

# Mind the Gap in Mindfulness Research: A Comparative Account of the Leading Schools of Thought

Rona Hart and Itai Ivztan  
University of East London

Dan Hart  
Birmingham University

The literature on mindfulness has been dominated by the two leading schools of thought: one advanced by Langer and her colleagues; the other developed by Kabat-Zinn and his associates. Curiously, the two strands of research have been running in parallel lines for more than 30 years, scarcely addressing each others' work, and with almost no attempt to clarify the relationship between them. In view of this gap, this article sought to systematically compare and contrast the two lines of research. The comparison between the two schools of thought suggests that although there are some similarities in their definitions of mindfulness, they differ in several core aspects: their philosophies, the components of their constructs, their goals, their theoretical scope, their measurement tools, their conceptual focus, their target audiences, the interventions they employ, the mechanisms underlying these interventions, and the outcomes of their interventions. However, the analysis also revealed that self-regulation is a core mechanism in both perspectives, which seems to mediate the impact of their interventions. In view of the differences between the two strands of research, we propose that they be given different titles that capture their prime features. We suggest "creative mindfulness" for Langer and her colleagues' scholarship, and "meditative mindfulness" for Kabat-Zinn and his associates' scholarly work.

*Keywords:* mindfulness, mindfulness-based stress reduction (MBSR), intervention, meditation, review

During the past 30 years, we have witnessed an exponential increase in the research and theorizing on mindfulness, coupled with a growing interest and application of mindfulness interventions by practitioners and therapists in clinical and nonclinical settings (Kabat-Zinn, 2005; S. L. Shapiro, Oman, Thoresen, Plante, & Flinders, 2008; Brown, Ryan, & Creswell, 2007; Baer, 2003). Mindfulness is often associated with positive psychology, and is considered a primary facet of psychological well-being (Langer, 2005; Kabat-Zinn, 2005, 2009; Lyubomirsky, 2011; Fredrickson, 2011; Brown & Ryan, 2003; Ivztan, Gardner, & Smailova, 2011). The components and mechanisms of mindfulness, though differently defined by disparate schools of thought, have been found to be positively associated with numerous aspects of well-being, including happiness, positive emotions, life satisfaction, vitality, sense of autonomy, optimism, self-regulation, and several aspects of cognitive performance (Brown et al., 2007; Keng, Smoski, & Robins, 2011; S. L. Shapiro et al., 2008; Langer, 2005). At the same time, the research has provided consistent evidence attesting to the effectiveness of mindfulness interventions in lessening several psychological disorders in clinical patients, including rumination, neuroticism, depression, stress, and anxiety (Baer, 2003; Keng

et al., 2011; Chiesa & Serretti, 2009, 2010; Grossman, Niemann, Schmidt, & Walach, 2004).

Despite these notable developments in the volume and quality of the publications on the topic, a central aspect of the research has been generating continual confusion over the years, and to date remain unresolved. This area of ambiguity relates to the two leading schools of thought dominating the literature on mindfulness: one advanced by Langer (Langer, 1989, 2005) and her colleagues, and the other developed by Kabat-Zinn (Kabat-Zinn, 1994, 2009) and his associates. Regardless of evident areas of convergence between them, the two strands of research have been running in parallel for more than 30 years, scarcely addressing each others' work, and with almost no attempt to merge them or clarify the relationship between them.

In view of the long-standing gap between the two primary lines of research, this article reviewed the relevant literature to systematically compare the two strands of research, and to clarify the areas of convergence and discrepancies between them.

The article opens with a review of the definitions and features of mindfulness as described by the two leading schools of thought, while the next section discusses the measurement tools developed and used by the two research teams. The fourth section reviews their respective interventions and the research that assessed their effectiveness, while the final section discusses the findings of this comparative examination.

## Research History and Definitions

The research on mindfulness has emerged from two main schools of thought. One strand of research, introduced by Langer and her colleagues in the early 1970s, explores mindfulness as a mental mode, in an attempt to assess its outcomes in terms of

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Rona Hart and Itai Ivztan, School of Psychology, University of East London, London, England; Dan Hart, Birmingham Business School, University of Birmingham, Birmingham, England.

Correspondence concerning this article should be addressed to Rona Hart, School of Psychology, University of East London, Stratford Campus, Water Lane, London E15 4LZ, England. E-mail: [director@hart2heart.co.uk](mailto:director@hart2heart.co.uk)

cognitive functioning, psychological well-being, and health (Langer, 1989, 2005).

Langer conceptualized mindfulness as an active and effortful mode of conscious awareness characterized by “a heightened state of involvement and wakefulness” (Langer & Moldoveanu, 2000, p. 2), in which one attends to the present moment and to the processes that unfold (Langer, 1989).

Much of Langer’s work contrasts mindfulness with the automatic, habitual, and superficial cognitive processing that characterizes a state of mindlessness (Langer, 1989, 2005). Although she has acknowledged that automatization (conceptualized as the activation of habitual behavioral scripts) is useful, since it frees our mind to perform higher levels of cognitive functioning (Langer, 1989, 1992, 2000; Chanowitz & Langer, 1981), she argued that we spend an overextended portion of our waking time in this state (Langer, 1992, 2005). As her studies revealed, running on autopilot can be costly to our performance, cognitive functions, psychological well-being, and even longevity (Langer, 1989, 1992, 1997, 2005; Langer & Piper, 1987).

Langer argued that mindfulness requires more than the absence of mindlessness, since it entails “openness to novelty” or “actively drawing novel distinctions” (Langer, 2005, p. 214). This requires one to be highly attentive to external stimuli, which can manifest itself in having enhanced sensitivity to one’s context, by being receptive to new information, by drawing new categories to structure one’s observations, or by being able to adopt multiple viewpoints on a subject (Langer, 1989; Langer & Moldoveanu, 2000).

Langer’s definition hence suggests that mindfulness involves (a) self-regulation of one’s attention (which is defined as “self-exerting control to override prepotent response” (Vohs et al., 2008, p. 884), (b) directing one’s awareness to external stimuli, and (c) engaging with it cognitively in a creative way.

Langer and her colleagues conceptualized mindfulness as a cognitive state that is grounded in a person’s disposition (Langer, 1989, 1997; Langer & Moldoveanu, 2000). Sternberg (2000) refined this definition by suggesting that mindfulness is a cognitive style. Defining cognitive styles as “preferred ways of using one’s cognitive abilities” (p. 22), he identified five components that constitute mindfulness: present orientation, openness to novelty, attentiveness to difference, recognition of diverse contexts, and ability to adopt multiple perspectives.

The purpose of mindfulness, according to Carson and Langer (2006), is to increase cognitive and behavioral control, thereby facilitating people’s capacity to tolerate uncertainty, to be less reactive and more flexible, and to experience a more meaningful engagement with their environments.

Dhiman (2012) suggested that the type of “mindful creativity” that Langer described is the gateway to the experience of flow (Csikszentmihalyi, 1990). Flow is defined as a state of operation, in which a person experiences full immersion in the activity he or she is doing. It often characterizes the experience of creativity and peak performance (Nakamura & Csikszentmihalyi, 2005). In line with this observation, much of Langer and her colleagues’ work (1989; 1997; 2006; Levy & Langer, 1994, 1999; Langer & Moldoveanu, 2000; Pirson, Langer, Bodner, & Zilcha, 2012) associated mindfulness with creativity. Levy and Langer (1999) defined creativity as “the ability to transcend traditional ways of thinking by generating ideas, methods and forms that are meaningful and new to others” (p. 45). They suggested that mindfulness

facilitates creativity, while mindlessness impedes it. In her recent work on creativity, Langer (2006) argued that mindfulness and creativity are natural partners, because the key feature of mindfulness—the openness to new ideas—invokes the types of cognitive processes that are essential for creativity (e.g., curiosity, insight, analogical reasoning, remote associations, ideational productivity, divergent and convergent thinking, flexibility, critical thinking).

The connection between mindfulness and creativity, is indeed marked in Langer’s definition of mindfulness cited above. It is also apparent in the ways in which mindfulness is operationalized by Langer and her associates. The two mindfulness scales developed by Langer (Langer, 2004; Pirson et al., 2012) (see review in the following section) conceptualize mindfulness as a *trait*, and distinguish between four components of mindfulness: (a) engagement - being aware of changes that take place in the environment; (b) seeking novelty - having an open and curious orientation to one’s environment; (c) novelty producing - the capacity to construct new meanings or experiences; and (d) flexibility - the tendency to view experiences from multiple perspectives and to adjust one’s behavior accordingly. According to Levy and Langer (1999), these components lay the foundation for creative thinking.

In various experimental nonclinical studies, Langer and her coauthors have been able to induce a *state* of mindfulness through instructional interventions, which prompt respondents to intentionally regulate their momentary modes of thinking, thereby shifting from mindlessness to mindfulness (see review below). Langer and her coauthors (Langer & Moldoveanu, 2000; Langer, 1989, 2005) maintained that by interrupting the cognitive routines that had been unfolding mindlessly, these interventions can help in developing heightened levels of mindfulness and in habituating it, thereby strengthening the *disposition* of mindfulness. Indeed, in several studies Langer and her colleagues found that the interventions resulted in improvements in *trait mindfulness* (Langer, 2004, 2005; Burpee & Langer, 2005; Djikic, Langer, & Fulton-Stapleton, 2008). They also reported on improved cognitive performance, including creative thinking (Langer, Heffernan, & Kiester, 1988; Pirson et al., 2012), health, and psychological well-being (Langer, Beck, Janoff-Bulman, & Timko, 1984; Langer, Janis, & Wolfer, 1975; Langer & Rodin, 1976; Rodin & Langer, 1977).

While Langer’s theorizing on the concept of mindfulness is often perceived as a Western approach (Weick & Putnam, 2006), the school of thought reviewed next, advanced by Kabat-Zinn (1994, 2003) and his colleagues, has drawn heavily on Eastern philosophy (Baer, 2003; S. L. Shapiro, Carlson, & Astin, 2006; Brown et al., 2007). In one of her earlier publications, Langer (1989) noted that because Eastern perspectives are grounded in religious traditions and carry a moral message, the two perspectives do not easily converge. Nevertheless, she noted that there are significant similarities between them, specifically in the qualities of consciousness that mindfulness epitomizes and in their effects on well-being.

The second principal line of inquiry into mindfulness, initiated by Kabat-Zinn and his associates in the 1970s, is therapeutic in its orientation, and involves mindfulness meditation as a primary intervention for the alleviation of variety of mental and physical conditions.

Kabat-Zinn (1994) defined mindfulness as “paying attention in a particular way: on purpose, in the present moment, and non-judgmentally . . . it is an appreciation for the present moment and

the cultivation of an intimate relationship with it through a continual attending to it with care and discernment.” (pp. 8–9). Baer (2003) clarified that this involves observing both *internal* and *external* stimuli as they arise.

Kabat-Zinn (1994) explained that the Buddhist concept of mindfulness—*sati* in Pali—combines awareness, attention, and remembering. From a Buddhist perspective, *sati* is the core of *vipassana bhavana*—insight meditation—which is perceived as a method for discerning how the psyche creates distress. It is practiced with the aim of improving introspective processes, by developing insight, clarity, and attentional stability, thereby alleviating suffering (Wallace, 2005). This suggests that mindfulness involves metacognitive awareness, which is practiced with the aim of improving one’s cognitive regulatory processes.

Kabat-Zinn’s definition thus indicates that mindfulness involves (a) self-regulation of one’s awareness, (b) directing one’s attention to internal and external stimuli, (c) introspection and metacognitive awareness of one’s thoughts processes, and (d) adopting a nonjudgmental attitude (Bishop et al., 2004). This analysis suggests that self-regulation of one’s attention is a key feature in both Langer’s (1989, 2005) and Kabat-Zinn’s (1994, 2003) conceptions of mindfulness. However, it also highlights the differences between them: while Langer’s view underscores the awareness of *external stimuli*, which do not necessitate attending to one’s own thought processes, the Buddhist practice described by Kabat-Zinn calls attention to both *internal and external* stimuli, and requires introspection and metacognitive awareness (Baer, 2003).

Similar to Langer (1989, 2005), Kabat-Zinn (1994) contrasted mindfulness to the normal waking state, which he described as a nonconscious autopilot mode that is both limited and limiting. The result of this habitual state of shallow attention is an undisciplined mind (Wallace, 2005), in which the mind becomes an unreliable instrument for examining internal or external processes. Mindfulness, Kabat-Zinn (1994) argued, requires the self-regulatory abilities of a disciplined mind to bring the fleeting attention back to the current moment. In this manner, it interrupts the state of mindlessness, thereby extending our spectrum of consciousness.

Building on Kabat-Zinn’s conception of mindfulness, Shapiro and colleagues (S. L. Shapiro et al., 2006; S. L. Shapiro et al., 2008) described three mechanisms that underlie therapeutic meditation-based interventions: (a) attention - observing internal or external experiences as they occur; (b) intention - the “why” behind mindfulness practice; and (c) attitude - the qualities that a person brings to mindfulness practice.

Drawing on Kabat-Zinn’s (2003, 2005), on S. L. Shapiro, Walsh, and Britton’s (2003), and on S. L. Shapiro et al.’s (2006) work, Brown et al. (2007) discussed mindfulness as a quality of consciousness, and identified six components that make up the attention mechanism highlighted above: (a) present-oriented consciousness of what is occurring; (b) clarity of awareness of one’s inner and outer realms; (c) nonconceptual, nondiscriminatory awareness of one’s own constructions of reality; (d) flexibility of awareness and attention (switching at will between an overall and a detail-focused perspective); (e) empirical stance toward reality (factual, value free, and nonjudgmental); and (g) stability of attention (fewer incidences of mindlessness).

In their exploration of the attitude mechanism cited above, S. L. Shapiro, Schwartz, and Santerre (2005) depicted 12 mindfulness qualities—seven of which were originally identified by Kabat-

Zinn (1990) and five additional qualities characterized by S. L. Shapiro and Schwartz (2000): (a) nonjudging - neutral observation of the present, moment by moment; (b) nonstriving - not forcing things and not aiming to achieve an end; (c) acceptance - recognizing and embracing things as they are; (d) patience - letting things progress in their time and pace; (e) trust - having confidence in oneself and in the processes unfolding in life; (f) letting go - not holding on to thoughts, feelings, or experiences; (g) gentleness - a soft, considerate, and tender outlook; (h) generosity - giving without expecting returns; (i) empathy - understanding another person’s state of mind; (j) gratitude - being thankful; (k) loving-kindness - caring for others, forgiving and loving unconditionally; and (l) openness - considering things anew, creating new possibilities.

The last quality—openness—is in tune with Langer’s (1989) conception, hence suggesting that Langer’s construct may be a substructure of the comprehensive and multifaceted construct explored above. A comparison of the measurement tools developed by the two research teams (the Five-Facet Mindfulness Questionnaire [FFMQ] developed by Baer et al., 2008, and the two scales developed by Langer, 2004, and Pirson et al., 2012) (see review in the following section) seems to support this assertion.

At first glance, it may seem that Kabat-Zinn and his associates’ model of mindfulness presented here is a cognitive mode that occurs *during* meditation and focuses on the self-regulatory processes involved in meditating. This perception is brought about by the ambiguous use of term mindfulness in Kabat-Zinn and his colleagues’ work, which seems to signify both a cognitive mindful mode, and the interventions that can cultivate it, namely, meditation. Some authors have used the terms meditation and mindfulness interchangeably (see, e.g., Didonna, 2009; Greeson, 2009; Kabat-Zinn, 2009; Chiesa, Calati, & Serretti, 2011). This conceptual overlap has been noted and criticized for causing significant misunderstandings (Bishop et al., 2004; Brown et al., 2007; Siegel, Germer, & Oldenzki, 2009; Kabat-Zinn, 2009).

However, Kabat-Zinn (2003) clarified that “mindfulness meditation *practices*. . . however important and essential . . . are merely launching platforms or particular kinds of scaffolding to invite cultivation and sustaining of attention in particular ways. They are the menu, so to speak, not the meal” (p. 147). Meditation, according to Kabat-Zinn (2003), is therefore a training process, which is meant to develop meditators’ abilities to monitor and regulate their consciousness, thereby enabling them to prolong periods of mindfulness in everyday life.

In a later article, Kabat-Zinn (2009) clarified that the term mindfulness has been used both as an umbrella term and as an operational expression: “mindfulness is the aim, the methods or practices, and the outcome or consequences all wrapped up together” (p. xxix). This statement illuminates the integration noted here between mindfulness as a cognitive mode and mindfulness as a meditative practice. It also highlights one of the key differences between the two schools of thought, since this conceptual amalgamation between the cognitive processes involved in mindfulness and the practices which induce a mindful mode does not feature in Langer’s work.

Drawing on the complex construct of mindfulness reviewed here, Kabat-Zinn and his colleagues developed in 1979 a meditation-based clinical intervention: the Mindfulness-Based Stress-Reduction (MBSR) program. It was initially trialed at the University of Massachusetts Medical Center, and has been offered

to outpatients there ever since (Kabat-Zinn, 1982, 2003, 2009). The goal of MBSR is to develop self-regulatory skills among patients for the relief of physical and psychological disorders, through daily practice of mindfulness meditation (Kabat-Zinn, 1982, 2003). Since its inception, it has been followed by numerous studies (Marchand, 2012; Chiesa & Serretti, 2009; Keng et al., 2011; Grossman et al., 2004; Bohlmeijer, Prenger, Taal, & Cuijpers, 2010), which demonstrated its effectiveness in improving a variety of physical and psychological conditions, and in promoting well-being (see review in later section).

The comparison offered thus far between Langer and Kabat-Zinn's definitions of mindfulness and the components of their constructs reveals that there are some similarities between the two lines of research in their definitions and in their indication that self-regulation of attention is essential for invoking mindful modes of awareness. There are, however, some key differences between them in their underlying philosophies, the components of their constructs, and their foci. This suggests that the two models embody different qualities of mindfulness, with Langer's construct accentuating the effortful, deliberate awareness to external events, and the inventive components that underlie creativity, while Kabat-Zinn's model stresses the metacognitive processes involved, the accepting and nonstriving stance, and also incorporates the means to induce and habituate these cognitive processes. Furthermore, there are some indications that Langer's concept may be a substructure of Kabat-Zinn's composite construct. These differences offer some explanation to the discrepancy between the two schools of thought. Such differences, however, should also be captured by the measurement tools developed and used by the two research teams, which will be reviewed next.

### The Measurements of Mindfulness

Over the years, several mindfulness inventories have been developed, tested, and refined. All of them are self-report measures, aiming to quantify varied degrees of trait or state mindfulness, ranging from mindlessness to mindfulness, and have been shown to have robust psychometric characteristics (Baer et al., 2008).

The more widely used trait mindfulness questionnaires are: the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003; Carlson & Brown, 2005); the Freiburg Mindfulness Inventory (FMI; Buchheld, Grossman, & Walach, 2001; Walach, Buchheld, Buttenmuller, Kleinknecht, & Schmidt, 2006); the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004); the Cognitive and Affective Mindfulness Scale—Revised (CAMS-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007); the Philadelphia Mindfulness Scale (Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008); the Southampton Mindfulness Questionnaire (SMQ; Chadwick et al., 2008); the Toronto Mindfulness Scale—Trait Version (Davis, Lau, & Cairns, 2009); the Five-Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006); Langer's Mindfulness Scales (LMS; Langer, 2004), and its shorter version, the Langer Mindfulness Scale (LMS14; Pirson et al., 2012).

In addition to trait questionnaires, two self-report measures of state mindfulness have been developed: the Toronto Mindfulness Scale—State Version (Lau et al., 2006), and the State Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003).

Among the *trait* mindfulness questionnaires mentioned above, two have been most frequently used by Langer and Kabat-Zinn's research teams, particularly in experimental studies that aimed to assess the effectiveness of their interventions. These are briefly described below.

The FFMQ (Baer et al., 2006; Baer et al., 2008) was developed using items from five existing measures of mindfulness: the MAAS, FMI, KIMS, CAMS, and SMQ to explore the multifaceted nature of mindfulness. The questionnaire has 39 items and includes five subscales: (a) Observing - the inclination to notice internal and external stimuli, i.e., emotions, thoughts, sights, smells, or sounds; (b) Describing - the ability to label experiences verbally; (c) Acting with awareness - paying attention to the events of the moment, in contrast with autopilot mode; (d) Nonjudging of inner experience - the ability to take a nonevaluative perspective toward thoughts and emotions; and (e) Nonreactivity to inner experience - the capacity to allow thoughts or feelings to appear and set off, without getting trapped in them (Baer et al., 2006; Baer et al., 2008).

FFMQ items include: "When I do things, my mind wanders off and I'm easily distracted"; "I watch my feelings without getting lost in them"; "It seems I am 'running on automatic' without much awareness of what I'm doing"; and "I pay attention to how my emotions affect my thoughts and behavior".

The FFMQ was found to correlate positively and significantly with self-regulation (Carmody, Baer, Lykins, & Olendzki, 2009). Brown and Ryan (2003) also found that trait mindfulness, as measured by the MAAS (which is incorporated within the FFMQ), correlated with self-regulation. It should be noted, however, that several items in the FFMQ closely resemble items included in the Self-Regulation Scale (Diehl, Semegon, & Schwarzer, 2006) and in the Self-Control Scale (Tangney, Baumeister, & Boone, 2004), thus indicating that the two constructs are, to some degree, entwined, which corresponds with Kabat-Zinn's conception of mindfulness reviewed earlier.

Other studies found that trait mindfulness correlated with emotional intelligence and openness to experience, and correlated negatively with thought suppression, alexithymia, and experiential avoidance (Baer et al., 2006; Baer et al., 2008). Meditators also scored higher compared with nonmeditators. Among experienced meditators, all factor scores were found to be positively linked with psychological well-being and negatively associated with psychological distress (Baer et al., 2006; Baer et al., 2008; Carmody & Baer, 2008).

Scores have improved following meditation courses—thus supporting the assertion that meditation develops mindfulness (Baer et al., 2006; Baer et al., 2008; Carmody et al., 2009; Carmody & Baer, 2008; Robins, Keng, Ekblad, & Brantley, 2012; Lykins & Baer, 2009; S. L. Shapiro et al., 2008).

The LMS (Langer, 2004) and the recently developed LMS14 (Pirson et al., 2012) are the operational applications of Langer's (2005) model of mindfulness reviewed earlier. Both questionnaires include four subscales: Novelty seeking, Engagement, Novelty producing, and Flexibility. The original scale includes 21 items, while the newer scale has 14 items (mostly drawn from the longer scale, though some items are worded differently). Example items include: "I make many novel contributions" (Novelty producing subscale); "I am very creative" (Novelty producing subscale); "I am very curious" (Novelty

seeking subscale); “I try to think of new ways of doing things” (Novelty seeking subscale); and “I am rarely aware of changes” (Engagement subscale). As seen from these examples, the questionnaires focus on elements of creativity and the awareness of one’s external environment.

A positive association was found between LMS scores and the aptitude to perceive events from multiple points of view, openness to experience, and creativity (Langer, 2004). Langer performed several experimental studies in the course of developing her questionnaire, all of which showed elevations in mindfulness following interventions (Langer, 2004, 2005; Burpee & Langer, 2005; Djikic et al., 2008).

Pirson et al. (2012) reported that the LMS14 correlated positively with psychological well-being, satisfaction with life, self-esteem, positive relationships, positive affect, humor, creativity, engagement at work, and health. It also correlated negatively with the need for structure, neuroticism, negative affect, depression, and pain.

A closer examination at the LMS and LMS14 developed by Langer (2004) and Pirson et al. (2012) revealed that of the four subscales included in the inventories, only the Engagement subscale captures mindful attention to the current moment and the inclination for mindlessness. The three other subscales—Novelty seeking, Novelty producing, and Flexibility—seem to capture the cognitive attributes that underlie creative thinking. This is in tune with Langer’s accent on creativity described earlier and, as seen above, the two scales correlated positively with creativity.

A comparison of the LMS and LMS14 (Langer, 2004; Pirson et al., 2012) and the FFMQ (Baer et al., 2006; 2008) revealed that the FFMQ is more comprehensive than the LMS and LMS14. Though they include few closely worded items, the LMS and LMS14 seem to focus mainly on the openness quality—which is incorporated in the Observing and in the Acting with awareness factors of the FFMQ. This suggests that Langer’s mindfulness construct is a substructure of Kabat-Zinn’s multifaceted mindfulness model, though a highly developed and expanded construct.

These variations in the measurement tools developed by the two research teams offer more insight into the differences between them. Such differences, however, should be further illustrated by their interventions and their outcomes, which will be reviewed next.

### Mindfulness Interventions

Since the 1970s, several mindfulness interventions have been tried and tested in clinical as well as nonclinical settings, and, building on consistent encouraging research findings, several of these interventions have been developed into comprehensive therapeutic protocols or programs currently offered in health centers as well as in schools, universities, and workplaces (Langer, 1989, 2000, 2005; Kabat-Zinn, 2009; Didonna, 2009; Baer, 2003; Keng et al., 2011; Marchand, 2012; S. L. Shapiro et al., 2008).

In this section, two types of interventions<sup>1</sup> will be reviewed: brief mindfulness interventions explored by Langer (1989, 2000, 2005) and several other researchers, and the MBSR developed by Kabat-Zinn (Kabat-Zinn, 1982, 2003; Kabat-Zinn, Lipworth, & Burney, 1985; Kabat-Zinn, Lipworth, Burney, & Sellers, 1986; Kabat-Zinn et al., 1992).

### Brief Mindfulness Interventions

A number of studies experimented with what have been called “brief mindfulness interventions” (Keng et al., 2011). These studies attempted to disrupt mindless, automated habitual cognitive states, by triggering mindful states of consciousness through a variety of stimuli that are geared to invoke intentional self-regulation of attention. Most of Langer’s work can be associated with this line of research (Langer, 1989, 1994, 1997, 2000, 2005, 2006).

In the majority of these studies, Langer and her associates induced a *state* of mindfulness through instructions that compelled participants to be more mindful and to attend carefully to the task at hand. For example, in Anglin, Pirson, and Langer’s (2008) study of mindfulness in math learning, participants were given conditional instructions and requested to look closely at the information given to them, and to explore different possibilities and perspectives. Similar interventions were used in other studies, most of which took place in (controlled or noncontrolled) laboratory settings, and with nonclinical populations (Langer, 1994, 1997, 2000; Langer & Imber, 1979; Ritchart & Langer, 1997; Langer & Piper, 1987; Langer, Bashner, & Chanowitz, 1985; Langer, Hatem, Joss, & Howell, 1989; Langer & Rodin, 1976; Rodin & Langer, 1977; Crum & Langer, 2007).

In these studies, Langer and her associates found that mindful modes of thinking had beneficial outcomes in terms of improved trait mindfulness (Djikic et al., 2008; Burpee & Langer, 2005), cognitive performance (Anglin et al., 2008), improved learning skills (i.e., attention, memory, concentration, and problem solving; Langer, 1993, 1997, 2000; Langer et al., 1989), and prevention of social stereotyping (Djikic et al., 2008; Langer et al., 1985; Levy & Langer, 1994).

As noted, creativity is a central construct in Langer’s work (Langer, 1989, 1997, 2006; Levy & Langer, 1994, 1999; Langer & Moldoveanu, 2000) and, accordingly, in several studies Langer and her coauthors reported on improvement in creativity following mindfulness interventions (Langer et al., 1988; Pirson et al., 2012).

Langer’s (1989, 2005) model does not only associate mindfulness with heightened cognitive performance, but it also convincingly argues that mindfulness is associated with psychological well-being and health measures. In several studies, the authors found that mindfulness had beneficial outcomes in terms of improved self-acceptance (Carson & Langer, 2006), improved relationships and relational satisfaction (Burpee & Langer, 2005; Langer, Blank, & Chanowitz, 1978), decreased burnout (Langer, 1994; Langer et al., 1988), and reduced stress (Langer et al., 1975). Several scholars who used similar types of brief interventions found that instruction-induced mindfulness interventions lessened psychological distress symptoms, ranging from rumination to depression, in healthy participants and in clinical patients (Nolen-Hoeksema & Morrow, 1991; Broderick, 2005; Huffziger & Kuehner, 2009), and alleviated adverse health symptoms (Alexander, Druker, & Langer, 1990; Langer et al., 1984; Langer & Rodin,

<sup>1</sup> Three additional widely used mindfulness interventions developed by others—the Mindfulness-based Cognitive Therapy (MBCT) (Segal, Williams, & Teasdale, 2002), Dialectical behavior therapy (DBT) (Linehan, 1993), and Acceptance and commitment therapy (ACT) (Hayes, Strosahl, & Wilson, 1999)—are not reviewed here.

1976; Rodin & Langer, 1977; Langer, Djikic, Pirson, Madenci, & Donohue, 2010; Delizonna, Ryan, & Langer, 2009).

Although Langer and her coauthors did not explore the cognitive mechanisms that underlie these interventions and their impressive outcomes, in his recent book Kahneman (2011) offered a comprehensive depiction of the two information-processing systems that govern mindfulness and mindless modes of operation.

According to Kahneman, there are two modes of information processing that operate simultaneously: “system1” (S1) generates a mindless mode of awareness, while “system2” (S2) engenders a mindful mode of consciousness. S1 is experiential, automatic, effortless, intuitive, unconscious, energy efficient, and a faster mode of processing. S2, on the other hand, is cognitive, deliberate, consciously effortful, energy consuming, and a relatively slow mode of reasoning (Kahneman, 1991, 1994, 2003; Gilovich, Griffin, & Kahneman, 2002; Kahneman & Frederick, 2005).

Drawing on Baumeister and his associates’ work into self-regulation (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister, Gailliot, DeWall, & Oaten, 2006), Kahneman (2011) argued that the activation of S2 necessitates controlling one’s attention, while the operation of S1 can be seen as a state in which one’s attention is underregulated (Baumeister & Heatherton, 1996). Kahneman (2011) also noted that although cognitive reasoning is at the core of mindful processes, emotions seem to be the main source of mindless processes.

Although the two systems have distinctive features, they are connected. In effect, S1 generates emotions, intuitions, and impressions that create the foundation for the beliefs that people hold or choices that people make consciously. On the other hand, one of the tasks of S2 is to control the impulses of S1 through self-regulatory processes. Since the mental resources available to execute effortful self-regulatory processes are limited and prone to depletion (Baumeister et al., 1998; Baumeister, Heatherton, & Tice, 1994; Muraven & Baumeister, 2000; Muraven, Tice, & Baumeister, 1998), Kahneman (2011) assessed that a large proportion of people’s information processing is conducted by S1, resulting in what Langer (1997, 2005) described as mindless and automatic mode of operation. S2, Kahneman argued, is mobilized into action (thereby producing a mindful mode of consciousness) when people face information or questions that S1 cannot tackle.

Hence, Kahneman’s (2011) model seems to provide a valid explanation as to how mindful modes of consciousness are triggered through the brief mindfulness interventions described above: the carefully worded attention-evoking instructions presented to participants seem to prompt self-regulation of one’s attention, thereby activating S2. The model is thus consistent with the idea that self-regulation of attention is a pivotal process in brief mindfulness interventions.

With regard to creativity, Kahneman (2011) suggested that creativity requires the activation of both systems in tandem, so that while S2 is in operation, and the person is mindful, he or she is also highly aware of intuitive cues generated by S1. According to Kahneman (2011), this requires being in a state of “cognitive ease” that “loosens the control of system2 over performance” (p. 69). Kahneman (2011) explained that “when in a good mood, people become more intuitive and more creative” (p. 69). This seems to be the state of mindfulness that Langer (1989, 1992, 1997, 2005, 2006) described and aspired to trigger through her mindfulness interventions: it entails mindful states of consciousness and cog-

nitive ease, while, at the same time, being creative and in touch with one’s intuitive insights.

As noted earlier, the state of creative mindful awareness that Langer (2006) described is the cognitive groundwork from which the experience of flow can emerge (Csikszentmihalyi, 1990; Dhi-man, 2012). Csikszentmihalyi (1992) explained that flow incorporates a unique mode of operation in which people are fully immersed in the activity they are doing, to the extent that the activity becomes semiautomated, and they become unaware of other events taking place around them, while, at the same time, they are alert and responsive of their creative insights. In other words, the paradox of flow is that it integrates the two states of mind—the automatic mode and the mindful one. Kahneman’s (2011) state of cognitive ease described here, in which both systems work in tandem, seems to be consistent with Csikszentmihalyi’s (1992) depiction of flow.

Although Kahneman’s (2011) dual-system model offers a convincing account as to how mindfulness is operated and triggered, his model does not explain how mindfulness (the activation of S2) elevates measures of well-being. Masicampo and Baumeister (2007) suggested that self-regulatory processes may mediate the positive association between mindfulness and well-being. Vohs and Baumeister (2011) argued that the ability to self-regulate is a critical component of psychological well-being. Studies on a variety of self-regulatory processes (control of one’s thoughts, emotions, attention, or action) provided strong support to the assertion that self-regulatory capacities are positively associated with well-being (Baumann, Kaschel, & Kuhl, 2007; Baumeister & Tierney, 2011; Baumeister et al., 2006; Baumeister & Vohs, 2003; Beckmann & Kellmann, 2004; Diehl et al., 2006; Koole, Kuhl, Jostmann, & Vohs, 2005; Kuhl, 1992; Schmeichel, Vohs, & Baumeister, 2003).

The centrality of self-regulatory processes in brief mindfulness interventions can also explain the improvements that Langer and associates found in trait mindfulness following interventions (Djikic et al., 2008; Burpee & Langer, 2005). Muraven and Baumeister (2000) contended that self-control may operate similarly to a muscle, and thus self-regulation “exercises,” such as the brief mindfulness interventions discussed here, may strengthen the self-regulation muscle thereby improving one’s dispositional self-regulatory capacities and reducing one’s susceptibility to ego depletion (Oaten & Cheng, 2006; Baumeister & Heatherton, 1996; Masicampo & Baumeister, 2007).

In conclusion, the studies reviewed here induced mindful states of consciousness mostly through brief instructional interventions, and have shown impressive results: improvement in a variety of cognitive functions, well-being, and health measures. To further explore the mechanisms that underlie these interventions, we drew on Kahneman’s dual information-processing system model, which seems to provide a valid explanation as to the how these interventions activate states of mindfulness. Furthermore, the model provides some indications to suggest that self-regulation of attention is a key mechanism in these interventions. Masicampo and Baumeister’s (2007) argument that self-regulatory processes may mediate the association between mindfulness and well-being provides further support and an explanation as to how these interventions engender the impressive outcomes found in Langer’s studies.

## The MBSR Program

MBSR is a group-based intervention program that is offered to outpatients with a variety of physical and psychological conditions (Kabat-Zinn, 1982, 1994, 2009). The program is designed as an 8- to 10-week course, with meetings taking place once a week. Classes include mindfulness meditation practice, yoga exercises, group discussions and exercises, and individual support. In addition, participants are requested to exercise mindfulness meditation at home (40–60 min per day). Most programs include intensive mindfulness meditation retreats at varying lengths (a day to a few days) (University of Massachusetts Medical School, 2012; Kabat-Zinn, 1990).

The program was initially developed as an add-on treatment for patients experiencing chronic pain (Kabat-Zinn, 1982, 1990). Over the years, it has been tested on a variety of other illnesses, and is currently offered as a preventative treatment to people at risk, or to patients diagnosed with cancer, heart disease, chronic illness or pain, fibromyalgia, gastrointestinal problems, high blood pressure, asthma, or skin disorders. It is also offered to patients experiencing a variety of psychological symptoms, such as stress, depression, anxiety, panic, sleep disturbances, or fatigue (University of Massachusetts Medical School, 2012).

Many randomized controlled trials have examined the effectiveness of MBSR, and reported on impressive reductions in participants' disorders, as well as increases in their well-being. Several studies found that MBSR improved trait mindfulness scores (however these were measured; Anderson, Lau, Segal, & Bishop, 2007; Carmody & Baer, 2008; Cohen-Katz et al., 2005; Greeson et al., 2011; Lykins & Baer, 2009; Nyklíček & Kuipers, 2008; Robins et al., 2012; S. L. Shapiro, Brown, & Biegel, 2007; S. L. Shapiro et al., 2008; Chang et al., 2004). Other studies (S. L. Shapiro, Brown, Thoresen, & Plante, 2011; Carmody et al., 2009; Baer, Carmody, & Hunsinger, 2012) found that trait mindfulness mediated the effects of MBSR on wellbeing, and thus participants with higher levels of mindfulness showed larger effects of MBSR on their wellbeing.

As for pain reduction, several clinical trials have demonstrated significant declines in subjective pain experience (Kabat-Zinn, 1982; Kabat-Zinn et al., 1985; Kabat-Zinn et al., 1986; Kabat-Zinn et al., 1992; Randolph, Caldera, Tacone, & Greak, 1999; Kaplan, Goldenberg, & Galvin, 1993; Goldenberg et al., 1994; Grossman, Tiefenthaler-Gilmer, Raysz, & Kesper, 2007; Sephton et al., 2007; Weissbecker et al., 2002). Similar findings regarding pain reduction were observed in patients with cancer (Saxe et al., 2001; Carlson, Speca, & Patel, 2003; Williams, Kolar, Reger, & Pearson, 2001; Witek-Janusek et al., 2008) and HIV (Gayner et al., 2012). Additionally, MBSR was shown to improve skin condition in patients with psoriasis (Kabat-Zinn, Wheeler, & Light, 1998; Bernhard, Kristeller, & Kabat-Zinn, 1988), and resulted in improved sleep in cancer patients (S. L. Shapiro, Bootzin, Figueredo, Lopez, & Schwartz, 2003).

In relation to psychological disorders, MBSR was tested on clinical and nonclinical populations. The findings revealed that self-reported global distress scores were reduced after participation (Astin, 1997; S. L. Shapiro, Schwartz, & Bonner, 1998; Tacón, McComb, Caldera, & Randolph, 2003; Williams et al., 2001). Other studies found a reduction in depression or dysphoria (Anderson et al., 2007; Grossman et al., 2010; Koszycki, Benger,

Shlik, & Bradwejn, 2007; Sephton et al., 2007; S. L. Shapiro et al., 1998; Speca, Carlson, Goodey, & Angen, 2000; Baer, 2003; Lykins & Baer, 2009), rumination (Anderson et al., 2007; Jain et al., 2007), mood disturbances (Speca et al., 2000), anxiety, panic, and worry (Baer, 2003; S. L. Shapiro et al., 1998; S. L. Shapiro et al., 2007; Anderson et al., 2007; Carmody & Baer, 2008), anger and hostility (Anderson et al., 2007; Baer, 2003), stress (Cordon, Brown, & Gibson, 2009; Astin, 1997; Bränström, Kvillemo, Brandberg, & Moskowitz, 2010; Nyklíček & Kuipers, 2008; Oman, Shapiro, Thoresen, Plante, & Flinders, 2008; S. L. Shapiro, Astin, Bishop, & Cordova, 2005; Speca et al., 2000; Williams et al., 2001; Chang et al., 2004), cognitive disorganization (Speca et al., 2000), thought suppression (Lykins & Baer, 2009), and post-traumatic stress disorder (Bränström et al., 2010; Kearney, McDermott, Malte, Martinez, & Simpson, 2012; Kluepfel et al., 2013). These changes correlated with the amount of meditation practice (Lykins & Baer, 2009; Baer, 2003; S. L. Shapiro, Schwartz, & Santerre, 2005).

Various types of studies (including correlational surveys, laboratory experiments, and randomized controlled trials) reported on improvements in aspects of well-being following MBSR training. These include increases in subjective measures of psychological well-being (Lykins & Baer, 2009; S. L. Shapiro et al., 2011), quality of life (Nyklíček & Kuipers, 2008; Witek-Janusek et al., 2008), positive states of mind (Chang et al., 2004; Bränström et al., 2010), positive emotions (Anderson et al., 2007; Bränström et al., 2010; Nyklíček & Kuipers, 2008), satisfaction with life and quality of life (Grossman et al., 2010; Koszycki et al., 2007; Nyklíček & Kuipers, 2008), hope (S. L. Shapiro et al., 2011), self-efficacy (Chang et al., 2004), spirituality (S. L. Shapiro et al., 1998; Astin, 1997; Greeson et al., 2011), self-compassion (Lykins & Baer, 2009; S. L. Shapiro, Astin, et al., 2005; S. L. Shapiro et al., 2007), empathy (S. L. Shapiro et al., 1998; S. L. Shapiro et al., 2011), forgiveness (Oman et al., 2008), and resilience (Chaskalson, 2011). Importantly, metacognitive awareness (S. L. Shapiro et al., 2006; Chiesa et al., 2011) and behavioral or emotional regulation have improved (Tacón et al., 2003; Robins et al., 2012; Lykins & Baer, 2009; Friese, Messner, & Schaffner, 2012; Arch & Craske, 2006; Burg & Wolf, 2012), along with perception of control (Astin, 1997) and sense of coherence (Weissbecker et al., 2002).

Several authors who attempted to explain the notable outcomes cited here (D. H. Shapiro, 1980; Walsh, 1983; Didonna, 2009; Baer et al., 2008) have theorized that conscious regulation of attention is a key mechanism in MBSR.

D. H. Shapiro (1980) described mindfulness meditation as a technique that involves conscious monitoring and regulation of awareness. Its purpose is to enhance "optimal states of psychological well-being and consciousness" (Walsh, 1983, p. 19) through "the development of deep insight into the nature of mental processes, consciousness, identity, and reality" (p. 19). Didonna (2009) clarified that the *process* of managing one's own attention is the essence of meditation.

In mindfulness meditation, practitioners attempt to notice whatever predominates their awareness—internal or external stimuli—as they occur in the moment. They aim to bring an attitude of readiness, interest, openness, acceptance, and kindness to observed experiences, and to avoid evaluating, criticizing, altering, or attempting to stop these experiences, even when they are taxing (Baer et al., 2008). Mindfulness meditations are considered mental

practices for opening up attention, and observing events closely; thus, the objective is not to select a particular object on which to focus, but to notice the shifting experiences (Siegel et al., 2009).

MBSR was originally inspired by Buddhist meditation retreats, which often require meditators to practice for hours while sitting motionlessly. Although practitioners typically adopt a comfortable position, the prolonged immobility often results in pain in muscles and joints. Meditators are encouraged not to change position to ease the pain, but instead to conscientiously focus on and attend to the ache sensations, and the thoughts, emotions, or urges that arise, while adopting a nonjudgmental attitude toward them. The ability to observe painful sensations with acceptance is believed to ease the anguish provoked by it, since it awakens the awareness that pain and the thoughts or emotions that accompany it are “just thoughts,” and are not reflections of truth or reality, and thus do not necessitate escaping or avoiding them (Kabat-Zinn, 1982, 1990; Baer, 2003). Kabat-Zinn (1982) claimed that the prolonged exposure to pain, which has no disastrous outcomes, can lead to diminution in the emotional reactivity triggered by the pain—thus leading to desensitization, which in turn relieves the pain or the emotional reaction or both.

Kabat-Zinn et al. (1992) described a similar mechanism for the alleviation of psychological disorders, such as anxiety and depression. They claimed that continual, accepting observation of these disturbing thoughts or emotions, without escaping or avoiding them, can lessen the emotional reactivity prompted by them, thereby leading to reduction of the symptoms.

The assertion of MBSR is therefore that, with repeated practice, patients can become skilled at being less reactive toward their symptoms, whether the symptoms are physical or psychological, and thereby more able to discern and moderate habitual maladaptive scripts of thinking and behavior (S. L. Shapiro, Walsh, & Britton, 2003).

S. L. Shapiro et al. (2006) theorized that the main mechanisms that underlie mindfulness meditation practices are *decentering*—becoming aware that we are constantly flooded by our stream of thoughts, and *disidentification*—being able to disidentify from them. Kabat-Zinn (1994, 2003) claimed that mindfulness meditation changes our relationship with our thoughts by offering a method through which we can step back from, and be less attached to our thoughts, thereby stripping them from the meaning, weight, or emotional tones that we assign to them, allowing us to observe and accept them. S. L. Shapiro et al. (2006) claimed that this shift in perception toward our thoughts, and the ability to step back from and be less attached to our own ideas, emotions, memories, beliefs, or sensations, is a core metacognitive mechanism in mindfulness interventions. They term it *reperceiving*, and contend that it is the key to the moderation of distress, since it quietens and soothes the mind. Through regular practice, meditators can develop their metacognitive skills, thereby strengthening their capacity to direct their consciousness at will in their daily lives (Bishop et al., 2004; Olendzki, 2009; Didonna, 2009; Baer, 2003).

It is important to reiterate that, similar to Langer’s model explored earlier, self-regulation is considered a key mechanism in meditation practice and in dispositional mindfulness that it cultivates. Brown et al. (2007) explained that the “receptively observant processing of internal and external information” (p. 223), which is central in Kabat-Zinn and colleagues’ model, promotes self-regulatory functions by providing a reflective space in which

people can make informed choices and respond adaptively to situations, rather than reacting automatically and on impulse. Bowlin and Baer’s (2012) findings confirmed that trait mindfulness and self-control are positively correlated. In their exploration whether dispositional self-control mediates the association between mindfulness and psychological well-being, the authors found that mindfulness explains a significant variance of well-being, over and above self-control.

In conclusion, the studies reviewed here, which use mindfulness meditation as a key intervention, have shown remarkable outcomes: improvements in a variety of physical and psychological symptoms, alongside increases in well-being measures. An exploration of the mechanisms that operate in mindfulness meditation revealed that it involves three metacognitive and self-regulatory processes that work in tandem: decentering, disidentification, and reperceiving (S. L. Shapiro et al., 2006). Together, they enable meditators to observe their own thoughts and emotions, while adopting an accepting attitude toward them. The assertion of MBSR is that these mechanisms can be best habituated through the regular practice of meditation, while its goal is to strengthen meditators’ self-regulatory and metacognitive capacities.

Our review of the mindfulness interventions initiated by Langer and Kabat-Zinn and their colleagues revealed that there are significant differences between Kabat-Zinn’s meditation-based clinical interventions and Langer’s nonclinical brief mindfulness interventions. While MBSR is a therapeutic “package” containing several components, Langer’s brief interventions induce mindfulness through instructions that draw attention to a cognitive task at hand. In addition to these differences in the means used by the two research teams to induce or enhance mindfulness, they seem to differ in other central aspects: their target clientele, timeframes, and the settings within which they are applied.

The comparison of the cognitive mechanisms that underlie each type of mindfulness intervention revealed that while self-regulation is considered the key mechanism involved in both types of mindfulness interventions, MBSR involves additional metacognitive mechanisms that work jointly.

Furthermore, Langer’s brief interventions are geared to trigger a mindful state, while Kabat-Zinn’s interventions are designed to enhance trait mindfulness. Also, as seen in our comparative review of the definitions and features of mindfulness provided earlier, these interventions provoke distinct qualities of mindfulness: Langer’s model draws attention to the creative component of mindfulness and the deliberate awareness of external events, while Kabat-Zinn’s model stresses the introspection involved and the accepting and nonstriving attitude.

Of the two interventions reviewed, MBSR is more extensively studied and the research assessing it seems to be more empirically robust. However, these studies, some of which were conducted 20–30 years ago, have been noted to have some limitations (S. L. Shapiro, Schwartz, & Santerre, 2005). Some of the study samples were small (Davis, Fleming, Bonus, & Baker, 2007; Astin, 1997; Cohen-Katz et al., 2005; Goldin & Gross, 2010; Rosenzweig et al., 2007), some did not have an appropriately matched control group or no-treatment group (Tacón et al., 2003; Carlson & Garland, 2005; Beddoe & Murphy, 2004), and most did not follow participants after the program ended. Additionally, because MBSR is a therapeutic package, the research is not capable of assessing the impact of each of its components on its own. Since most of the

findings using MBSR echo the findings of meditation research (see Ospina et al., 2007; Chiesa & Serretti, 2010; Kabat-Zinn, 1996; Marchand, 2012; S. L. Shapiro, Walsh, & Britton, 2003; S. L. Shapiro, Schwartz, & Santerre, 2005), it is difficult to assess the degree to which the other components contribute to the outcomes observed.

As for the brief interventions, their benefit is in their capacity to isolate the effects of mindfulness from other elements that are typically included in the intervention packages reviewed above, therefore allowing researchers to draw stronger conclusions about their effects. However, the studies reviewed here seem to display some limitations which raise questions about their validity or reliability. The first is the interventions themselves—several of them are not clearly described and have no protocols that could be followed by researchers who may want to replicate the study (see Anglin et al., 2008; Delizonna et al., 2009; Crum & Langer, 2007; Djikic et al., 2008; Langer et al., 1985; Langer et al., 2010). Additionally, several studies did not measure trait mindfulness, and none of them measured state mindfulness, despite the fact that they attempted to manipulate it (see Anglin et al., 2008; Langer & Rodin, 1976; Delizonna et al., 2009; Crum & Langer, 2007; Alexander et al., 1990; Langer et al., 1985; Langer et al., 2010).

Despite these limitations and the striking differences between the two schools of thought, it seems that both types of interventions are effective, not only in alleviating physical or psychological disorders, but also in elevating measures of well-being and performance.

### Discussion and Conclusion

This article began with the observation that mindfulness research has taken center stage in terms of academic and public interest recently, alongside several therapeutic mindfulness-based interventions. In view of the surge in public interest, we sought to explore the apparent discrepancy between the two leading strands of research on mindfulness (Langer and Kabat-Zinn and their colleagues), which have been working in parallel lines for 30 years, with barely any association between them.

The literature review we conducted, which included correlational research, clinical interventions, laboratory experiments, theoretical inquiries, and a number of meta-analyses, has shown that there are three aspects of their conceptions that show some degree of convergence: their definitions, the centrality of self-regulatory mechanisms in their interventions, and their effect on health and well-being. However, the comparison between them suggests that the two schools of thought differ along several central lines:

- The philosophies on which they draw: Kabat-Zinn has drawn on Buddhist religious practices, while Langer's outlook is considered Western and scientific.
- The components of mindfulness: The comparative account has revealed that the two models embody different qualities of mindfulness—Langer's model seems to capture the cognitive attributes that underlie creativity in her concept, while Kabat-Zinn's multifaceted construct seems to accentuate the metacognitive processes and the accommodating stance involved in mindfulness.
- Their goals: While Langer's interventions are designed to improve cognitive performance and well-being, Kabat-Zinn's interventions are therapeutic in orientation and aim to lessen physical illness symptoms and psychological distress.

- The target of mindful awareness: In her definition of mindfulness, Langer accentuated the awareness of external stimuli, while Kabat-Zinn referred to internal and external stimuli.

- Their theoretical scope: Kabat-Zinn's construct seems to be much wider in scope compared with Langer's. Further analysis into the qualities of mindfulness incorporated in Kabat-Zinn's model revealed that it includes 12 qualities, only one of which (openness) seems to overlap Langer's model. Though Langer developed and expanded her construct, it can be argued that Langer's construct is a substructure of Kabat-Zinn's multifaceted model.

- Their conceptual focus: Kabat-Zinn's model seems to merge the cognitive characteristics of mindfulness with the practices that cultivate it, namely, meditation. In contrast, Langer's concept does not feature this conceptual integration.

- Their measurements tools: While both research teams measured *trait* mindfulness, the FFMQ, which is often used by Kabat-Zinn and his associates, is much wider in scope and multifaceted, compared with the LMS and LMS14 developed by Langer, which seem to focus on two particular substructures of the FFMQ.

- Their target audiences and settings: Kabat-Zinn's work has mainly been conducted with patients in clinical settings, compared with Langer's, which targeted mainly healthy people in their everyday settings.

- The interventions they employ to induce mindfulness: Kabat-Zinn's MBSR intervention is offered as a therapeutic package containing several components. They also require long-term daily practice. Langer's brief interventions are instructional, short-lived in nature, and do not involve continual practice.

- The mechanisms underlying their interventions: A comparison of the cognitive mechanisms that underlie the two types of mindfulness interventions has shown that self-regulation of attention is the core mechanism in *both types* of mindfulness interventions. However, MBSR involves additional metacognitive mechanisms that work in concert.

- The outcomes of their interventions: Kabat-Zinn's meditation-based interventions are designed to increase the disposition of mindfulness, compared with Langer's instructional interventions, which are geared to induce a state of mindfulness.

As seen above, the two schools of thought differ along several key aspects, which can explain why they have not referred to each other's work. Importantly, they vary in the scope and comprehensiveness of their constructions, with Kabat-Zinn's model presenting more detail and breadth than Langer's.

In view of the differences between the two schools, we propose that it would be useful (and less confusing for newcomers to the field) if the two strands of research were given different titles that capture the different qualities of mindfulness that they evoke. We therefore suggest "creative mindfulness" for Langer and her colleagues' scholarship, and "meditative mindfulness" for Kabat-Zinn and his associates' scholarly work.

Despite these differences, our literature review is unambiguous in asserting that mindfulness and its cultivation, however it is defined, induced, or measured, can elevate positive psychological aspects of well-being and improve functioning among healthy people, as well as alleviate an array of physical and psychological disorders among clinical patients. Importantly, our findings revealed that self-regulatory processes are central to both types of

interventions, and seem to mediate the impact of mindfulness interventions.

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