraction" in part means that one sustains an awareness that is not caught by the goal-oriented, approach/avoidance structures that pull one into a chain of thoughts.

"Self-Liberation" of Thoughts as "Decentering" or Dereification

Another crucial tool offered to the novice practitioner emerges from the previously discussed theory of concept formation whereby the phenomenal content when one thinks "apple" can be experienced just as a facet of mind, rather than as somehow representing an actual apple. In Mahāmudrā terminology, this is known as the "self liberation" (*rang grol*) that occurs when one "looks intently" (*cer gyis lta*) at a thought. To do so, one must not become caught in the chain of thoughts that the thought induces; instead, one must remain present-centered and direct attention intently to the thought itself as an appearance in the present moment of mind. Beheld in this fashion, the thought subsides or "self liberates," and it thus fails to induce a chain of thoughts about past or future. As noted previously, this closely approaches the notion known as "decentering," "defusion," and so on in the literature on Contemporary Mindfulness.

Suspension of Judgment and Ethics

When Wangchûg Dorjé moves on to the "Specific Instructions" that guide practitioners who are unable to initially engage with the objectless practice discussed by the General Instructions, he explicitly addresses the suspension of the Classical ethical typology in which some mental facets are "to be abandoned" while others are "to be cultivated." Discussing a practice where one focuses on whatever sensory or mental impression that arises, Wangchûg Dorjé comments:

> In particular, thoughts as mental objects may arise. Some may be to be abandoned, such as the five poisonous mental facets that are attachment, aversion and so on. Some may be virtues to be adopted, such as generosity. And some may be neutral. But whatever thought arises, one should one-pointedly attend to it and settle [awareness on it such that the thought self liberates]. Some say that one should deliberately suppress thoughts to be abandoned, but if one does so, then it will just increase conceptuality and it will be difficult for concentration (*samādhi*) to arise. Therefore, whatever thought arises, one should not see the thought as a fault, one should just let it go and intently settle on the thought itself. Without for a moment falling into a scattered state, recognize each thought, one after the other. Then rest for a while.

Here, the typology of negative mental states to be abandoned and virtues to be cultivated has been set aside, since in this context judgments of that kind will simply proliferate and ensnare the practitioner further in thought. Nevertheless, the rationale for setting aside the Classical typology is not that the framework is itself somehow faulty, but rather that in formal Mahāmudrā practice, any such conceptuality will be an obstacle. This clearly leaves a place for that ethical framework in other contexts.

Mindfulness in Mahāmudrā

Another crucial feature of the instructions for the beginner is the notion of mindfulness (Tibetan, *dran pa*) itself. In *Ocean*, the General Instructions speak of a "mindfulness that is mere nondistraction," and in part this clearly consists in a capacity to sustain awareness without becoming caught in thoughts. Unpacking this further, in the Specific Instructions Wangchûg Dorjé suggests an exercise that involves staring intently at a visual object such as a small stone. He elaborates:

> Without thinking of its features such as thickness, length or color, just release what is seen into its own place and, without distraction, make it such that the continuity of mindfulness is just not cut. That focal object of meditation [i.e., the stone, etc.] is just a reminder or prompt. Hence, directing the gaze of mere non-distraction toward it, one lets go and settles awareness. It is not the case that one is meditating on that object.

In this passage, mindfulness is not a faculty that maintains stable attention on an object; if that were the case, one would indeed be meditating on the stone. Instead, it is the mere non-distraction of the mind that does indeed occur when the mind is settled on an object, but (at least for Mahāmudrā) can also occur in objectless states. This then relates to another term that Wangchûg Dorjé uses, the "spy of mindfulness" (*dran pa'i so pa*).

Wangchûg Dorjé uses the metaphor of the spy or lookout at several places in *Ocean*, but the metaphor is most prominent when connected to meditation on objects. The "spy" is the aspect of mind that observes the quality of the object-focused state in a manner that appears to be similar to the monitoring function of reflexive awareness mentioned above. The exact relationship between mindfulness as a "spy" and mindfulness as mere non-distraction is not entirely clear, but it appears that the capacity to monitor one's attention is a coarser version of mere non-distraction. If this is correct, then training through object-focused meditation can lead to an objectless practice of mere non-distraction precisely because monitoring and mere non-distraction draw on the same objectless, reflexive aspect of awareness[7]. It is clear, in any case, that Wangchûg

[7] This is certainly the opinion of another Mahāmudrā author, Tsélé Natsôg Rangdröl (rTse le sna tshogs rang grol, b. 1608), who understands mindfulness to be the reflexive monitoring aspect of *śamatha* and who sees that mindfulness as itself becoming nondual insight (Sna tshogs rang grol & Kunsang, 2009).

Dorjé sees object-focused practice as a means to create a state where one need only drop the object so as to transition to the main practice described in the General Instructions. In short, to cite Wangchûg Dorjé's own citation of a well-known Sanskrit verse, "Relying on object focus, the objectless state arises."

Mahāmudrā and Contemporary Mindfulness

When compared to the Classical Buddhist paradigm, the basic instructions for formal Mahāmudrā practice differ starkly on the issues of judgment, memory, and ethics. Clearly, Mahāmudrā formal instructions require one to be "non-judgmental," in that one is not to engage with any conceptual evaluation during formal practice. Instead, one releases all expectations or evaluative paradigms, and when distracting thoughts occur, one does not judge them as virtuous or non-virtuous. Instead, one simply "looks intently" at the thought in the present moment and, having been experienced as just a feature of mind itself, the thought "self liberates" or dissipates on its own. Since all conceptual judgment is suspended, one also does not recollect any typology for the evaluation of thoughts, since one would then be "chasing after the past." Likewise, as shown clearly above, the ethical framework of the Abhidharma paradigm must also be suspended during formal practice.

At first glance, then, basic Mahāmudrā practice clearly aligns much more closely with some key features of Contemporary Mindfulness, including the emphasis on being present-centered and the non-judgmental stance of practice. And this should come as no surprise, since Nondual Buddhist traditions are key sources for the development of Contemporary Mindfulness. Further research on contemplative theory and techniques in Zen and Seon, for example, would surely reveal similar parallels (see, for example, Kim, 2007). The alignment of Nondual styles with Contemporary Mindfulness further suggests that the theoretical Buddhist background on concept formation, monitoring, and reflexivity, for example, may prove useful for inquiring into the mechanisms of mindfulness and its features such as decentering or cognitive insight. In any case, if one were to compare Contemporary Mindfulness only with the Classical Buddhist paradigm, one might conclude that its account of formal practice departs in significant and troubling way from its Buddhist roots. When one turns to Nondual styles, however, the techniques for formal practice appear quite similar.

A Difference Between Sessions

In other ways, however, Contemporary Mindfulness still differs significantly from the Mahāmudrā approach. The most crucial issue is the role of context, especially in relation to spirituals goals and ethics. Although the instructions for formal Mahāmudrā practice require practitioners to set aside any goal-oriented stance, one becomes eligible for such instruction only after an intensive period of training in "preliminary practices" that instill, for example, an intense concern for the suffering of others and a strong motivation to become capable of relieving that suffering. Moreover, every meditation session begins with a rehearsal of these preliminary practices, most especially those that refresh one's commitment to that goal. Only then does the session proceed to the actual Mahāmudrā practice in which all such concerns are set aside.

Likewise, ethics play an important role in the larger context of Mahāmudrā practice. It is true that this tradition admits room for the "Madman" (Tibetan, *smyon pa*), the highly realized practitioner whose antinomian behavior transcends all ethical categories (DiValerio, 2011). Yet, in social terms, the image of the Madman also serves to locate the novice practitioner squarely within the practice of the Classical Buddhist ethical code, for as a novice, one cannot hope to enjoy the Nondual insight that is depicted in the figure of the Madman. His excesses often serve to highlight the standard ethical and institutional norms.

In the context of informal practice between sessions, both the Nondual and the Classical

approaches require the practitioner to adopt a paradigm of the proper Buddhist life along with its ethical norms. Nondual traditions claim that this ethical paradigm is somehow an innate capacity that emerges naturally, but setting this aside for the moment, one can instead hypothesize that the disagreement here is about the methods in formal practice that best facilitate the adoption of the Buddhism life paradigm between sessions. The Classical traditions emphasize techniques that reinforce and amplify the paradigm during formal practice. In contrast, the Nondual approach appears to be based on an insight: namely, that techniques which purport to set aside all paradigms during formal practice will more readily facilitate the adoption of the new paradigm during informal practice between sessions. It may further be the case that these approaches both persist in many Buddhist cultural contexts because they are found to be effective in producing similar behavioral results for persons with different cognitive or affective styles.

Turning to Contemporary Mindfulness, it is clear that the techniques for formal practice align significantly with those found in Mahāmudrā, and it is possible to demonstrate a similar alignment with other Nondual traditions such as Dzogchen and Zen (see, for example, Suzuki, 2006 and Van Schaik, 2004). A significant divergence emerges, however, when one examines the approach to contexts outside of formal practice. Here, in what is termed the "between session" context, Dorjé's *Ocean* instructs Mahāmudrā practitioners to adopt and enact the core features of Classical style's paradigm, including an emphasis on a heedful engagement with the world in a way that avoids unethical activity and cultivates virtues such as generosity and compassion. Nondual traditions such as Mahāmudrā will claim that this ethical engagement emerges naturally from the innate capacities of the practitioner (for more on the "Innateism" in Nondual traditions, see Dunne, 2011b), but even with this innateist or nativist rhetoric in place, practitioners are still explicitly and extensively trained in the ethical paradigm that they are to adopt between sessions. Contemporary Mindfulness, in contrast, does not usually promote any explicit ethical framework of that kind. It would appear that, similar to Mahāmudrā, an appeal is made to the emergence of innate capacities (Kabat-Zinn, 2013), but unlike Mahāmudrā, there is no notion that, despite the innateist rhetoric, an explicit paradigm is still necessary.

If one examines the reasons for the Mahāmudrā tradition's promotion of an explicit ethical framework between sessions, one possibility is that, if left simply to rely on the emergence of allegedly innate qualities, some practitioners at various stages of development will not exhibit the types of behaviors and personal transformation that the tradition seeks. By training practitioners in an explicit paradigm between sessions, the tradition thus "guarantees," in a sense, that only the allegedly innate qualities of wisdom, compassion and so on emerge, rather than some other outcome that results when the between session framework is just left to the practitioner. In any case, a clear assumption here is that some kind of framework for engagement with the world must be present between sessions, even if one seeks to suspend all such frameworks during formal practice.

If rather than some kind of innate, natural engagement with the world, practitioners instead necessarily deploy learned (or personally invented) paradigms and frameworks for practice between sessions, how would this apply to Contemporary Mindfulness? One possibility is that, even in the absence of an explicit framework, an *implicit* one is being provided. In MBSR, for example, that framework would emerge from the use of carefully selected poems by Rumi, Mary Oliver, and others. Education in the physiology of stress would be another component. These and other aspects of MBSR training may suggest some key elements in a framework for engagement with the world that practitioners then complete through their own creative appropriation of other sources and their life histories. This does not in itself seem problematic, but if the self-invented paradigm goes in certain directions, it does leave itself open to the critique of the cultural critique Slavoj Žižek (2001, 2012). In effect, he maintains that mindfulness has become popular because it serves to dampen the distress and horror of global capitalism.

During sessions, one alleviates the pain, and between sessions, one returns to being a good producer and consumer. Mindfulness thus becomes the opiate of the elite. While Žižek's critique is typically hyperbolic, it may not entirely miss the mark.

Conclusion: Using the Heuristic

In practical terms, the heuristic account presented here can enable researchers to identify various styles of mindfulness and assess their coherence relative to Buddhist sources. The Buddhist traditions that generally exhibit these styles are grouped according to their approach in Table 18.1, but the reality is that sub-traditions and individual teachers will fall along a spectrum. Some will strongly exhibit Classical tendencies; others may be clearly Nondual, and yet others (such as the Thai Forest tradition) may fall somewhere between these poles. At the same time, as Table 18.2 illustrates, certain features of formal practice tend to coalesce together in accord with Buddhist theoretical accounts, and from that standpoint, some approaches will appear incoherent. One might maintain, for example, that the target state in formal meditation requires one to be present-centered and non-judgmental, and yet one might also insist that this state retains ethical discernment. It is difficult to see how this approach could be theoretically coherent from a Buddhist standpoint, since ethical discernment would require a form of conceptuality that is not present-centered. This incoherence relative to Buddhist sources does not mean that such an approach is necessarily wrongheaded. Instead, it calls for the development of a new theoretical account that explains its coherence and thus leads to hypotheses about mechanisms and ways to assess outcomes empirically.

Another clear research agenda that emerges from this heuristic is the examination of the crucial role played by the context assumed or deliberately created for informal practice between sessions. In actual training, both Classical and Nondual Buddhist styles work hard to create a lifeworld for practitioners structured around a paradigm of the ideal Buddhist and the proper way to engage with the world. The personal transformation that occurs through contemplative practice is thus not just a matter of what occurs "on the cushion." It also depends heavily on the way the world is imagined before and after. How does this between-session paradigm interact with techniques in formal practice? To effect personal transformation, are some practitioners best served by the Classical approach, where the paradigm is a prominent feature of formal practice? And for others, is a Nondual approach better? That is, do these practitioners more easily alter their lives to a new paradigm between sessions by using a formal practice that suspends all paradigms? Could it be that one approach or another will be better for an individual at different points along a developmental trajectory? These are some of the many questions that this heuristic engagement with Buddhist sources can suggest.

Table 18.2 Classical and nondual: features of target state in formal practice

	Classical	Nondual
Object focus	Meditative states always have an object	Novices may use an object, but eventually all objects are dropped
Ethical judgment	Required	Suspended
Conceptual schemas	Vows recollected and Abhidharma categories used	All conceptual schemas suspended
Present-centeredness	Not fully present-centered so as to allow for ethical judgment and recollection of vows and Abhidharma schema	Always present-centered

References

Adam, M. T. (2003). *Meditation and the concept of insight in Kamalaśīla's "Bhāvanākramas" (Doctoral Dissertation)*. Canada: McGill University.

Anālayo. (2003). *Satipaṭṭhāna: The direct path to realization*. Birmingham, AL: Windhorse.

Anuruddha & Bodhi. (2000). *A comprehensive manual of Abhidhamma: The Abhidhammattha sangaha of Ācariya Anuruddha*. Seattle: BPS Pariyatti Edition.

Arnold, D. A. (2012). *Brains, Buddhas, and believing: The problem of intentionality in classical Buddhist and cognitive-scientific philosophy of mind*. New York: Columbia University Press.

Asanga. (2001). *Abhidharmasamuccaya: The compendium of the higher teaching*. (Walpola Rahula & S. Boin-Webb, trans.). Fremont, CA: Asian Humanities Press.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., …, Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, *11,* 230–241.

Bodhi, B. (2011). What does mindfulness really mean? A canonical perspective. *Contemporary Buddhism, 12*, 19–39.

Braun, E. (2013). *The birth of insight meditation: Modern Buddhism and the Burmese monk Ledi Sayadaw*. Chicago: University of Chicago Press.

Buddhadāsa Bhikkhu. (1997). *Mindfulness with breathing: A manual for serious beginners* (Santikaro Bhikkhu, trans.). Boston: Wisdom Publications.

Buddhaghosa & Ñāṇamoli. (1976). *The path of purification: Visuddhimagga*. Berkeley: Shambhala Publications.

Chambers, R., Gullone, E., & Allen, N. B. (2009). Mindful emotion regulation: An integrative review. *Clinical Psychology Review, 29*, 560–572.

Coseru, C. (2012). *Perceiving reality: Consciousness, intentionality, and cognition in Buddhist philosophy*. New York: Oxford University Press.

DiValerio, D. M. (2011). *Subversive sainthood and tantric fundamentalism: An historical study of Tibet's holy madmen (Doctoral Dissertation)*. United States: University of Virginia.

Dreyfus, G. (1997). *Recognizing reality: Dharmakīrti's philosophy and its Tibetan interpretations*. Albany: State University of New York Press.

Dreyfus, G. (2011). Is mindfulness present-centered and non-judgmental? A discussion of the cognitive dimensions of mindfulness. *Contemporary Buddhism, 12*, 41–54.

Dunne, J. D. (2004). *Foundations of Dharmakīrti's philosophy*. Boston: Wisdom Publications.

Dunne, J. D. (2011a). Key features of Dharmakīrti's *apoha* theory. In M. Siderits, T. Tillemans, & A. Chakrabarti (Eds.), *Apoha: Buddhist nominalism and human cognition*. New York: Columbia University Press.

Dunne, J. D. (2011b). Toward an understanding of non-dual mindfulness. *Contemporary Buddhism, 12*, 71–88. doi:10.1080/14639947.2011.564820.

Dunne, J. D. (2012). Resources for the study of *svasaṃvitti* in ultimate contexts. Presented at the National Meeting of the American Academy of Religion.

Gethin, R. (2015). Mindfulness: Buddhist conceptualizations. In K. W. Brown, J. D. Creswell, & R. M. Ryan (Eds.), *Handbook of mindfulness: Theory and research*. New York: Guilford Press.

Gethin, R. (1998). *The foundations of Buddhism*. New York: Oxford University Press.

Gethin, R. (2011). On some definitions of mindfulness. *Contemporary Buddhism, 12*, 263–279.

Gold, J. (2014). *Paving the great way: Vasubandhu's unifying Buddhist philosophy.* New York: Columbia University Press.

Goldstein, J. (2002). *One dharma: The emerging Western Buddhism*. San Francisco: Harper.

Gźon nu rgyal mchog & Dkon mchog rgyal mtshan. (2006). *Mind training: The great collection* (Thupten Jinpa, trans.). Boston: Wisdom Publications.

Harvey, P. (1990). *An introduction to Buddhism: Teachings, history and practices*. New York: Cambridge University Press.

Hayes, S. (2003). *Acceptance and commitment therapy: An experiential approach to behavior change* (Paperbackth ed.). New York: Guilford Press.

Higgins, D. (2008). On the development of the non-mentation (amanasikāra) doctrine in Indo-Tibetan Buddhism. *Journal of the International Association of Buddhist Studies, 29*(2), 255–303.

Kabat-Zinn, J. (2011). Some reflections on the origins of MBSR, skillful means, and the trouble with maps. *Contemporary Buddhism, 12*, 281–306.

Kabat-Zinn, J. (2013). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness* (Revised and updated ed.). New York: Bantam Books.

Karma Dbang Phyug Rdo Rje. (2006). *Phyag chen rgyas pa nges don rgya mtsho, 'bring pa ma rig mun sel, bsdus pa chos sku mdzub tshugs bcas so: Lhan cig skyes sbyor gyi zab khrid nges don rgya mtsho'i snying po phrin las 'od*. Varanasi, India: Vajra Vidhya Institute Library.

Kim, H.-J. (2007). *Dōgen on meditation and thinking: A reflection on his view of Zen*. Albany, NY: SUNY Press.

Lusthaus, D. (2002). *Buddhist phenomenology: A philosophical investigation of Yogācāra Buddhism and the Ch'eng Wei-shih lun*. New York: Routledge-Curzon.

Mathes, K.-D. (2008). *Maitrīpa's Amansikārādhāra ("A justification of becoming mentally disengaged")* (pp. 3–30). XIII: Journal of the Nepal Research Centre.

McMahan, D. (2008). *The making of Buddhist modernism*. New York: Oxford University Press.

McRae, J. R. (2003). *Seeing through Zen: Encounter, transformation, and genealogy in Chinese Chan Buddhism*. Berkeley: University of California Press.

Papies, E. K., Barsalou, L. W., & Custers, R. (2012). Mindful attention prevents mindless impulses. *Social Psychological and Personality Science, 3*, 291–299.

Rapgay, L., & Bystrisky, A. (2009). Classical mindfulness: An introduction to its theory and practice for clinical application. In W. C. Bushell, E. L. Olivo, & N. D. Theise (Eds.), *Longevity, regeneration, and optimal health: Integrating Eastern and Western perspectives* (pp. 148–162). New York: Wiley-Blackwell.

Safran, J., & Segal, Z. V. (1990). *Interpersonal process in cognitive therapy*. New York: Basic Books.

Śāntideva. (2008). *The Bodhicaryāvatāra* (K. Crosby & A. Skilton, trans.). New York: Oxford University Press.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York: Guilford Press.

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*, 373–386.

Sharf, R. H. (1995). Buddhist modernism and the rhetoric of meditative experience. *Numen, 42*(3), 228–283.

Sharf, R. (2014). Mindfulness and mindlessness in early chan. *Philosophy East and West, 64*(4), 933–964.

Sna tshogs rang grol, & Kunsang, E. P. (2009). *Heart lamp: Lamp of Mahamudra and the heart of the matter*. Boudhanath: Rangjung Yeshe Publications.

Suddendorf, T., & Corballis, M. C. (2007). Mental time travel across the disciplines: The future looks bright. *Behavioral and Brain Sciences, 30*, 335–345.

Suzuki, S. (2006). *Zen mind, beginner's mind*. Shambhala.

Tsong kha pa. (2002). *The great treatise on the stages of the path to enlightenment* (Vol. 3). Ithaca, NY: Snow Lion Publications.

Tweed, T. A. (1992). *The American encounter with Buddhism, 1844-1912: Victorian culture and the limits of dissent*. Bloomington: Indiana University Press.

Van Schaik, S. (2004). *Approaching the Great Perfection: Simultaneous and gradual approaches to Dzogchen practice in Jigme Lingpa's Longchen Nyingtig*. Boston: Wisdom Publications.

Vasubandhu. (2012). *Abhidharmakosa-Bhasya of Vasubandhu: The treasury of the abhidharma and its (auto) commentary* (L. de La Vallée Poussin & Lodrö Sangpo, trans.). New Delhi: Motilal Banarsidass Publishers Private Ltd.

Wallace, B. (2006). *The attention revolution: Unlocking the power of the focused mind*. Boston: Wisdom Publications.

Wallis, G. (2003). *Advayavajra on ādikarma* (pp. 203–230). Pacific World: Journal of the Institute of Buddhist Studies.

Žižek, S. (2001). *On belief*. New York: Routledge.

Žižek, S. (2012, August 10). The Buddhist ethic and the spirit of global capitalism. Retrieved from http://www.egs.edu/faculty/slavoj-zizek/articles/the-buddhist-ethic-and-the-spirit-of-global-capitalism/

The Emperor's Clothes: A Look Behind the Western Mindfulness Mystique

19

Eleanor Rosch

Mindfulness is a word. It is currently a very popular word. As the other papers in this volume amply document, mindfulness has become a magnet for research in psychology, neuroscience, and medicine, and it is a hot topic in clinical psychology. Many Buddhist groups have joined in the enthusiasm, taking the research to be proof that "meditation works" ("Shambhala Sun," 2012) and/or that society is undergoing a "mindfulness revolution" (Boyce, 2011). With enthusiasm, however, can come confusion. Having a word may make us think there is a "thing" that is the word's meaning; having definitions for the word (even if they are multiple and divergent) may lull us into thinking we (or someone) knows that meaning; having trainings with that word in the title reassures the researcher that the thing the word means is now at hand; and once researchers can design measurement instruments that vary with the training, the whole process may become sacrosanct and largely closed to further questioning.

It is time to reopen all of this to scrutiny. Why are people not already mindful? Might Buddhism, the origin of mindfulness practices, have anything illuminating to reveal about its Western uses? Where does mindfulness fit into Buddhist training of attention or of other virtues? What specific practices are taught in Mindfulness Based Stress Reduction (MBSR, Kabat-Zinn, 1990) and similar trainings, and what clues do we have about how the people who go through these programs use what they are taught? This is an especially important question not only because MBSR is the prototype for Western therapeutic uses of mindfulness but also because the most frequent de facto operational definition of mindfulness (verbal definitions aside) is that subjects in an experiment have taken some form of the 8-week MBSR program. In regard to the measurement of mindfulness, what specific items make up the mindfulness measurement scales; what do the items ask, and what are they measuring? I believe that it is only by this kind of examination of the specifics of what is going on that we can wake from the spell cast by the word *mindfulness* and gain clearer understanding of it. This could result in new and more grounded research questions and simpler, more individually targeted therapies—ideally perhaps even to shifts in our understanding of body and mind.

To this end, the rest of the chapter presents: (a) A brief overview of mindfulness (and attention generally) in Buddhism. (b) An examination of the contents of the 8 week MBSR program and how participants use those contents. (c) A template of the basic components that make up a therapeutic program of this nature and an account of some alternative ways these components could be

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instantiated. Such a template could be used to generate more focused research questions and to design interventions to fit specific individual or population differences. (d) A critique of the present mindfulness measurement scales. (e) Predictions of some major changes in our views of both body and mind that could occur in the future and cast a broader perspective on all this work.

Attention and Mindfulness in Buddhism

Western therapeutic mindfulness is not Buddhism. It may use some techniques borrowed from Buddhism, but it uses them in a different manner and towards different goals. Buddhism itself is not unitary. It is divided into three major world forms, called *yanas* (paths/vehicles) in Buddhism—Theravada, Mahayana, and Vajrayana—each of which treats the domain in which mindfulness functions, attention to the present, rather differently. There are also a number of newly emerging social activist forms of Buddhism that at times lay claim to the status of a fourth yana. Psychologists should be wary of using citations from one of the yanas (usually Theravada) as though they represent Buddhism as a whole; not only does this obscure diversity, but it tends to be less than appreciated by Buddhists from the non-cited yanas. The following review emphasizes psychologically relevant factors and is based on the ways Buddhism is taught and practiced in contemporary Buddhist centers as well as on historical reconstructions of its past. Thus the review is not in any way a substitute for the detailed accounts of particular periods, trends, and texts provided by Buddhist Studies scholarship.

Theravada

Theravada (The Speech of the Elders) is the one surviving school of early Buddhism (that began in India around 500 BCE) and the primary Buddhism of Southeast Asia: Thailand, Myanmar (Burma), Sri Lanka, Laos, Cambodia, and parts of Vietnam. I will discuss it in some detail because the meditation portion of MBSR is derived from Theravada meditations. (For more material on the early Buddhism to be covered in this section see Buddhaghosa, 1976; Byrom, 1993; Kornfield, 1977; Nyanaponika 1973; Rahula, 1959.) Theravada teachings contain the basis of Buddhist psychology: an explanation of why we are not happy when that is what we wish for, and an account of the practices that can be done to remedy that. The format in which this is often presented is the Four Noble Truths: life is marked by *dukkha* (suffering/unsatisfactoriness); there is a cause of suffering; by extinguishing the cause, suffering will cease; and there is a path by which this can be accomplished. It sounds simple and upbeat, but there is a catch. To see any of this personally—the pervasiveness of suffering as well as its cause and cure—requires looking deeply into one's experience. In the words of the Dhammapada (The Saying of the Buddha), "He [the master practitioner] looks deeply into things/ And sees their nature" (Byrom, 1993, p. 108). This is something that we don't ordinarily do and in fact cannot do as long as we have a wild mind that "like a monkey, leaps from branch to branch" (common simile for the untamed mind in Eastern cultures). That is where Buddhist meditation enters and where we find the initial introduction of mindfulness.

There are two aspects to early Buddhist meditation: peaceful abiding (Pali: *samatha*, Sanskrit: *shamatha*, Tibetan: *shine'*) and clear seeing (Pali: *vipassana*, Sanskrit: *vipashyana*, Tibetan: *lhagthong*). Shamatha, which literally means *peace*, is generally viewed as a preliminary practice whose purpose is to calm and stabilize the mind. Calming the mind includes what in the West we call *relaxation*, but it is an alert relaxation. This pacified mind provides a platform from which the meditator can direct close enough attention to moment-to-moment mental occurrences (breathing, sensations, perceptions, feelings, thoughts) to see into their nature. To make the initial shamatha practice simple, the meditator is generally taught to hold his mind (more realistically to keep returning his mind) to a single object of attention, such as his breath or a visual object

(*kasina*)—a task that necessitates not only close focus on an object but an inhibition (or a release) of focus on other objects. The quality of attention is not necessarily different in single object meditation and in attention to moment-to-moment mental phenomena, though it can be if directed in a probing contemplative direction.

Where in all this is mindfulness? Here we enter a thicket of terminological and interpretive dispute. Scholars generally agree that the English word *mindfulness* began life as a translation for the Pali term *sati* (Sanskrit *smrti*), but there is disagreement, both ancient and modern, about just what in the meditation process (or in consciousness in general) sati was intended to include. At issue is that meditation practices, like other human activities, do not occur in a vacuum but rather in meaningful contexts. In dispute is what kind of context and how much of it to include in the meaning of the word mindfulness. Does mindfulness refer only to the power by which the mind can return to an object of concentration (one of a cluster of mental factors said to be always present in a moment of experience in the Buddhist systematization of mental factors called the *Abhidharma*) or should it be used to name a particular kind of meditation as was done in two early Buddhist suttas? If the latter, does it refer to bare attention alone (and is there such a thing?); or to close attention to present experience over time alone; or to close attention combined with memory of Buddhist teachings; or to attention plus memory plus discernment regarding ethical actions; and so on? (For an exploration of these disputes see "Contemporary *Buddhism*," 2011; Sharf, 2015). Since the importance for psychology of any of this is what claims were (and are) being made about different mental processes, those are what we will look at as we continue.

When the meditator develops the capacity for close attention and clear seeing, what does he see? Early Buddhism speaks of the Three Marks of Existence: impermanence, egolessness, and suffering. *Impermanence* points not only to obvious changes such as that people die (called gross impermanence) but to the subtler moment-to-moment arising and falling, birth and death, of one's perceptions and thoughts. This is relevant to MBSR because MBSR contains some meditation, and when a person begins to meditate, impermanence is usually the first thing noticed, albeit in the form of an active, wandering, uncontrollable-seeming mind. *Egolessness* raises the question: who is it that observes that mind? This is also relevant to the MBSR meditator because the *I/me* who he assumes is the observer is illusive, never in direct sight, and frustratingly never quite in control. What the more experienced Buddhist meditator also sees is that this illusive supposed self is the center of his motivation, emotions, and actions. *Suffering* is understood in Buddhism to be inherent in a life of struggle to grasp what is felt to be good for that imagined self, to avoid or attack what is felt bad for it, and to ignore what is judged irrelevant. One is trapped in the struggle because getting what one wants increases rather than assuages desire (the basis of addiction; watch what happens the next time you bite into something delicious), and, similarly, acting out fear, aggression, or ignoring augments rather than relieves oneself of those emotions. What the beginning mindfulness meditator will see of all this is that when she attempts to remain present with the simplest experience, either in meditation or daily life, although the first moment or two might be entertaining, shortly the tension begins to build; boredom, irritation, even fear, may increase; seductive thoughts intrude, and she is again gone. In short, there is no contentment.

This constant cycling from one unsatisfactory mode of being to another is called *samsara*, traditionally thought of as composed of actual realms into which a sentient being could be born as well as mental states. The goal of meditation was to be liberated from samsara. How? In early Buddhism the logic is that since it is desire, aggression and ignorance in the mind that forge the chains of cause and effect (*karma*) keeping one imprisoned, those three poisons need to be eliminated from the mind. There were two basic methods: (a) One could allow the impulse toward actions arising from both wholesome (*kusala*) and unwholesome (*akusala*) mind states to rise and fall without response. This eliminates karmic seeds and does not replace them with new ones.

That was considered the only way to conclusively eliminate the three poisons and gain liberation. But it requires renunciation, dedication, restraint of the senses, and protracted close mindfulness meditation to implement and was thus the province of monastics. (b) One could counter unwholesome states such as greed, hatred, and aggression with other more wholesome mind states such as nonviolence or loving kindness (*metta*). This method creates good karma, and was appropriate for both monastics and the lay community. Note that the momentary periodic checking in with what is happening in the present that is needed to be functional in everyday life—and that everyone does to some extent—was taken for granted and not considered mindfulness. The ultimate goal in early Buddhism and in present Theravada is to attain nirvana (Pali: *nibbana*), a state from which, after death, one would not again be reborn.

Theravada teachings in their seminal form do not transfer well to the West. The question for Westerners is usually not, "How can I wake from delusion and free myself from samsara?" but, "How can I use meditation to calm down, feel better, and become more successful?" With that change of context, the nature and implementation of meditation and mindfulness also change radically, as we will see.

Mahayana

Mahayana (Great Vehicle) Buddhism is estimated to have begun around 100 CE in India and eventually spread throughout East Asia: China, Korea, Japan, and parts of Vietnam. (For more material on the Mahayana Buddhism to be discussed in this section see, Demoulin 2005; Nhat Hanh, 1987; Santideva, 1995; Sprung, 1979; Suzuki, 1970; Trungpa, 1993.) Indian Mahayana added two major teachings to early Buddhism: emptiness (*shunyata*) and compassion (*karuna*), which are said to be inseparable "like the two wings of a bird." This is a vast topic, but what is relevant for present purposes is to note that in Mahayana there is a type of functioning of the mind beyond the motivations of samsara. When a practitioner realizes the openness and release of shunyata and his own inherent compassionate good will towards others, he can live with his senses and thoughts in an enlightened way in this very life. In fact, Mahayana practitioners may take Bodhisattva vows to be reborn in life after life in order to be of benefit to others.

In the Buddha nature schools appearing in later Mahayana, further assertions are made; sentient beings already have an enlightened nature (Buddha nature, *tathagatagarbha*), and the goal of practice is to fully realize it. The path to that is seen as: a) removal of the obstacles that obscure the enlightened nature and b) breaking through to the nature itself. The classic dispute between the gradual and sudden enlightenment schools occurred when these two steps were judged to conflict rather than to mutually support one another.

What happens to mindfulness and the training of attention in this context? The deliberate mindfulness of early Buddhism tends to be replaced by a fierce concentration—for example, on a koan (Loori, 2006)—that enables the practitioner to shatter his conceptual mind and emerge into the vast interdependent universe in which there is no separate observer to observe or mind to be mindful. This is called non-duality. It directly cuts into the sense of a self with its projects, so that, even in the practice of "just sitting" (*shikantaza*), it is eventually necessary to simply let go into one's original mind (Suzuki, 1970). Alone among Buddhist teachers, the influential Vietnamese peace activist, poet, and Zen teacher Thich Nhat Hanh employs the English word *mindfulness* to refer to the entire path—its ground, path, and fruition (Nhat Hanh, 1975, 1987), a usage that can potentially blur the distinctions that Nhat Hanh makes in other ways when that single word enters the context of science.

Vajrayana

The Vajrayana (Diamond Vehicle) became prominent circa 800 CE in India. Early forms of it moved into China and Japan, later ones to Tibet. Because it is the Tibetan forms that are most

known and practiced in the West, I will limit discussion to those. (For more material on the Vajrayana to be discussed in this section see, Fremantle 2001; Ponlop, 2003; Rosch 2008, Snellgrove, 1987; Sogyal, 1992; Trungpa, 1991; Tsoknyi, 1998.) Vajrayana adds two new teachings to the Buddhism that came before it as well as a variety of methods originating in Indian Tantra and in pre-Buddhist Tibet. The new teaching is that there is wisdom awareness (*rigpa*) beyond samsara and beyond emptiness that knows the primordial ground of being: pure, timeless, complete, and all-good. From that ground radiates the phenomenal world of experience. Known with pure vision (*dag snang*), the ordinary world of experience—samsara with its grasping, aggression, ignorance, and suffering—is seen to actually consist of the wisdom energies of that radiance. (In the simpler language of a contemporary outgrowth of Vajrayana called Shambhala (Trungpa, 1984), all this is encompassed by the term "basic goodness.")

Where is mindfulness in this? For a beginner's practice, Vajrayana makes a distinction between mindfulness (Tibetan: *trenpa*), the mind's simple connection with an object of perception such as a sight or one's breath, and awareness (Tibetan: *sheshin*), the broader knowing that surrounds it that can, for example, recognize that one is no longer attending to one's breath (Mipham, 2003). (The closest Western analog of awareness may be William James' concept of fringe attention in contrast to focal attention—James, 1890.) Various analogies may be used for the relationship between mindfulness and awareness; for example, mindfulness is likened to a single word and awareness to the sentence, grammar, paragraph, book, or meaning in which the word is embedded (Trungpa, 1976). Both mindfulness and awareness are necessary. If only a pointillist mindfulness were to be developed, it would make the practitioner a plodding ignorant animal (a *tudro*), not a happier or a more enlightened human; with only expanded awareness, the practitioner could be ungrounded and imprecise. As awareness is broadened and deepened with training, the quality of the moment of being present is also transformed. Eventually that flash of presence can be experienced as brilliant, self-knowing, and self-liberating. There is more to be said about the practicalities of Vajrayana, but the topics that are relevant to MBSR, such as the role of the physical body, will emerge later when we discuss those aspects of MBSR.

What have we learned about mindfulness and attention to the present moment from this whirlwind tour of Buddhism? The minimal meaning of mindfulness appears to be close moment-to-moment attention to one's experience as it is happening over a period of time. The purpose is to enable the mind to penetrate to the nature of experience. People in the usual state of mind called *samsara* flee the present moment because they find it painful or boring, and it is disconfirming of the fantasy self. As greater mindfulness and/or awareness develop through practice and through input from the yana in which the meditator is practicing, obstacles to realization are diminished or drop away; the fruition of realization (which differs in the different yanas) begins to manifest, and the nature of the present moment is understood to be itself transformed in ways well beyond mindfulness.

Mindfulness Based Stress Reduction (MBSR)

We now have the background to look into some of the factors in Western therapeutic and research oriented uses of mindfulness. I am going to do this by means of an examination of MBSR, since it was the first and has become the prototype for such uses. In fact, most of the studies that meet scientific standards that use "eight weeks of mindfulness training" as their de facto operational definition of mindfulness turn out to have been done on MBSR or some close variant. The impression given is that subjects were intensively practicing mindfulness meditation, or at least mindfulness, however defined, for 8 weeks. This is not the case. MBSR is a potpourri of practices and teaching that develop beneficial life skills that include some meditation but also much else. My account of what is in MBSR (although preceded by my study of written protocols for the

training such as those in Kabat-Zinn, 1990 and Stahl & Goldstein, 2010) is based primarily on participant observation (the anthropological technique that includes recordings and interviews) that I have carried out over the last 2 years.

Data for the following account was obtained as follows: I attended three complete MBSR 8-week trainings. In the first training, I stayed within the role of participant, taking on-site notes only during teacher talks and group discussions and not conducting formal interviews. During the second two trainings, I did the same on-site observations, but in addition interviewed all participants who were willing to schedule the extra time to speak with me, a total of 17 people. Fourteen of these people were interviewed twice, once during the course of the training and once after its conclusion. Three people were interviewed only once; two of them after the training had ended. The interviews were primarily naturalistic; I posed initial topics, but subsequent questions and conversation stemmed from the interviewee's responses. Because my intent was to elicit what was salient to the participants, not all participants spoke about all of the topics. An exception to this was that at the end of the final interview (when participants had already completed the MBSR program), I posed specific questions directed at their understanding and experience of the mindfulness aspects of the training. My overall purpose was to study how MBSR was presented and how participants reacted to the various exercises.

Introductory Context and Motivation Setting

In the first session, all three teachers in the groups that I observed enthusiastically introduced MBSR as a scientifically proven course that can improve/change people's lives. Participants (10–15 in a group was the norm) introduced themselves, said why they had come to the program, and were asked to talk about an attribute that they liked about themselves, a technique that turns attention toward the positive, an approach used in positive psychology (Seligman, 2011). It also generated a friendly group atmosphere. Context and motivation were provided by a lecture on the destructive effects of stress and the benefits of reducing it, and participants were told that the method they would learn for reducing stress was *mindfulness*. Although mindfulness was defined as in Kabat-Zinn (1990)—attention to the present, on purpose, and without judgment—that abstract formulation was not specifically referenced again in any of the groups. (This is the usual fate of definitions in natural language—Rosch, 2011.) The pleasures to be provided by enhanced attention were demonstrated by an exercise consisting of the slow, guided, eating of three raisins. In closing, a workbook was given to participants with sections for each week of the training, and Kabat-Zinn (1990) was recommended as optional reading. This entire context differs from that in Buddhism, and we will see how that affects participant response to the meditations.

The Meditations

Two guided meditations are part of the program: a body-scan and what was called a sitting meditation. For home practice, CDs of the guided instructions, spoken by the teacher of the group, were provided to each participant. Teachers of MBSR are trained and authorized by the University of Massachusetts Center for Mindfulness, and although the three teachers had different personal styles in their talks and in discussions with participants, their presentation of the meditations were very similar.

The body-scan. The body-scan appears to have been created by a Burmese Buddhist meditation teacher of the late 19th-early 20th century named Ledi Sayadaw, and is now taught in the West primarily by the Indian teacher S.N. Goenka (1987). It is an idiosyncratic variant of Theravada Buddhism. The premise of the body scan is that the basic body-mind units of experience are sensations. When we desire, fear, or abhor something external, what we really want or do not want, are particular kinds of sensations. Through explicit Theravada teachings and through intense,

prolonged, and unwavering attention to body sensations, including the pain that comes from sitting immobile for many hours at a time in Goenka's intensive 10 day retreats, participants are meant to realize that sensations are mere transient vibrations, thereby hopefully eliminating all desire and aversion from their minds.

Not surprisingly, the body-scan in MBSR is done differently. It is performed comfortably lying down, either on a yoga mat in the MBSR session or at home in a place of the participant's choice, usually his bed. Eyes are closed. In neutral tones, the voice of the teacher instructs the student to notice any sensations in his left foot and slowly, with pauses in between, leads the student to notice points all over his body. (No mention of transient vibrations or desire and aversion.) A single scan is done in a 45-min session.

What do participants make of this practice? Overwhelmingly participants talked about it as relaxation (for 85 % it was their first comment), a natural assumption given that this was a stress reduction program and that the practice is done lying down with closed eyes. In this group, roughly half said that the body scan actually was relaxing for them and that they did it as homework at least part of the time. Many of these also said that it helped them to sleep or actually put them to sleep, some reporting happily that they had never stayed awake for the entire CD. (During the group sessions, a chorus of snores typically accompanied the body scan.) Four people said they augmented their relaxation by adding other relaxation techniques they had previously learned. The other half of the group varied from less enthusiastic to negative, the latter finding the practice boring, uncomfortable, or pointless. The two participants who mentioned learning to be in the present as a purpose for the exercise had the usual beginning meditator's concern about drifting into thought rather than staying with the sensations as directed. Almost all the participants, upon further probing, reported having noticed something about their body or their relationship to their body that they had not been previously aware of, but this was at the level of information not intimacy. Not surprisingly, participants who did not like the body scan were less likely to do it at home.

Sitting mindfulness meditation. This is a common mindfulness meditation, often used as a bridge to vipassana exercises although not in MBSR. Participants are led first to attend to their breath, then to sensations, feelings, emotions, thoughts, and finally to awareness itself. The practice is done sitting in a chair with eyes closed. Participants' reactions to the practice were more varied and less classifiable than with the body scan, but it was clear that relaxation was still a strong concern. Some participants who had not found the body scan relaxing did relax with attention to their breath and vice versa. Over half mentioned the wildness of their minds, some with surprise or interest, but others concluding from it that the meditation was something they couldn't do. With probing, some participants voiced confusion about what in their minds they were supposed to look at (for example, what is the difference between a feeling and an emotion, and what does looking at awareness mean?), however all could easily identify the difference between sensations and thoughts. Three participants expressed worry that the meditation, either because of negative content or difficulty, was making them more stressed, and they, as well as others who didn't like it or who felt they were too busy to spend 45 min on it, did not to do the home practice.

What participants are and are not getting out of the meditations. Participants who participated actively in the program appeared to be deriving three main benefits from the meditations. Most obvious was relaxation. The second was discrimination of bodily sensations (and to some extent feelings) from mental thoughts and stories. While this is a distinction that functional adults can easily make, at least at the cognitive level, these practices provided a platform in which the two could be brought into a more focal juxtaposition. Finally, there were precursors and perhaps glimpses of mindful present moment functioning. Relaxation and discrimination are clearly beneficial, but not of themselves present moment presence, and the greater development of such presence seemed not in the forefront of participant concerns; e.g., only two participants mentioned it without probing. By the end of the initial

weeks of training, which was the period devoted to the meditations, MBSR participants were still confused about what constituted being present as well as having difficulty doing the meditations as instructed, even those that provided them a measure of relaxation. (This is what can be expected with an introduction to mindfulness meditation in any setting.) As the course proceeded, other practices became the focus of the training and of participants' interest. In addition to shifting the focus, these practices interacted with people's understanding of the meditations; for example, some participants reinterpreted the meditations as information gathering.

It should be noted that none of this would be surprising to long-term Buddhist practitioners. To develop an alert, present oriented attention that is stable over a noticeable period of time goes against the habits of a lifetime and disrupts people's ordinary sense of themselves. To nurture such requires time and motivation.

I will return to all of these issues in later discussions.

Hatha Yoga

Practice of simplified and relatively undemanding hatha yoga movements and poses is given equal time with meditation in MBSR, both in the group sessions and in the recommendations for home practice. In fact some participants who liked the yoga and did not like the meditations, did only the yoga at home thus giving it close to full time. (Guided CDs for the poses were provided for home use.) Research on MBSR might well be enriched by a fuller consideration of this highly physical aspect of the program.

The practice was described as "mindful yoga" and "the practice of moving presence," the point being that it was attention to the movements, rather than trying to perfect them, that was important. Many participants, however, reported just trying to learn what to do, a task performance mind-set rather than an orientation to being present. Some participants who liked the yoga reported becoming caught up in trying to stretch further. Some said that as the practice got more familiar, they tried to follow their movements as they did them, but, although they saw this could be pleasurable, it was difficult to maintain (also reported by participants who already had a yoga or other movement based home practice and did that instead). Some participants found the yoga physically difficult or painful. Over half said they did little or no home practice of it. Note that there is mounting research evidence that hatha yoga is of itself beneficial (Broad, 2012; Fields, 2012), so we can assume that the MBSR participants who did the yoga were deriving those benefits from it whether they did it attentively or not.

Explicit Stress Reduction Practices

Interruption and alleviation of stressful situations. These skills were central to what many participants said they got out of MBSR. Participants were given a series of assignments. The first was to notice one or more pleasant events and record the feelings, sensations and thoughts they had during the event. This served as preparation for the following week when participants were to do the same for unpleasant, stressful events. In the third week participants were encouraged to be vigilant [my word] to detect their bodily feelings of stress, particularly changes in breathing, so that they could catch the stressful feelings before they escalated out of control and thus have a choice of what to do next. Teachers varied in how much and what kind of further advice they gave: for example, pause, breath, see what your body is doing, stay with awareness, be kind/compassionate to yourself, look reasonably at what is happening, remember this situation will not last, etc. All the participants worked with these exercises to some extent, were animated in the group discussions of them, and, in some cases, came up with their own interesting or heartfelt solutions of what to do. Just staying with awareness was given little or no attention (another unexpected finding to be addressed later), but the exercise as a whole made sense to them, and they went at it in full problem solving mode.

Catching and correcting distortions of thought. This is a mainstay of cognitive therapy (Beck, 2011). Distortions discussed here included: all or

none thinking, overgeneralization, focusing on the negative, thinking feelings are facts, perfectionism, over-responsibility, labeling oneself, and identifying with thoughts and emotions. Participants who spoke agreed that they did all of these things, sometimes giving humorous examples. Distressing emotions and the thoughts that went with them were treated in the workbooks and teacher talks as a combination of stressful event and distorted thought and received the same instructions for alleviation as had the stressful events: notice early, apply remedies. None of the (admittedly more existential in nature) distortions of thought pointed to in Buddhism were ever mentioned.

Changing habits. Habits were given a week of their own, however the technique was virtually the same as in working with stressful events. Instructions were: be attentive to situations where the habit comes into play; catch it early enough to have traction; stop and do something else.

Interpersonal Relations

Metta. MBSR contains a section on metta loving kindness practice. The essence of the practice is to wish good for people: for example, health, safety, peacefulness, happiness, joy. Traditionally this would be done first for oneself, then a loved one, friend, neutral, and finally an enemy. People easily understand what to do in this practice and, after an initial surprise at how difficult it is to wish well to oneself, they generally reported liking it. There is research showing that an attitude of loving kindness and compassion toward oneself and other people is beneficial (Keltner, 2009; Chapter 10), and, as with hatha yoga, this aspect of MBSR would seem ripe for increased attention by researchers. (In two groups, a taste of another practice of this type was added: in one the keeping of a gratefulness diary, in another a brief foray into the Rosenberg (2003) nonviolent communication training.) Remember that metta is something different from mindfulness.

Human interaction. MBSR participants interact both with their teacher and with each other. Teachers are screened, trained, and certified by the University of Massachusetts Center for Mindfulness. (The need for a certification procedure became apparent when MBSR began to be taught by people without background, and under those conditions reportedly did not work.) The teachers I observed all had prior meditation background; two were therapists, and all had people skills. Interaction within the group included periodic dialogs between participants and group discussion periods during each session. The atmosphere was pleasant and upbeat, focusing on what had been discovered or had worked for the participants when performing the exercises. Although the sessions had some aspects of a support group, MBSR is not a place to discuss personal pathologies. The one person I observed who appeared to be in crisis left after the third week to seek individual therapy. Almost all participants, including those who reported themselves too busy to do most of the homework, said they liked their teacher, their group, and the classes.

Poetry

Teachers periodically read poetry of their choice to the participants. The poetry introduced a touch of imagery and feeling beyond rationality into the proceedings, a dimension understandably not present in the training per se—also humor.

The Template

Now that we've seen what practices and trainings comprise MBSR and have at least some information on how participants use them, it is possible to construct a template of the factors at work in this kind of therapeutic program. There are alternative ways that each of the factors can be instantiated, and such alternatives could be used when they are judged more appropriate for an individual or a target population. Even religions could use the factors by substituting methods for achieving them based on their own beliefs. One or more of the factors can be combined with other kinds of

therapies or interventions. Such an analysis should also bring up many research questions that are obscured if everything is called by the name *mindfulness*.

Origin Story

MBSR uses stress and its evolutionary explanation as an origin story for the reversible aspects of much human distress. In contrast, the origin story of dysfunction in psychoanalysis is in terms of childhood material that is unconscious. The origin story of suffering in Buddhism is contained in how the mind of samsara functions, of Christianity in sin and redemption, and so on. Simply having an origin story satisfies people's need for explanation, and the belief systems in which these stories are embedded set the stage for how the other factors will be used.

Relaxation

Relaxation has its own potent research history. It is generally defined as the absence of (or opposite of) the stress response, which, to oversimplify physiologically, is carried by the action of the parasympathetic, as opposed to the sympathetic, nervous system (Benson & Proctor, 2010). Books and websites listing techniques for relaxation abound, some citing research showing the effectiveness of each technique (Davis, Eshelman, & McKay, 2008). Virtually all of them list meditation and/or mindfulness meditation, as one of those techniques. Once one realizes that relaxation and mindfulness are not enemies and that relaxation may contribute to the success of MBSR and similar programs, it opens the door for creative changes.

People differ in what does and does not relax them. Neither the body scan nor the sitting mindfulness meditation of MBSR were designed for relaxation, though they allowed it, but by no means all of the MBSR participants found both, or either, relaxing. In early Buddhism an alert peaceful-abiding practice would generally precede and lead into mindfulness meditation, and there were options among such practices. Even meditative attention to breath can be performed in different ways with attention directed towards: breath at the nostrils, the rise and fall of the abdomen, whole body breathing, the outbreath only, alternate nostril breathing, extending the outbreath, thinking a relaxation-inducing word such as *peace* on the outbreath, and so on. Some relaxation methods can be performed quickly on the spot, a present day virtue. When we add other yogic or modern relaxation methods that do not use meditation, there are a cornucopia of possibilities to suit particular needs.

With respect to research, the reader might consider what role relaxation may play in the various findings, including effects on attention, that are reported in this volume. In addition, there may be more to relaxation of the body than is contained in the opposite-of-stress model, and the maps of an inner energy system in various Eastern yogic practices may offer clues about where to look (see next section). There may also be levels and subtleties to relaxing the mind; for example, Vajrayana shamatha designates nine levels of resting the mind, and teachings on Vajrayana awareness may use relaxation imagery such as a Brahman housewife whose work is done or the uncoiling of a knotted snake. And with respect to therapy, relaxation is surely the Type-O blood that could facilitate almost anything.

Bodily Movement Practices

Simple hatha yoga is a prominent part of MBSR. Like mindfulness, yoga has its enthusiastic supporters and an ever-mounting research literature demonstrating its benefits (Broad, 2012; Fields, 2012). And like relaxation, once one admits that yoga may be a factor in the benefits of MBSR, the door opens to variations that might be more beneficial or better tailored to individual needs; for example, twists are believed helpful for alleviating depression, and there are cooling poses to engender relaxed calm and heating poses to stimulate energy flow.

As we saw, not everybody in the MBSR groups liked or could do the yoga or did it attentively as

instructed. Fortunately, there are alternatives. All across Asia, the body is understood to be composed not only of flesh, blood and internal organs, but also of an internal energy system, metaphorically described as channels—and in some cases energy vortices called *chakras*—through which the energy flows. In Hindu, Buddhist and Taoist yoga, movement of energy in the subtle body is seen as an origin of mental as well as physical states; for example, wildness versus stability of mind. Chinese exercises, such as tai chi and chi gong, like the hatha yoga used in MBSR, are designed to adjust the internal energy body as well as provide exercise. There is already an accumulation of medical and psychological research showing the benefits of these systems (Hong, 2008). For older people or those with limited movement capacity (or limited time), *tai chi chih*, a simple system designed for its medical benefits, is available and increasingly used in senior centers (Stone, 1992). For Buddhist mindfulness inspired programs, Tibetan yoga and use of breath (Wangyal, 2011) may be particularly appropriate. Among Western exercises, walking may supply yogic as well as aerobic benefits due to the bilateral continuous movement of the arms and legs.

There are research implications. It is surely time to take these maps of an inner energy physiology as seriously as we do the effects of the yoga or acupuncture based on them, and to find ways to subject such conceptions of the body to scientific investigation. There are also implications for therapy; imagine if psychotherapists and teachers of therapeutic movement formed teams to work simultaneously with a given patient.

Sleep

Both relaxation and yoga have been shown to reduce insomnia and improve the quality of sleep. Sleep deprivation leads to a cascade of negative effects on body and mind that are endemic in our severely sleep deprived society (Dement & Vaughn, 1999). In addition, sleep disturbances have been identified as comorbid factors for all categories of mental illness (Harvey, Watkins, Mansell, & Shafran, 2004). A number of MBSR participants reported improvement in their sleep. The life benefits afforded by adequate sleep are of the same sort as found for MBSR and other such programs. Thus sleep may be an amplifying or mediator variable between practices such as yoga and relaxation and their beneficial effects, and, by extension, the benefits of MBSR.

Familiarity with Body and Mind

Any endeavor to "know thyself," surely involves becoming more familiar with one's body and mind. The emphasis of MBSR is on the body. The body scan, breathing, sensations, yoga, vigilance for changes in the body signaling stress, the use of breathing or good bodily memories to calm stress and offset habits—all produce greater familiarity with the body (even in cases where it is only at the conceptual level) and more tendency to check in periodically with the state of one's body. In this respect MBSR is closely allied with the growing field of somatic psychology and the upsurge of somatic therapies (Barratt, 2010). In fact, with the self improvement task oriented attention that MBSR participants bring to the body, MBSR appears closer to somatic psychology than to Buddhist "mindfulness of body," one of the four foundations of mindfulness taught in early Buddhism (Silananda, 2002). MBSR also offers participants the opportunity to become more familiar with their minds, or at least the contents of their minds, but that is less prominent. There are other meditation derived uses of attention to the body—for example, the transformation of intractable chronic pain into sensations of heat or light made possible by prolonged penetrating concentration on the pain (Young 2004)—that the interested researcher or therapist can look into.

Discrimination Between Sensations, Feelings, Emotions, Thoughts

One aspect of clinical disorders such as anxiety or depression is the automatic leap from negative

bodily sensations and feelings to thoughts and stories about the meaning of those bodily states, which then perpetuates further negative sensations and feelings. This applies to the miseries of ordinary people in nonclinical populations as well. Discrimination between sensations, feelings, and thoughts is necessary if one is to develop an early warning system to interrupt the automaticity of this feedback loop. However, there are simpler and more explicit ways of teaching people such discrimination than are afforded by MBSR or mindfulness meditation. Carmody's paper (this volume) provides a clear description of the logic and implementation of this process.

Vigilance and Interruption of Habitual Patterns

Humans are already vigilant for threats and opportunities (however defined by the person) and for information relevant to present concerns. In fact it is the capacity for vigilance and its misuse that lead to stress in the first place. To interrupt the escalation of stress, negative emotions, and unwanted habits, vigilance is needed in order to catch the early stages of these patterns. MBSR teaches this, and any therapeutic work aimed at explicit direct change of feelings and behavior will probably need to incorporate some version of it. (Note: the term *vigilance* is mine and was not used in MBSR.)

Correctives for Habitual Patterns

Vigilance for warning signs is not enough. "Here I go again!" often precedes simply going there again. At the point of noticing, one must insert something different. The options of "just being" or of hanging out with enlightened awareness are possible only if one has access to such states. Likewise for "not identifying with negative emotions," which was largely opaque for MBSR participants. On the other hand, breathing (even if just "taking three deep breaths") made sense to them, as did looking at themselves with kindness and compassion—or at least having that intention. Other strategies were to think of a favorite memory or to try to reason with oneself. A number of people reported bringing to mind what appeared to be the larger purpose for which they were engaged in the stressful activity, usually having to do with their loved ones. It was as though some participants were spontaneously coming up with their higher order commitments, a fundamental aspect of Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 1999).

Identification and Correction of Thought Distortions

This is a particular kind of corrective. Participants who identified one of the thought distortions, usually self-criticism, as a stressor and became vigilant of it, then made efforts to substitute a more positive or more reasonable alternative. Correction of thought is important as a factor in its own right. Note that origin stories and the belief systems in which they are embedded all have their own versions of true versus mistaken forms of thought and methods for correcting the mistaken.

Attention Directed to What Is Positive and What Works, Not to What Doesn't

All of the discussions were led in a way consonant with this principle, even though it was not explicitly taught as such. It is noteworthy as a separate factor because it is the basic principle of positive psychology, another input to MBSR of a Western therapeutic system that has growing research demonstrating its effectiveness (Seligman, 2011; Snyder, Lopez, & Pedrotti, 2011).

Sense of Agency

Working with vigilance and finding antidotes to counter stress appeared to impart a sense of agency to people. It put them into an animated

problem-solving state of mind. The word *mindfulness* has been used for this kind of activity in contrast to passive or automatic actions (Langer, 1989). But the reason why Buddhist mindfulness retreats are repetitious and stripped of complex activities is that complexity and mental manipulation to make things better are the very activities that suck a beginner away from mindful presence, not those that lead to it. Agency and problem solving are good, even essential, but they're on a different dimension of mental functioning than mindfulness.

Loving Kindness and Compassion

Humans are social animals, and metta practice is directly connected to that. People can understand what the practice is and the instructions for how to do it without a background in meditation. It relaxes and softens people and provides a ground on which other practices can flourish. Some Buddhist teachers use such practices as their basic introductory material. It is prudent to keep the practice as simple as possible and to let people choose what good things they will be wishing on themselves and others. Remember that metta is not a mindfulness practice.

Missing Factors

There are three "known unknowns" missing from MBSR. (1) First is the dimension of releasing, giving things up—what in religions is called *renunciation* or *surrender*; in religious studies *kenosis*; and in ordinary language *change*. To change anything about oneself, one has to let go of what one was or is. This can be the unacknowledged elephant in the room in any kind of therapy, self-improvement regiment, or in MBSR. (2) The second dimension is the experience of not knowing. Openness to experience is predicated on openness to non-experience. Without this, the conscious conceptual mind thrashes anxiously in a sea of not knowing rather than swimming in it. Without acknowledging the unknown, we could never learn anything…or have science. (3) Finally there is the dimension of beyond the known, the longing or reaching out toward beyondness, whether that is pictured as a depth of experience, as is common in Buddhism, or as a height, as is the tendency in Western religious language. The practical side of this is noted by common expressions such as "outside the box" and "inspiration that seems to come from nowhere." Lest that seem beyond the useful, notice how in Dialectical Behavior Therapy (DBT) (Linehan, 1993), even borderline patients can be guided to a remarkable prescience that is neither familiarly intellectual nor emotional (see also examples in Baer, 2006).

In Short

Results of this inquiry into the specifics of MBSR might appear somewhat like Leeuwenhoek's first glance through a microscope into a drop of pond water. What had been assumed just water was found teeming with life. MBSR, normally treated as just mindfulness, on closer inspection is revealed as a cornucopia of potentially beneficial practices, each of which has possible applications in research and therapy. That leaves the role of mindfulness itself as a question rather than an assumption. This issue will be addressed further in the final discussion.

Measurement of Mindfulness

The Scales

Five self-report scales for measuring mindfulness have been in common use for some time. Since Ruth Baer (this volume) has, with great clarity, reviewed the scales and her own work regarding their psychometric properties, I will present only a brief reminder here. The scales are: the Mindful Attention Awareness Scale (MAAS), the Freiburg Mindfulness Inventory (FMI), the Kentucky Inventory of Mindfulness Skills (KIMS), the Cognitive and Affective Mindfulness Scale (CAMS), and the Mindfulness Questionnaire (MQ). Baer and her collaborators (Baer, Smith,

Hopkins, Krietemeyer, & Toney, 2006), in a comprehensive factor analytic study of the properties of these scales, have convincingly demonstrated them to be measuring five separate factors in the construct rather than a unipolar factor. My concern in this chapter is: what are the factors in these scales actually measuring? Let's look at the bottom line definition of mindfulness and then at the factors derived from Baer's analysis.

The minimum component in definitions of mindfulness, past or present, is that one's mind is present with one's experience as the experience occurs over successive moments of time. Variations in definitions consist either of debates over the subcomponents of that process or the addition of other attributes to the process. Mindfulness training consists of doing a practice designed to produce such presence. If a researcher wants to study the effects of mindfulness, then mindfulness itself needs to be measured separately from the effects; that is, the ability to maintain attention to present experience with some degree of stability (at least sometimes) would be the independent variable and hypothesized outcomes of that kind of attention would be the dependent variables. But none of the scales, or the factors in the scales, measures that kind of attention.

There is only one factor in the scales aimed at attention, a factor that loads almost entirely on items from Brown and Ryan's MAAS (Brown & Ryan, 2003). It is composed of items that ask about extremes, in fact pathologies, of attention, not about mindful presence. For example, a high endorser of these items admits to behaviors such as driving places on automatic pilot and then wondering why he went there. A normal person muddling through in our usual non-mindful way would be a relatively low endorser and be classified as mindful. A second problem with this factor is that all of the items have to be answered in the negative to be scored as mindful; but research has shown that items with the same content requiring negative answers get different results from those phrased for positive answers (see Grossman & Van Dam, 2011, for an extended review and discussion of this issue). Finally note that this is a self-report measure, and except for the extremes of dysfunctional "spacing out," most people have no idea whether they're present or not.

A second factor measures strong self-criticism; a high endorser says that she makes judgments about whether her thoughts are good or bad and gets angry with herself for having distressing thoughts or images. But this is a measure of the contents of experience not of whether a person can be, or ever actually is, present with those contents while they occur. (To turn attention to the contents rather than nature of experience is a natural shift that, as we have seen, was also made by the MBSR participants.) One might hypothesize that being mindfully present with negative self-judgments will reduce their frequency of occurrence, but such a hypothesis remains inherently untestable as long as the completed outcome is contained in the definition. That is, if the dependent variable is already contained in the independent variable, then a positive experimental result can be nothing but a tautology. It is medieval, not scientific, logic to include outcomes in one's definitions (as in Molière's famous parody, "Opium puts people to sleep because of its dormative power"). The fact that MBSR may produce this kind of outcome will not help, since MBSR teaches many techniques (apparently employed by participants far more vigorously than mindfulness) that are aimed explicitly at replacing negative mental contents (self criticism is high on the list) with more positive ones.

A third factor measures moderation in emotion, e.g., an ability to modulate affective states and not get carried away by thoughts; it correlates positively with the first two factors (provided that one considers the inability to modulate affective states as the high end of the scale). All the objections to the second factor also apply to this one. In fact, if we were to actually take the third factor seriously, there would be no need for this book—of course self-regulation and mindfulness go together if they are part of the same definition. Again appeal to the effect of MBSR is not germane. The heart of MBSR practical training for most participants was the set of exercises designed to explicitly prevent emotional,

even conceptual, deregulation. The guidelines: be vigilant for signs of deregulation, stop and apply a corrective. For someone already having access to more awake states of awareness, bringing that awareness to the situation is enough, but for MBSR participants what seemed meaningful was to actively manipulate mental content instead. Finally, there are practices in MBSR—such as relaxation, yoga, and loving-kindness—known to calm body and mind and prevent deregulation and escalation of emotions whether done mindfully or not.

The fourth factor is an ability to label and describe with words. Verbal facility is an increasingly necessary ability in our civilization, but it is not mindfulness. In fact, a mind busy with verbal labels and descriptions is a prime obstacle for beginning meditators. One does not need an elaborate verbal apparatus to distinguish what is the object of one's meditation from what is not.

A possible fifth factor consisting entirely of items taken from the FMI and KIMS, dealt with what is usually called psychological mindedness, i.e., the observation and labeling of internal states. It did not correlate with any of the other factors for people who were not experienced meditators, thus offering more evidence that mindfulness and observation mean different things to those with and without training (Grossman & Van Dam, 2011).

But these existing mindfulness scales get research results, one might protest; what is happening? I believe that the scales are measuring what psychology knows how to measure: factors of general mental health and wellbeing. Naturally they correlate with each other and with other measures of health versus pathology. And naturally they have brain correlates; everything a living person does and is has brain correlates. The whole area of measurement of mindfulness needs serious rethinking.

What to Do Instead

How then should mindfulness be measured? This is not a simple question. Buddhist teachers and meditation instructors (and therapists who work with sullen teenagers) well know how difficult it is to find out what is going on in someone's mind when that person himself doesn't know. Someone with even occasional experience of being mindfully present is more likely to report herself hopelessly not mindful than a person without any such experience. Long-term Buddhist practitioners reminisce with each other about times they believed they understood or realized one or another teaching but were then disabused by experience more to the point. This is not optimal territory for the use of self-report scales. Probing interviews are highly impractical. At this point I believe it would be most useful for psychologists to turn their attention away from the how-to of measurement and towards prior questions about what there is to be measured. An extensive landscape of states of mind related to being present lies currently uncharted by Western psychology. Some examples of near neighbors of close mindfulness are:

Absorptions. These are states where the mind becomes sufficiently absorbed in the object on which it is focusing that it loses clear awareness of itself and the situation. For example, some MBSR participants who liked the breathing described themselves as relaxing or sinking into their breath, or as feeling their minds get blurry or fuzzy, or of feeling themselves slipping, sliding or falling slowly asleep. Here the mind is present in the sense that it is not wandering elsewhere yet not alert enough to be cognizant of the whole situation. Another kind of absorption that three MBSR participants offered as an experience of mindfulness was becoming intensely focused on a task and shutting out everything else, including, for one person, bodily needs. Again the mind is not wandering (or not as much as usual), but one is not present with oneself.

Human realm states. This is the most important category with respect to the Western understanding of mindfulness. In Buddhism, states of mind can be classified into different aspects of the core motivations of desire/passion, aversion/aggression, and ignorance. Traditionally these were taught as realms into which a sentient being could be born for a lifetime as well as mental states. Human realm is considered the most

auspicious because (at least in early Buddhism) it is the only realm or state of mind in which one can hear and practice the Dharma. That is, one cannot practice mindfulness meditation, clear seeing, loving kindness or, some practices of the later forms of Buddhism if one's mind is dominated by a hellish state of aggression, a hungry ghost mentality of desperate neediness, the automaticity and plodding ignorance of an animal, the competitiveness of a jealous god, or the drugged-like, ignorant absorptions of "god realm." (For a detailed description of the realms in terms of states of mind, see Trungpa, 1976.)

The predominant mental state of human realm is one of intelligent desire. The human sees that she is not satisfied and seeks what will make things better. If what she does doesn't work, she tries to understand why not, and experiments with doing or getting something else. In a human realm state of mind, a person intermittently checks his environment and himself to monitor how he's doing and is wary of losing that monitoring by becoming too spaced out, angry, critical, or emotional. He develops skills such as language fluency in order to have better relationships with the people, objects, and situations in his environment in order to better get what he wants and avoid what he doesn't want. A person who spends a reasonable amount of time in human realm states of mind—and is able to return relatively quickly to them when she slides into extremes of ignorance, greed, depression, aggression, or competitiveness—will likely be judged mentally healthy and is likely to score as mindful on the mindfulness measurement scales since that is what the scales are measuring. Within this framework, the basic aim of psychotherapies might be described as trying to help patients towards greater human realm functioning. This is also the state of mind that 20 years ago and without input from Buddhism, Langer (1989) called mindfulness, by that meaning using the mind actively (rather than automatically) and with a sense of efficacy. To guide people into such a mode of functioning is also the predominant thrust of the second half of the MBSR training; it was also what was most described by participants when they spoke during the final class or final interview about what they felt they had gotten out of MBSR. (Relaxation was a close runner-up.) In short: what psychology measures under the name mindfulness is basically human realm functioning. Rather than quarreling over a word, perhaps we should just distinguish it as a separate species of mindfulness, naming it *Human Realm Mindfulness* or *Humanist Mindfulness*. (And if it came to it, we could also have *Relaxation Absorption Mindfulness* and *Task Absorption Mindfulness*.)

Awareness. In awareness, the alert, stable, present oriented attention of mindfulness becomes increasingly expansive. Walking meditation provides an example. Under Theravada mindfulness instructions (minimally introduced towards the end of MBSR), the practitioner walks slowly, barely moving, with instructions to pay close attention to each detail of change in pressure on the foot from heel to toe, the lifting, lateral movement, and lowering of the other foot, etc. Under awareness instructions, the walk is more normally paced with attention on the whole body moving in space including a sense of the space surrounding the body (along with what is in it, such as other people), the enclosure of the room if it's taking place indoors, the functioning of one's senses, the vastness of the space outside the room, and so on. Walking in this way is considered a bridge to maintaining awareness during the activities of daily life.

Non-dual awareness. Here experience knows itself without a separation of observer and observed. One is present because there is no separate mind to wander elsewhere. The senses, including mental states such as thoughts, arise freely in their "natural brilliance." From this point of view, judging an experience or wanting it to be some other way will seem irrelevant, and the laborious mindfulness of the beginner appears a fiction, an artificial and unstable exaggeration of the confused mind's assumption of duality between an experiencing me and an object of experience.

Non-duality is understood to be a portal into the further realizations in Mahayana and Vajrayana, but why bring it up here? The issue is that Kabat-Zinn's original mindfulness instruc-

tion to be present without judgment—the inspiration on which MBSR is based—only makes full sense within the context of these later teachings where one is understood to have an original nature which, "does not pick and choose," and "is free from accepting and rejecting, hope and fear" (common tropes in Zen and Vajrayana). The problem is that the typical person who comes for stress reduction or therapy cannot understand or follow instructions based on such qualities (the mind of samsara constantly judges) any more than she can follow an instruction to just be or to love herself unconditionally. (In fact "without judgment" was interpreted as some variant of "I shouldn't criticize myself so much" by most MBSR participants when asked in the final interview.) It takes a path that aims toward non-dual awareness to uncover it, and MBSR is not that; it is a creatively helpful path towards more and better picking and choosing. This disparity confuses researchers and will be addressed further in the final discussion.

Discussion, Prophecies, Buddhism, and the Emperor's Clothes

MBSR works; it can improve people's lives. The mindfulness measurement scales also work; they usably measure a relative absence of mental pathology as well as some positive traits. But is it mindfulness that is behind such results? If by *mindfulness* we mean close, stable, present-oriented attention, the analysis in this chapter suggests that the role of mindfulness may not be as obvious as previously assumed. There is no measure of such attention in the scales, and it is problematic what role it played in the minds of the MBSR participants I studied, at least in comparison to the other aspects of the training. Why were the participants not experiencing more mindfulness by the end of the study given that they had been taught two mindfulness meditations (of the close ongoing attention genre) and a hatha yoga practice with instructions to perform it mindfully? A number of factors would appear at work, each interacting synergistically with the others.

Why Was There Not More Mindfulness?

1. Mindfulness is challenging. It goes against the grain. The habits of a lifetime reinforce a mind that moves constantly, ever building and rebuilding the sense of oneself, one's past and future, successes and failures, plans and projects, whatever momentarily maintains a sense of meaning to one's life. Present oriented, close attention cuts through all that. It is stark. It requires letting go rather than acquiring. In addition to these affective issues, mindfulness is hard to conceptualize. One doesn't know quite what it is or how to do it. It takes time and effort to develop.
2. Easy familiar practices supersede new challenging ones. In MBSR, mindfulness is taught in a context with other practices, such as vigilance, interrupting stress, and replacing negative emotions with positive ones that are easy to understand and that fit into the familiar motivations of getting what you want and avoiding what you don't want. It is natural that people will replace what is difficult, unknown and new with a familiar, easier, and more understandable alternative when that is offered.
3. Goals. Goals determine how cognition and attention will be deployed (if you're walking to a shoe store, you may suddenly notice everyone's shoes). A goal also provides the rationale and motivation for performing activities that will lead to that goal. Close, continuous attention to the present is a necessary practice in early Buddhism because it enables one: (a) to see impermanence, no self, and that acting on the basis of desire, aversion, and ignorance never lead to satisfaction, and (b) to gradually empty oneself of the habits (karma) of lifetimes; this is brought about by not responding to the content of each moment as it arises. When this kind of attention is taught as an initial practice in later Buddhism, the further purpose is to bring the practitioner to the point where she is able to uncover, awaken, recognize, or receive transmission of the basic enlightened nature already there, in the light

of which the present moment is transformed. Given such purposes and views of the mind, we can see how instructions in the mindfulness meditations to "just notice," "just see it," "no need to do anything about it," "just stay with the experience," and so on make sense. But if one's purpose, as in MBSR, is to reduce stress, thereby having fewer negative and more positive experiences in one's life, these instructions would be obvious only if "just seeing it" were immediately rewarding (pleasurable, peaceful, or at least a relief). However to an ordinary mind "in samsara," that isn't necessarily the case.

Purpose effects the actual mindfulness meditations in many ways. For example, try doing a brief portion of the body scan with the intention to "just notice" the sensations at each point, then a second time with the intention to use the noticing to relax, and a third time with the intention to gain information about your body. Purpose also influences one's motivation to stick with a practice. If one has a stress reduction mind-set and finds the meditation boring or disturbing, why grit your teeth and stick with it? Upon realizing one is getting stressed, if one has never experienced that staying with an experience can be transformative, why not quickly use some other remedy instead?

Purpose also seemed to effect how the MBSR classes were taught. For example, the existential questions with which Buddhism deals (and which mindfulness meditations were designed to arouse) were never talked about in the discussions, even on occasions when participants brought up something that would have triggered such discussion in a Buddhist setting. To illustrate: impermanence was treated only as a comforting reminder that painful situations don't last, and participants were not steered away from concern for the contents of their experience towards inquisitiveness about the nature of the experiencer. This is understandable, even skillful. Given the place MBSR occupies in our society, it is important to keep it science and medicine based and away from anything interpretable as religion. Furthermore opening the Pandora's box of such questions would have disrupted the structure, flow, and ambience of the program.

One final thought: is mindful, close attention actually needed to achieve MBSR stress reduction or is the intermittent strategic noticing used in human realm monitoring sufficient?

Limitations to This Study of MBSR

There are a number of limiting factors. The number of trainings I observed was small as were the number of participants interviewed. All three trainings were commercially offered, and the participants were reasonably high functioning people. MBSR given in a hospital setting might show different patterns. The one participant in the trainings I observed who identified herself as seriously ill (not one of the interviewees), remarked one day as we were leaving, "These people act like tourists visiting their bodies; wait till they get sick and have to live there." MBSR was originally designed for chronic pain patients judged beyond medical help at the University of Massachusetts Medical Center. It is quite possible that for such people the body scan, given with the original instructions to observe without judgment (however they interpreted that), could have been a radically new and life altering experience. People with problems that might require close, protracted, present attention to unravel—addictions for example or just an inability to lose weight—might have their own relationship to MBSR.

A different set of issues with the study has to do with participants' use of language. The meditations, in fact the domain of present oriented experience in general, were new terrain for their vocabulary and thought processes. Were some participants saying what they did because they didn't know how else to identify or express what they wanted or were getting from the meditations? (The questions specifically directed at mindfulness at the end of the final interview seemed more problematic for some people in this respect than the more naturalistic parts of the interviews.) An even deeper linguistic problem is

that the words we have may not be adequate to express what goes on for people in such meditations. For example, participants' use of *relaxation* may have covered deeper and more complex processes than either they or scientists presently have a vocabulary to express. Finally, it is possible that the meditations were affecting participants at a level where the effects were not available to consciousness. Note that use of a questionnaire would not help any of these concerns.

A final obvious limitation to this study of MBSR is that it was about MBSR and thus applies only suggestively and not necessarily to other mindfulness programs that present trainings in their own ways.

The Other Beneficial Factors in MBSR

The prevailing story about why MBSR works is *mindfulness*. This has tended to obscure and deflect research from the array of less exotic therapeutic techniques that occupy the greater part of the training and may have displaced, at least for the people I studied, the close-attention to body and mind potentially introduced by the meditations. Look at what MBSR offers: relaxation, physical exercise and yogic movement, improvement in sleep, discrimination training, an early warning system for disturbance, correctives for what is negative, attention to what is positive, a sense of agency, correction of thought distortions, and loving kindness. A range of therapies are invoked: somatic therapy, relaxation training, sleep medicine, cognitive behavioral therapy, behaviorist therapies, positive psychology and therapy, empowerment training, and the kindness and compassion embraced by all of the world's religions and ethical systems.

How does this combination of techniques work in MBSR? One hypothesis is that it is a synergy amongst the factors—as in the effectiveness of the AIDS cocktail versus earlier solo drugs. Or we might think of MBSR as a tea sampler or, more endearingly, a gift basket, of effective formulas from which MBSR participants can select the one or more that work for them. Nor can we discount the role of the meditations. Participants who did neither the meditations nor the yoga as homework—strongly predicted by their having named some variant of "too much to do" as their predominant stressor in the first class—were also the least satisfied or enthusiastic about what they had gotten out of the program. However, these participants also did less of the homework for the stress reduction techniques, so it is difficult to untangle cause and effect. It may well be that without at least some settling, calming, and relaxation from the meditations, it would be difficult for many people to achieve even the "tourist visits" to present experience needed for the stress reduction practices. The meditations may have made such visits more frequent and/or redirected the sites visited. (Many participants said they now paid more attention to their bodies.) Buddhists might claim that introduction to the meditations could, of itself, plant a seed of realization that will bear fruit later. And, of course, belief in the mindfulness mystique could be a factor—thus can research and its wide dissemination return home to influence that which is studied. All of this is ripe for further research.

Prophecies and a Closing Note

There are present trends that may make the future context for mindfulness research a different world. Here are some predictions: Prediction 1: Research on other forms of contemplative practice will show the same kinds of beneficial results as mindfulness. This is already beginning for centering prayer in both its Christian and a secular form (Wachholtz & Pargament 2005). Centering prayer requires a very different kind of attention than mindfulness, a giving out and opening up, not a close pointillist attention. Prediction 2: The fact that the brain shows specific patterns of neural firing whenever a person does anything with his body or mind, including meditation, will no longer be a wow factor of itself; the researcher will need to show changes that are part of a more general theoretical formulation. Prediction 3: Biochemistry and biophysics will find ways to measure increasingly subtle

energy patterns in the body so that we can do serious research on inner energy bodies; for example, compare them across different yogic systems, or relate their changing forms to physical and mental health. Prediction 4: One of the sciences, perhaps physics, will find ways to measure aspects of the mind able to function apart from the brain. There are already a number of phenomena purportedly indicating this to be the case (for a compendium see Kelly & Kelly, 2007), and advances in resuscitation medicine have stimulated research interest in such matters (Parnia, 2013). A separation of mind and brain would open many questions and lines of research, and could bring to center stage the claims and meditation practices of the later forms of Buddhism, now largely dismissed as religion by psychologists.

This brings us back full circle to Buddhism and its relation to Western therapeutic mindfulness. No one would doubt that the therapies that operate under the name *mindfulness* in the West can be of great benefit to individuals. And anything that makes people more relaxed, reasonable, or kindly is truly a boon to civilization. But this is not the same as and does not negate the kinds of deep mindfulness and awareness that can be developed in Buddhist meditative and contemplative practices. That both can exist and perhaps enhance one another should go without saying.

However it apparently does need a bit of saying. Kabat-Zinn (2011) seems to now be arguing that his interpretation of mindfulness should and will replace Buddhism. The Buddhist Studies scholar John Dunne (2011) has supported the logic of this claim by taking Kabat-Zinn's definition of mindfulness, "being present without judgment," as a reference to Buddha nature, in fact as an evocation of the highest non-dual awareness of Vajrayana. Is this what MBSR actually conveys to its participants? Non-dual awareness, the self-known arising of each moment without a watcher, may be vast, brilliant and glorious, but caution! It evaporates the sense of self, the reality of time, self-referential projects—in short, life as previously known. It is the kind of awareness that allows lamas to radiate and teach from the heart center in their death samadhi when they are brain and organ dead (Rosch, 2014). Non-dual is a serious matter. Established traditions offer not only wise teachings but also path. In my observation there was nothing whatsoever said by any of the MBSR participants or said to them by their teachers that indicated even a slight approach toward the non-dual; if anything, the meditations in MBSR evoked a heightened sense of an onlooker watching oneself from a distance. If there is a deeper awareness that might allow people who are so inclined to get out of the box altogether and perhaps remake the world for all of us, it should surely be nurtured rather than destroyed.

Back to the emperor's cloths: he is naked but also resplendently arrayed. There is no contradiction. They mutually support each other as long as you don't think one is the other. Clarity about this makes for good research, good meditation, and a good life.

References

Baer, R. A. (Ed.). (2006). *Mindfulness based treatment approaches*. Amsterdam: Elsevier.

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*, 27–45.

Barrett, B. B. (2010). *The emergence of somatic psychology and body-mind therapy*. New York: Palgrave MacMillan.

Beck, J. S. (2011). *Cognitive behavioral therapy: Basics and beyond* (2nd ed.). New York: The Guilford Press.

Benson, H., & Proctor, W. (2010). *Relaxation revolution: The science and genetics of mind body healing*. New York: Scribner.

Boyce, B. (Ed.). (2011). *The mindfulness revolution*. Boston, MA: Shambhala.

Broad, W. J. (2012). *The science of yoga: The risks and the rewards*. New York: Simon & Schuster.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848.

Buddhaghosa, B. (1976). *The path of purification* (Vols. 1 and 2). Boston, MA; Shambhala.

Byrom, T. (Ed.). (1993). *The Dhammapada: The sayings of the Buddha*. Boston, MA: Shambhala.

Contemporary Buddhism. (2011). Mindfulness: Diverse perspectives on its meaning, origins, and multiple applications at the intersection of science and dharma [Special issue]. *12* (1).

Davis, M., Eshelman, E. R., & McKay, M. (2008). *The relaxation and stress reduction workbook* (6th ed.). Oakland, CA: New Harbinger.

Dement, W. C., & Vaughn, C. (1999). *The promise of sleep*. New York: Dell.

Demoulin, H. (2005). *Zen Buddhism: A history, India & China (Vol. 1)*. Bloomington, IN: World Wisdom.

Dunne, J. (2011). Toward an understanding of non-dual mindfulness. *Contemporary Buddhism, 12*, 71–88.

Fields, T. M. (2012). *Yoga research*. Bloomington, IN: Xlibris Corporation.

Fremantle, F. (2001). *Luminous emptiness: Understanding the Tibetan book of the dead*. Boston, MA: Shambhala.

Goenka, S. N. (1987). *The discourse summaries of S.N. Goenka*. Onalaska, WA: Vipassana Research Publications.

Grossman, P., & Van Dam, N. T. (2011). Mindfulness by any other name…: Trials and tribulations of *sati* in Western psychology and science. *Contemporary Buddhism, 12*, 219–239.

Harvey, A., Watkins, E., Mansell, W., & Shafran, R. (2004). *Cognitive behavioral processes across psychological disorders: A transdiagnostic approach to research and treatment*. Oxford, UK: Oxford University Press.

Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York: Guilford.

Hong, Y. (Ed.). (2008). *Tai chi chuan: State of the art in international research (medicine and sport science)*. Basil, SZ: S. Karger.

James, W. (1890/1950). *The principles of psychology*. New York: Dover.

Kabat-Zinn, J. (1990). *Full catastrophe living*. New York: Dell Publishing.

Kabat-Zinn, J. (2011). Some reflections on the origins of MBSR, skillful means, and the trouble with maps. *Contemporary Buddhism, 12*, 281–306.

Kelly, E., & Kelly, E. W. (2007). *Irreducible mind: Toward a psychology for the 21st century*. Lenham, MD: Rowman & Littlefield.

Keltner, D. (2009). *Born to be good: The science of a meaningful life*. New York: Norton.

Kornfield, J. (1977). *Living Buddhist masters*. Santa Cruz, CA: Unity Press.

Langer, E. J. (1989). *Mindfulness*. Cambridge, MA: Perseus Books.

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York: Guilford.

Loori, J. D. (2006). *Sitting with koans: Essential writings on the Zen practice of koan introspection*. Somerville, MA: Dharma Communications Press.

Mipham, S. (2003). *Turning the mind into an ally*. New York: Riverhead Books.

Nhat Hanh, T. (1975). *The miracle of mindfulness! A manual on meditation*. Boston: Beacon.

Nhat Hanh, T. (1987). *Being peace*. Berkeley, CA: Parallax Press.

Nyanaponika, T. (1973). *The heart of Buddhist meditation*. New York: Weiser Books.

Parnia, S. (2013). *Erasing death: The science that is rewriting the boundaries between life and death*. New York: HarperCollins.

Ponlop, D. (2003). *Wild awakening: The heart of Mahamudra and Dzogchen*. Boston, MA: Shambhala.

Rahula, W. (1959). *What the Buddha taught*. New York: Grove.

Rosch, E. (2008). Beginner's mind: Paths to the wisdom that is not taught. In M. Ferrari & G. Potworowski (Eds.), *Teaching for wisdom* (pp. 135–162). Hillsdale NJ: Erlbaum.

Rosch, E. (2011). Slow lettuce: Categories, concepts, fuzzy sets, and logical deduction. In R. Belohlavek & G. J. Klir (Eds.), *Concepts and fuzzy logic* (pp. 89–120). Cambridge, MA: MIT Press.

Rosch, E. (2014). Tibetan dream yoga and the limits of western science. In R. Hurd & K. Bulkeley (Eds.), *Lucid dreaming: New perspectives on consciousness in sleep* (Vol. 2, pp. 1–22). Santa Barbara, CA: Praeger.

Rosenberg, M. (2003). *Nonviolent communication: A language of life*. Encinitas, CA: PuddleDancer.

Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. New York: Free Press.

Shambhala Sun. (2012). *20* (4), whole issue.

Santideva. (1995). *The Bodhicaryavatara*. Oxford, UK: Oxford University Press.

Sharf, R. H. (2015). Is mindfulness Buddhist? (and why it matters). *Transcultural Psychiatry, 52*(3).

Silananda, U. (2002). *The four foundations of mindfulness*. Boston, MA: Wisdom Publications.

Snellgrove, D. (1987). *Indo-Tibetan Buddhism: Indian Buddhists and their Tibetan successors (Vols. 1 and 2)*. Boston, MA: Shambhala.

Snyder, C. R., Lopez, S. J., & Pedrotti, J. T. (2011). *Positive psychology: The scientific and practical explorations of human strengths*. Thousand Oaks, CA: Sage.

Sogyal, R. (1992). *The Tibetan book of living and dying*. San Francisco, CA: Harper.

Sprung, M. (1979). *Lucid exposition of the middle way*. Boulder, CO: Prajna Press.

Stahl, B., & Goldstein, E. (2010). *A mindfulness-based stress reduction workbook*. Oakland, CA: New Harbinger.

Stone, J. F. (1992). *T'ai chi chih! Joy thru movement*. Albuquerque, NM: Good Karma Publications.

Suzuki, S. (1970). *Zen mind, beginner's mind*. New York: John Weatherhill.

Trungpa, C. (1976). *The myth of freedom and the way of meditation*. Boston: Shambhala.

Trungpa, C. (1984). *Shambhala: The sacred path of the warrior*. Boston, MA: Shambhala.

Trungpa, C. (1991). *Crazy wisdom*. Boston, MA: Shambhala.

Trungpa, C. (1993). *Training the mind and cultivating loving-kindness*. Boston, MA: Shambhala.

Tsoknyi, D. (1998). *Carefree dignity: Discourses on training in the nature of mind*. Hong Kong, HK: Ranjung Yeshe Publications.

Wachholtz, A. B., & Pargament, K. I. (2005). Is spirituality a critical ingredient of meditation? Comparing the effects of spiritual meditation, secular meditation and relaxation on spiritual, psychological, cardiac and pain outcomes. *Journal of Behavioral Medicine, 28*, 369–384.

Wangyal, T. (2011). *Awakening the sacred body: Tibetan yogas of breath and movement*. Carlsbad, CA: Hay House.

Young, S. (2004). *Break through pain: A step-by-step mindfulness meditation program for transforming chronic and acute pain*. Boulder, CO: Sounds True.

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