The title: **Mind the Gap in Mindfulness Research: A comparative account of the leading schools of thought**

Rona Hart, Itai Ivtzan

University of East London, UK

and Dan Hart

Birmingham University, UK

Abstract

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 hardly any attempt to clarify the relationship between them. In view of this gap, this paper aims to systematically compare and contrast the two lines of research.

The comparison between the two schools of thought suggests that while 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 would 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.

Key words: mindfulness, MBSR, intervention, meditation, review.

Authors' note: Rona Hart and Itai Ivtzan, School of Psychology, University of East London; Dan Hart, Birmingham Business School, Birmingham University.

Correspondence concerning this article should be addressed to Rona Hart, University of East London, Stratford Campus, Water Lane, London, E15 4LZ, director@hart2heart.co.uk.

1. Introduction

In the past thirty years we have been witnessing 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 non clinical settings (Kabat-Zinn, 2005; Shapiro, Oman, Thoresen, Plante & Flinders, 2008; Brown, Ryan & Creswell, 2007; Baer, 2003). Mindfulness is often associated with positive psychology, and considered a primary facet of psychological well-being (Langer, 2005; Kabat-Zinn, 2005; 2009; Lyubomirsky, 2011; Fredrickson, 2011; Brown & Ryan, 2003; Ivtzan, 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 wellbeing, 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; Shapiro et al., 2008, Langer, 2005). At the same time, the research provides consistent evidence attesting to the effectiveness 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 have 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 and her colleagues (Langer, 1989; 2005) and the other developed by Kabat-Zinn and his associates (Kabat-Zinn, 1994; 2009). Regardless of evident areas of convergence between them, the two strands of research have been running in parallel lines for more than 30

years, scarcely addressing each others' work, and with hardly any 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 paper aims to review the relevant literature, in an attempt to systematically compare the two strands of research, and clarify the areas of convergence as well as the discrepancies between them.

The paper opens (section 2) with a review of the definitions and features of mindfulness as described by the two leading schools of thought, while section 3 discusses the measurement tools developed and used by the two research teams. Section 4 offers a review their respective interventions and the research which assessed their effectiveness, while the closing section brings together and discusses the findings of this comparative examination.

2. Research history and definitions

The research on mindfulness 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 cognitive functioning, psychological wellbeing and health (Langer, 1989; 2005).

Langer conceptualizes 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 acknowledges 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 argues that we spend an overextended portion of our waking-time in this state (Langer, 1992; 2005). As her studies reveal, running on auto-pilot can be costly to our performance, cognitive functions, psychological wellbeing and even longevity (Langer, 1989; 1992; 1997; 2005; Langer & Piper, 1987).

Langer argues 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 1. self-regulation of one's attention (which is defined as "self-exerting control to override prepotent response" (Vohs et al., 2008), 2. directing one's awareness to external stimuli, and 3. engaging with it cognitively in a creative way.

Langer and her colleagues perceive mindfulness as a cognitive state that is grounded in a person's disposition (Langer, 1989; 1997; Langer & Moldoveanu, 2000). Sternberg (2000) refines 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 identifies 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 & 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) suggests that the type of "mindful creativity" that Langer describes is the gateway to the experience of flow (Csikszentmihalyi, 1990). Flow is defined as a state of operation, where 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) associates mindfulness with creativity. Levy & Langer (1999) define 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 suggest that mindfulness facilitates creativity while mindlessness impedes it. In her recent work on creativity, Langer (2006) argues that mindfulness and creativity are natural partners, since the key feature of mindfulness – the openness to new ideas, invokes the types of cognitive processes that are essential for creativity (such as: curiosity, insight, analogical reasoning, remote associations, ideational productivity, divergent and convergent thinking, flexibility, or 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 section 3) conceptualize mindfulness as a *trait*, and distinguish between four components of mindfulness:

- Engagement – being aware of changes that take place in the environment,
- Seeking novelty - having an open and curious orientation to one's environment,
- Novelty producing - the capacity to construct new meanings or experiences,

- Flexibility - the tendency to view experiences from multiple perspectives and adjust one's behavior accordingly.

According to Levy & Langer (1999) these components lay the foundation for creative thinking.

In various experimental non-clinical studies, Langer and her co-authors 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 section 4). Langer and her co-authors (Langer & Moldoveanu, 2000; Langer, 1989; 2005) contend 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 report on improved cognitive performance, including creative thinking (Langer, Heffernan & Kiester, 1988; Pirson et al., 2012) health, and psychological wellbeing (Langer, Beck, Janoff-Bulman & Timko, 1984; Langer, Janis & Wolfer, 1975; Langer & Rodin, 1976; Rodin & Langer, 1977).

While Langer's theorising 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, draws heavily on Eastern philosophy (Baer, 2003; Shapiro, Carlson & Astin, 2006; Brown et al., 2007). In one of her earlier publications, Langer (1989) notes that because Eastern perspectives are grounded in religious traditions and carry a moral message, the two perspectives do not

easily converge. Nevertheless, she notes that there are significant similarities between them, specifically in the qualities of consciousness that mindfulness epitomizes, and in their effects on wellbeing.

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) defines mindfulness as "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally" (p.8), "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." (p.9). Baer (2003) clarifies that this involves observing both *internal* and *externa*l stimuli as they arise.

Kabat-Zinn (1994) explains that the Buddhist concept 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 1. self-regulation of one's awareness, 2. directing one's attention to internal and external stimuli, 3. introspection and metacognitive awareness to one's thoughts processes, and 4. adopting a non-judgemental attitude (Bishop et al., 2004).

This suggests that while 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, there are several key 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 that Kabat-Zinn describes, calls attention to both *internal* and *external* stimuli, and requires introspection and metacognitive awareness while adopting a particular attitude (Baer, 2003).

Similar to Langer (1989; 2005), Kabat-Zinn (1994) contrasts mindfulness to the normal waking state, which he describes as a non-conscious automatic-pilot mode that is both limited and limiting. The result of this habitual state of shallow attention is an undisciplined mind (Wallace, 2005), where the mind becomes an unreliable instrument for examining internal or external processes. Mindfulness, argues Kabat-Zinn (1994), requires the self-regulatory abilities of a disciplined mind, in order 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 et al. (2006; 2008) describe three mechanisms that underlie therapeutic meditation-based interventions:

- Attention – observing internal or external experiences as they occur.
- Intention – the "why" behind mindfulness practice.
- Attitude – the qualities that a person brings to mindfulness practice.

Drawing on Kabat-Zinn's (2003; 2005) and on Shapiro, Walsh & Britton (2003) and Shapiro et al.'s (2006) work, Brown et al. (2007) discuss mindfulness as a quality of consciousness, and identify six components that make up the attention mechanism highlighted above:

- Present-oriented consciousness of what is occurring.

- Clarity of awareness of one's inner and outer realms.
- Nonconceptual, nondiscriminatory awareness of one's own constructions of reality.
- Flexibility of awareness and attention - switching at will between an overall and a detail-focused perspective.
- Empirical stance toward reality - factual, value free and nonjudgmental.
- Stability of attention – fewer incidences of mindlessness.

In their exploration of the attitude mechanism cited above, Shapiro, Schwartz, & Santerre (2005) depict 12 mindfulness qualities: seven which were originally identified by Kabat-Zinn (1990) and five additional qualities characterized by Shapiro & Schwartz (2000):

- Nonjudging: neutral observation of the present, moment by moment.
- Nonstriving: not forcing things, and not aiming to achieve an end.
- Acceptance: recognising and embracing things as they are.
- Patience: letting things progress in their time and pace.
- Trust: having confidence in oneself, and in the processes unfolding in life.
- Letting go: not holding on to thoughts, feelings or experiences.
- Gentleness: a soft, considerate, and tender outlook.
- Generosity: giving without expecting returns.
- Empathy: understanding another person's state of mind.
- Gratitude: being thankful.
- Loving-kindness: caring for others, forgiving and loving unconditionally.
- 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 FFMQ developed by Baer et al. (2008), and the two scales

developed by Langer (2004) and Pirson et al., 2012) (see review section 3), 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, as well as the interventions that can cultivate it, namely: meditation. Some authors use the terms meditation and mindfulness interchangeably (see for example: Didonna, 2009; Greeson, 2008; Kabat-Zinn, 2009; Chiesa, Calati & Serretti, 2011). This conceptual overlap has been noted and has been criticized for causing significant misunderstandings (Bishop et al., 2004; Brown et al., 2007; Siegel, Germer & Oldenzki, 2009; Kabat-Zinn, 2009).

However, Kabat-Zinn (2003) clarifies 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 paper, Kabat-Zinn (2009) clarifies that the term mindfulness has been used both as an umbrella term and well 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 indeed 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, as this conceptual amalgamation

between the cognitive processes involved in mindfulness and the practices that 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 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 hunderds of studies (Marchand, 2012; Chiesa & Serretti, 2009; Keng et al., 2011; Grossman et al., 2004; Bohlmeijer, Prenger, Taal & Cuipers, 2010), which demonstrate its effectiveness in improving a variety of physical and psychological conditions, and in promoting wellbeing (see review section 4).

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 where their focus lies. 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 meta-cognitive processes involved, the accepting and non-striving stance, and also incorporates the means to induce and habituate these cognitive processes. Furthermore, there are some indications to suggest

that Langer's concept may be a substructure of Kabat-Zinn's composite construct. These differences indeed 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.

3. The measurements of mindfulness

Over the years several mindfulness inventories have been developed, tested, and refined. All of these 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 PHLMS (Cardaciotto, Herbert, Forman, Moitra & Farrow, 2008), The Southampton mindfulness questionnaire (SMQ; Chadwick et al., 2005), The Toronto Mindfulness Scale - Trait Version (TMST; Davis, Lau, & Cairns, 2009), The Five-Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer & Toney, 2006), and Langer's Mindlessness Scales (LMS; Langer, 2004; and its shorter version the 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 (TMSS; Lau et al., 2006), and the state 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 which aimed to assess the effectiveness of their interventions. These are briefly described below.

The Five-Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006; 2008) was developed using items from five existing measures of mindfulness: MAAS, FMI, KIMS, CAMS, and the SMQ to explore the multifaceted nature of mindfulness. The questionnaire has 39 items and includes five subscales:

- *Observing* – the inclination to notice internal and external stimuli (emotions, thoughts, sights, smells, or sounds).
- *Describing* – the ability to label experiences verbally.
- *Acting with awareness* – paying attention to the events of the moment, in contrast with auto-pilot mode.
- *Nonjudging of inner experience* – the ability to take a nonevaluative perspective toward thoughts and emotions,
- *Nonreactivity to inner experience* - the capacity to allow thoughts or feelings appear and set off, without getting trapped in them (Baer et al., 2006; 2008).

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;
- I pay attention to how my emotions affect my thoughts and behavior.

The FFMQ was found to be positively and significantly correlated with self-regulation (Carmody, Baer, Lykins & Olendzki, 2009). Brown & Ryan (2003) also found that trait mindfulness 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 & Schwartzer, 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 have 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; 2008). Meditators also scored higher compared to non-meditators. 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; 2008; Carmody & Baer, 2008).

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

The Langer's Mindfulness/Mindlessness Scale (LMS; Langer, 2004) and the recently developed **Langer Socio-cognitive Mindfulness Scale** (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 (NS),*
- *Engagement (E),*
- *Novelty producing (NP), and*
- *Flexibility (F).*

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 (NP);
- I am very creative (NP);
- I am very curious (NS);
- I try to think of new ways of doing things (NS);
- I am rarely aware of changes (E);

As seen from these examples, the questionnaires focus on elements of creativity and accentuate 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 showing elevations in mindfulness following interventions (Langer, 2004; 2005; Burpee & Langer, 2005; Djikic et al., 2008).

Pirson et al. (2012) report that the LMS14 was found to be positively correlated with psychological wellbeing, satisfaction with life, self-esteem, positive relationships, positive affect, humour, creativity, engagement at work, and physical health. It was also negatively correlated with the need for structure, neuroticism, negative affect, depression, and pain.

A closer look at the LMS and the LMS14 developed by Langer (2004) and Pirson et al. (2012) reveals that out 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 which focus on 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 are positively correlated with creativity.

A comparison of the LMS and LMS14 (Langer, 2004; Pirson et al., 2012) and the FFMQ (Baer et al., 2006; 2008) reveals that FFMQ is more comprehensive than the LMS / 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 multi-faceted mindfulness model, though indeed a highly developed and expanded construct.

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

4. Mindfulness interventions

Beginning in the 1970s several mindfulness interventions have been tried and tested in clinical as well as non-clinical settings, and building on consistent encouraging research findings, several of these 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; Shapiro et al., 2008).

In this section, two types of interventions[i] 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 have experimented with what has been termed as "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 compel participants to be more mindful and attend carefully to the task at hand. For example, in Anglin, Pirson & 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 laboratory settings (controlled or non-controlled), and with non clinical 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 – attention, memory, concentration, and problem solving (Langer, 1993; 1997; 2000; Langer et al. 1989), and in 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, 1999; 1994; Langer & Moldoveanu, 2000) and accordingly in

several studies Langer and her co-authors report 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 convincingly argues that mindfulness is associated with psychological wellbeing 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 as well as 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, 1976; Rodin & Langer, 1977; Langer, Djikic, Pirson, Madenci & Donohue, 2010; Delizonna, Ryan & Langer, 2009).

While Langer and her co-authors do not explore the cognitive mechanisms that underlie these interventions and their impressive outcomes, in his recent book Kahneman (2011) offers 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 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) makes the point that the activation of S2 necessitates controlling one's attention, while the operation of S1 can be seen as a state where one's attention is under-regulated (Baumeister & Heatherton, 1996). Kahneman (2011) also notes that while 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 indeed 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) assesses that a large proportion of people's information processing are conducted by S1, resulting in what Langer (1998; 2005) describes as mindless and automatic mode of operation. S2, Kahneman argues, is mobilised 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) suggests 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" which "loosens the control of system2 over performance" (p. 69). Kahneman (2011) explains: "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) describes and aspires to trigger through her mindfulness interventions: it entails mindful states of consciousness and cognitive 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) describes is the cognitive groundwork from which the experience of flow can emerge (Csikszentmihalyi,1990; Dhiman, 2012). In line with Kahneman's model, Csikszentmihalyi (1992) explains that flow incorporates a unique mode of operation where people are fully immersed in the activity they are doing, to the extent that the activity becomes semi-automated, 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. Csikszentmihalyi's (1992) depiction of flow thus seems to be consistent with Kahneman's (2011) state of cognitive ease described above in which both systems work in tandem.

While 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 wellbeing. Masicampo & Baumeister (2007) suggest that self-regulatory processes may mediate the positive association between mindfulness and wellbeing. Vohs & Baumeister (2011) argue 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) provide strong support to the assertion that self-regulatory capacities are positively associated with wellbeing (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 her associates found in trait mindfulness following interventions (Djikic et al., 2008; Burpee & Langer, 2005). Muraven & Baumeister (2000) contend that self-control may operate similarly to a muscle, and thus self-regulation "exercise" 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, wellbeing 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 & Baumeister's (2007) argument that self-regulatory processes may mediate the association between mindfulness and wellbeing, provides further support and an explanation as to how these interventions engender the impressive outcomes found in Langer's studies.

The Mindfulness-Based Stress Reduction Program

MBSR is a group-based intervention program which is offered to outpatients with a variety of physical and psychological conditions (Kabat-Zinn, 1982; 1994; 2009). The program is designed as an eight to ten 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 minutes per day). Most programs include intensive mindfulness meditation retreats at varying lengths (a day to a few days) (University of Massachusetts Medical School (UMMS), 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 (UMMS, 2012).

Many randomised clinical trials have been carried out on MBSR showing impressive improvements in participants' disorders as well as increases in wellbeing. Several studies began with an investigation whether MBSR increases mindfulness scores. The findings

indicate that participation in the program indeed led to increases in trait mindfulness (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 & Kuijpers, 2008; Robins et al., 2012; Shapiro, Brown, & Biegel, 2007; Shapiro et al., 2008; Chang et al., 2004). Additionally, several studies (Shapiro, Brown, Thoresen & Plante, 2011; Carmody et al., 2009; Baer, Carmody & Hunsinger, 2012) found that trait mindfulness mediated the effects of MBSR on several aspects of wellbeing, and thus participants with higher levels of mindfulness showed larger effects of MBSR on their wellbeing .

As for pain reduction, several clinical trials demonstrated significant declines in subjective pain experience (Kabat-Zinn, 1982; Kabat-Zinn et al., 1985; 1986; 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 (Shapiro, Bootzin, Figueredo, Lopez & Schwartz 2003).

In relation to psychological disorders, MBSR was tested on clinical as well as non-clinical populations. The findings reveal that self-reported global distress scores reduced following participation (Astin, 1997; Shapiro, Schwartz, & Bonner, 1998; Tacon, 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; 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 or worry (Baer, 2003; Shapiro et al., 1998; 2007; Anderson et al., 2007; Carmody & Baer, 2008), anger or hostility (Anderson et al., 2007; Baer, 2003), stress (Cordon, Brown & Gibson, 2009; Astin, 1997; Branström et al., 2010; Nyklíček & Kuipers, 2008; Oman, Shapiro, Thoresen et al., 2008; 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, Kvillemo, Brandberg & Moskowitz, 2010; Kearney, McDermott, Malte, Martinez & Simpson, 2012; Kluepfel et al., 2013). These changes were correlated with the amount of meditation practice (Lykins & Baer, 2009; Baer, 2003; Shapiro, Schwartz & Santerre, 2005).

Various types of studies (including correlational surveys, laboratory experiments and randomised controlled tests) reported on improvements in aspects of wellbeing following MBSR training. These include increases in subjective measures of psychological wellbeing (Lykins & Baer, 2009; 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 & Kuijpers, 2008), satisfaction with life and quality of life (Grossman et al., 2010; Koszycki et al., 2007; Nyklíček & Kuijpers, 2008), hope (Shapiro et al., 2011), self-efficacy (Chang et al., 2004), spirituality (Shapiro et al., 1998; Astin, 1997; Greeson et al., 2011), self-compassion (Lykins & Baer, 2009; Shapiro, Astin et al., 2005; Shapiro et al., 2007), empathy (Shapiro et al., 1998; 2011), forgiveness (Oman et al., 2008) and resilience (Chaskalson, 2011). Importantly, improved metacognitive awareness (Shapiro et al., 2006;

Chiesa, Calati & Serretti, 2011) and behavioral or emotional regulation has been registered (Tacon et al., 2003; Robins et al., 2012; Lykins & Baer, 2009; Friese, Messner & Schaffner, 2012; Arch & Craske, 2006; Burg & Wolf, 2012), along with increased perception of control (Astin, 1997), and sense of coherence (Weissbecker et al., 2002). Several authors who attempted to explain the notable outcomes cited here (Shapiro, 1980; Walsh, 1983; Didonna, 2009; Baer et al., 2008) theorize that conscious regulation of attention is a key mechanism in MBSR.

Shapiro (1980) describes 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" (Walsh, 1983: p. 19). Didonna (2009) clarifies 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, criticising, 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 to focus on, 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) claims 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) describe a similar mechanism for the alleviation of psychological disorders, such as anxiety and depression. They claim 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 these are physical or psychological, and thereby more able to discern and moderate habitual maladaptive scripts of thinking and behavior (Shapiro et al., 2003).

Shapiro et al. (2006) theorize that the main mechanisms that underlie mindfulness meditation practices are *decentring* – becoming aware that we are constantly flooded by our stream of thoughts, and *disidentification* - being able to disidentify from them. Kabat-Zinn (1994; 2003) claims 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. Shapiro et al. (2006) claim 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 meta-cognitive 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) explain that the "receptively observant processing of internal and external information" (p.223) that is central in Kabat-Zinn's and his colleagues model, promotes self-regulatory functions by providing a reflective space where people can make informed choices and respond adaptively to situations, rather than reacting automatically, and on impulse. Bowlin & Baer's (2011) findings indeed confirm that trait mindfulness and self-control are positively correlated. In their exploration whether dispositional self-control mediated the association between mindfulness and psychological wellbeing, the authors found that mindfulness explains a significant variance of wellbeing, over and above self-control.

In conclusion, the studies reviewed here which utilise mindfulness meditation as a key intervention, have shown remarkable outcomes: improvements in a variety of physical and psychological symptoms, alongside increases in wellbeing measures. An exploration of the mechanisms that operate in mindfulness meditation revealed that it involves three meta-cognitive and self-regulatory processes that work in tandem: decentring, disidentification, and reperceiving (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.

The review offered here of the mindfulness interventions initiated by Langer and Kabat-Zinn and their colleagues, reveals that there are significant differences between Kabat-Zinn's meditation based clinical interventions and Langer's non-clinical 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, time-frames, and the settings within which they are applied.

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

Importantly, while Langer's brief interventions are geared to trigger a mindful state, Kabat-Zinn's interventions are designed to enhance trait mindfulness. Also, as seen in the comparative review of the definitions and features of mindfulness provided earlier, these interventions aim to 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 non-striving attitude.

Of the two interventions reviewed, MBSR is more extensively studied and the research around it seems to be more empirically robust. However, these studies, some of which have been conducted 20-30 years ago, have been noted to have some limitations (Shapiro, Schwartz & Santerre, 2005). Some of their 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 (Tacon et al., 2003; Carlson & Garland, 2005; Baddoe & Murphy, 2004) and most did not follow the participants after the program has ended. Additionally, because the MBSR is a therapeutic package, the research is not capable of assessing the impact of each of its components on its own. Since much of the findings around MBSR echo the findings of meditation research (see Ospina et al., 2007; Chiesa & Serretti, 2010; Kabat-Zinn, 1996; Marchand, 2012; Shapiro et al., 2003; 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 as to their effects. However, the studies reviewed here seem to display some limitations which raise questions as to their validity or reliability. The first is the interventions themselves - several of these are not clearly described and have no protocol that could be followed by researchers who may wish to replicate the study (see Anglin et al., 2008; Delizonna, Ryan & Langer, 2009; Crum & Langer, 2007; Djikic et al., 2008; Langer et al., 1985; 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; 2010).

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

5. Discussion and Conclusions

This paper 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, this paper aimed 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 conducted for the purpose of this paper, which included correlational research, clinical interventions, laboratory experiments, theoretical inquiries, and a number of meta-analyses, suggests that there are three aspects of their conceptions which show some degree of convergence*:* their definitions, the centrality of self-regulatory mechanisms in their interventions, and their effect on health and wellbeing. However, the comparison between them suggests that the two schools of thought differ along several central lines:

- **The philosophies upon which they draw**: Kabat-Zinn draws on Buddhist religious practices, while Langer's outlook is considered Western and scientific.
- **The components of mindfulness:** The comparative account provided here suggests 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 meta-cognitive processes and the accommodating stance involved in mindfulness.

- **Their goals:** While Langer's interventions are designed to improve cognitive performance and wellbeing, 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 operational definition of mindfulness Langer accentuates the awareness of external stimuli, while Kabat-Zinn addresses both internal and external stimuli.
- **Their theoretical scope:** Kabat-Zinn's construct seems to be much wider in scope compared to Langer's. Further analysis into the qualities of mindfulness incorporated in Kabat-Zinn model, revealed that it includes 12 qualities, only one of which (openness) seems to overlap Langer's model. Though Langer has indeed 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 together 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 measure *trait* mindfulness, the FFMQ often used by Kabat-Zinn's associates is much wider in scope and multifaceted compared to the LMS and the LMS14 developed by Langer, which seem to focus on two particular substructures of the FFMQ.
- **Their target audiences and settings**: Kabat-Zinn's work is mainly conducted with patients in clinical settings, compared to Langer who targets mainly healthy children or adults in their everyday settings.

- **The interventions they employ to induce mindfulness**: Kabat-Zinn's MBSR meditation based intervention is offered as a therapeutic package containing several components. They also require long-term daily practice. Langer's brief interventions are instructional, and 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 suggests that self-egulation of attention is the core mechanism in *both types* of mindfulness interventions, however, MBSR involves additional meta-cognitive mechanisms that work in concert.
- **The outcomes of their interventions**: Kabat-Zinn's meditation based interventions are designed to increase disposition of mindfulness, compared to Langer's instructional interventions, which are geared to induce a state of mindfulness.

As seen above, the two schools of thought seem to 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 compared to Langer's.

In view of the differences between the two schools of thought, 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, the literature review is unambiguous in asserting that mindfulness and its cultivation, however it is defined, induced, or measured, can elevate positive psychological aspects of wellbeing and improve functioning among healthy people, as well as alleviate an array of physical and psychological disorders among clinical

patients. Importantly, the findings reveal that self-regulatory processes are central to both types of interventions, and seem to mediate the impact of mindfulness interventions.

References

Alexander, C.N., Druker, S.M., & Langer, E.J. (1990). Major issues in the exploration of adult growth. In C.N. Alexander & E.J. Langer, (Eds.), *Higher stages of human development: Perspectives on adult growth* (pp. 3–32). New York: Oxford University Press.

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.

Anglin, L.P., Pirson, M., & Langer, E.J. (2008) Mindful learning: a moderator of gender differences in mathematics performance. *Journal of Adult Development*, 15, 132–139.

Arch, J.J., & Craske, M.G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behavior Research and Therapy*, 44, 1849–1858.

Astin, J.A. (1997). Stress reduction through mindfulness meditation. Effects on psychological symptomatology, sense of control, and spiritual experiences. *Psychotherapy and Psychosomatics*, 66, 97–106.

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., Carmody, J., & Hunsinger, M. (2012). Weekly changes in mindfulness and perceived stress in a MBSR program. *Journal of Clinical Psychology*, doi: 10.1002/jclp.21865.

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.

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., Walsh E., Duggan, D., & Williams, J.M. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment,* 15, 329-342.

Baddoe, A.E., & Murphy, S.O. (2004). Does mindfulness decrease stress and foster empathy among nursing students? *Journal of Nursing Education,* 43, 305-312.

Baumann, N., Kaschel, R., & Kuhl, J. (2007). Affect sensitivity and affect regulation in dealing with positive and negative affect. *Journal of Research in Personality*, 41, 239–248.

Baumeister, R.F., Bratslavsky, M., 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., Gailliot, M., DeWall, C.N., & Oaten, M. (2006). Self-regulation and personality: How interventions increase regulatory success, and how depletion moderates the effects of traits on behavior. *Journal of Personality*, 74, 1773–1801.

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

Baumeister, R.F., Heatherton, T.F., & Tice, D.M. (1994). *Losing control: How and why people fail at self-regulation*. San Diego: Academic Press, Inc.

Baumeister, R.F., & Tierney, J. (2011). *Willpower: Rediscovering the greatest human strength*. New York: Penguin Press.

Baumeister, R.F., & Vohs, K.D. (2003). Self-regulation and the executive functioning of the self. In M.R. Leary & J.P. Tangney (Eds.), *Handbook of Self and Identity* (pp. 197–217). New York: Guilford Press.

Beckmann, J., & Kellmann, M. (2004). Self-regulation and recovery: Approaching an understanding of the process of recovery from stress. *Psychological Reports*, 95, 1135–1153.

Bernhard, J., Kristeller, J., & Kabat-Zinn, J. (1988). Effectiveness of relaxation and visualization techniques as an adjunct to phototherapy and photochemotherapy of psoriasis. *Journal of the American Academy of Dermatology*, 19, 572–73.

Bishop, S., Lau, M., Shapiro, S., Carlson, L., Anderson, N., Carmody, J., Segal, Z.V., Abbey, S., Speca, M. Velting, D., & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and practice*, 11, 230–241.

Bohlmeijer, E., Prenger, R., Taal, E., & Cuijpers, P. (2010). The effects of MBSR therapy on mental health of adults with a chronic medical disease: A meta-analysis. *Journal of Psychosomatic Research*, 68, 539-544.

Bowlin, S.L., & Baer, R.A. (2011). Relationships between mindfulness, self-control, and psychological functioning. *Personality and Individual Differences*, 52, 411–415.

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, 151-61.

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 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 salutary effects. *Psychological Inquiry*, 18, 211–237.

Buchheld, N., Grossman, P., & Walach, H. (2001). Measuring mindfulness in insight meditation (Vipassana) and meditation-based psychotherapy: The development of the Freiburg mindfulness inventory (FMI). *Journal for Meditation and Meditation Research*, 1, 11–34.

Burg, J.M., & Wolf, O.T. (2012). Mindfulness as self-regulated attention. *Swiss Journal of Psychology*, 71, 135-139.

Burpee, L., & Langer, E.J. (2005). Mindfulness and marital satisfaction. *Journal of Adult Development*, 12, 43–51.

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., & Brown, K.W. (2005). Validation of the Mindful Attention Awareness Scale in a cancer population. *Journal of Psychosomatic Research,* 58, 29–33.

Carlson**,** L.E., Speca, M., & Patel, K.D. (2003). Mindfulness-based stress reduction in relation to quality of life, mood, symptoms of stress, and immune parameters in breast and prostate cancer outpatients. *Psychosomatic Medicine,* 65, 571–581.

Carlson, L.E., & Garland, S.N. (2005). Impact of Mindfulness-Based Stress Reduction (MBSR) on Sleep, Mood, Stress and Fatigue Symptoms in Cancer Outpatients. *International Journal of Behavioral Medicine,* 12, 278–285.

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, Lykins. E., & Olendzki, N. (2009). An empirical study of the mechanisms of mindfulness in a mindfulness-based stress reduction program. *Journal of Clinical Psychology*, 65, 613-26.

Carson, S.H., & Langer, E.J. (2006). Mindfulness and self-acceptance. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 24, 29-43.

Chadwick, P., Hember, M., Symes, J., Peters, E., Kuipers, E., & Dagnan, D. (2008). Responding mindfully to unpleasant thoughts and images: Reliability and validity of the Southampton mindfulness questionnaire (SMQ). *British Journal of Clinical Psychology*, 47, 451-455.

Chang, V.Y., Palesh, O., Caldwell, R., Glasgow, N., Abramson, M., Luskin, F., Gill, M., Burke, A., & Koopman, C. (2004). The effects of MBSR program on stress, mindfulness, self-efficacy and positive states of mind. *Stress and Health*, 20, 141-147.

Chanowitz, B., & Langer, E.J. (1981). Premature cognitive commitment. *Journal of Personality and Social Psychology*, 14, 1051–1063.

Chaskalson, M. (2011). *The Mindful Workplace: Developing Resilient Individuals and Resonant Organisations with MBSR*. Chichester, UK: Willey-Blackwell Publishers.

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.

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. (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.

Cohen-Katz, J., Wiley, S.D., Capuano, T., Baker, D.M., Kimmel, S., & Shapiro, S. (2005). The effects of mindfulness-based stress reduction on nurse stress and burnout, Part II: A quantitative and qualitative study. *Holistic Nursing Practice, 19*, 26–35.

Cordon, S.L., Brown, K.W., & Gibson, P.R. (2009). The role of mindfulness-based stress reduction on perceived stress: Preliminary evidence for the moderating role of attachment style. *Journal of Cognitive Psychotherapy: An International Quarterly*, 23, 258–268.

Crum, A.J., & Langer, E.J. (2007). Mind-set matters: Exercise and the placebo effect. *Psychological Science*, 18, 165–171.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York, NY: Harper and Row.

Csikszentmihalyi, M. (1992). *Flow: The psychology of Happiness*. London: Rider.

Davis, J.M., Fleming, M.F., Bonus, K.A., & Baker, T.B. (2007). A pilot study on mindfulness based stress reduction for smokers. *Complementary and Alternative Medicine*, 7, 2. doi:10.1186/1472-6882-7-2.

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.

Delizonna, L.L., Ryan P.W., & Langer, E.J. (2009). The effect of mindfulness on heart rate control. *Journal of Adult Development*, 16, 61-65.

Dhiman, S. (2012). Mindfulness and the art of living creatively: cultivating a creative life by minding our Mind. *Journal of Social Change,* 4, 24–33.

Didonna, F. (2009). Introduction: where new and old paths to dealing with suffering meet. In F. Didonna (Ed.), *Clinical handbook of mindfulness* (pp. 1-17). New York, NY: Springer.

Diehl, M., Semegon, A.B., & Schwarzer, R. (2006). Assessing attention control in goal pursuit: A component of dispositional self-regulation. *Journal of Personality Assessment*, 86, 306–317.

Djikic, M., Langer, E.J., & Fulton-Stapleton, S. (2008). Reducing stereotyping through mindfulness: effects on automatic stereotype-activated behaviors. *Journal of Adult Development,* 15, 106-111.

Feldman, G., Hayes, A., Kumar, S., Greeson, J., & 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.

Fredrickson, B. (2011). *Positivity: Groundbreaking Research to Release Your Inner Optimist and Thrive.* Oxford: Oneworld Publications.

Friese, M. Messner, C., & Schaffner, Y. (2012). Mindfulness meditation counteracts self-control depletion. *Consciousness and Cognition,* 21, 1016–1022.

Gayner, B., Esplen, M.J., DeRoche, P., Wong, J., Bishop, S., Kavanagh, L., & Butler, K. (2012). A randomized controlled trial of mindfulness-based stress reduction to manage affective symptoms and improve quality of life in gay men living with HIV. *Journal of Behavioral Medicine,* 35, 272–285.

Gilovich, T., Griffin , D., & Kahneman, D. (2002). *Heuristics and biases: The psychology of intuitive judgment*. New York : Cambridge University Press.

Goldenberg, D.L., Kaplan, K.H., Nadeau, M.G., Brodeur, C., Smith, S., & Schmid, C.H. (1994). A controlled study of a stress-reduction, cognitive-behavioral treatment program in fibromyalgia. *Journal of Musculoskeletal Pain, 2,* 53–66.

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.

Greeson, J.M. (2009). Mindfulness Research Update: 2008. *Complement Health Practice Review* 14, 10–18.

Greeson, J.M., Webber, D.M., Smoski, M.J., Brantley, J.G., Ekblad, A.G., Suarez, E.C., & Wolever, R.Q. (2011). Changes in spirituality partly explain health-related quality of life outcomes after Mindfulness-Based Stress Reduction. *Journal of Behavioral Medicine,* 34, 508-18.

Grossman, P., Kappos, L., Gensicke, H., D'Souza, M., Mohr, D.C., Penner, I.K., & Steiner, C. (2010). MS, quality of life, depression, and fatigue improve after mindfulness training: A randomized trial. *Neurology, 75*, 1141-1149.

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.

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 & Psychosomatics*, 76, 226–233.

Hayes, S.C., Strosahl, K., & Wilson, K.G. (1999). *Acceptance and commitment therapy: an experiential approach to behaviour change.* NewYork: Guilford Press.

Huffziger, S., & Kuehner, C. (2009). Rumination, distraction, and mindful self-focus in depressed patients. *Behavior Research and Therapy*, 47, 224–230.

Ivtzan, I., Gardner, H.E., & Smailova, Z., (2011). Mindfulness meditation and curiosity: The contributing factors to wellbeing and the process of closing the self-discrepancy gap. *International Journal of Wellbeing, 1*, 316-326.

Jain, S., Shapiro, S.L., Swanick, S., Roesch, S.C., Mills, P.J., Bell, I., & Schwartz, G.E. (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.

Kabat-Zinn, J. (2009). Forward. In F. Dinonna (Ed.) *Clinical Handbook of Mindfulness* (pp.xxv-xxxiii). NY: Springer.

Kabat-Zinn, J. (2005). *Coming to our senses*. London: Piatkus Books Ltd.

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

Kabat-Zinn, J. (1996). Mindfulness meditation: What it is, what it isn't, and its role in health care and medicine. In Y. Haruki, Y. Ishii & M. Suzuki (Eds.), *Comparative and psychological study on meditation* (pp. 161–170). Netherlands: Eburon Publishers.

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

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.

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., Lipworth, L., & Burney, R. (1985). The clinical use of mindfulness meditation for the self-regulation of chronic pain. *Journal of Behavioral Medicine, 8,* 163–190.

Kabat-Zinn, J., Lipworth, L., Burney, R., & Sellers, W. (1986). Four year follow-up of a meditation-based program for the self-regulation of chronic pain: Treatment outcomes and compliance. *Clinical Journal of Pain, 2,* 159–173.

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

Kabat-Zinn, J. Wheeler, E., & Light, T. (1998). Influence of a mindfulness meditation based stress reduction intervention on rates on skin clearing in patients. Psychosomatic Medicine, 60, 625-632.

Kahneman, D. (2011). *Thinking Fast and Slow*. NY: Farrar, Straus and Giroux.

Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist,* 58 , 697-720.

Kahneman, D. (1991). Judgment and decision-making: A personal view. *Psychological Science*, 2, 142-145.

Kahneman, D. (1994). New challenges to the rationality assumption. *Theoretical Economics,* 150, 18-36.

Kahneman, D., & Frederick, S. (2005). A model of heuristic judgment. In K.J. Holyoak & R.G. Morrison (Eds.), *The Cambridge handbook of thinking and reasoning* (pp. 267-293). New York : Cambridge University Press.

Kaplan, K.H., Goldenberg, D.L., & Galvin, N.M. (1993). The impact of a meditation-based stress reduction program on fibromyalgia. *General Hospital Psychiatry,* 15, 284–289.

Kearney, D.J., McDermott, K., Malte, C., Martinez, M., & Simpson, T.L. (2012). Association of participation in a mindfulness program with measures of PTSD, depression and quality of life in a veteran sample. *Journal of Clinical Psychology*, 68, 101-116.

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, 1041-56.

Kluepfel, L., Ward, T., Yehuda, R., Dimoulas, E., Smith, A., & Daly, K. (2013). The evaluation of Mindfulness-Based Stress Reduction for veterans with mental health conditions. *Journal of Holistic Nursing*. doi: 10.1177/0898010113495975

Koole, S.L., Kuhl, J., Jostmann, N., & Vohs, K.D. (2005). On the hidden benefits of state orientation: Can people prosper without efficient affect regulation skills?. In A. Tesser, J. Wood & D.A. Stapel (Eds.), *On Building, Defending, and Regulating the Self: A psychological perspective* (pp. 217–243). London: Taylor & Francis.

Koszycki, D., Benger, D., Shlik, J., & Bradwejn, J. (2007). Randomized trial of a meditation-based stress reduction program and cognitive behavior therapy in generalized social anxiety disorder. *Behavior Research and Therapy*, 45, 2518–2526.

Kuhl, J. (1992). A theory of self-regulation: Action versus state orientation, self-discrimination, and some applications. *Applied Psychology: An International Review*, 41, 95–173.

Langer, E.J. (2006). *On Becoming an Artist: Reinventing Yourself Through Mindful Creativity.* NY: Ballantine Books

Langer, E.J. (2005). Well-being: Mindfulness versus positive evaluation. In C.R. Snyder & S.J. Lopez (Eds.), *Handbook of positive psychology* (pp. 214–230). New York: Oxford University Press.

Langer, E.J. (2004). *Langer Mindfulness Scale User Guide and Technical Manual*. Worthington, OH: IDS Publishing Corporation.

Langer, E.J. (2000). Mindful learning. *Current Directions in Psychological Science*, 9, 220–223.

Langer, E.J. (1997). *The power of mindful learning*. Cambridge, MA: De Capo Press.

Langer, E.J. (1994). Mindfulness and work. In C. Whitmyer (Ed.), *Mindfulness and meaningful work: Explorations in right livelihood* (pp. 223-230). Berkeley, CA: Paralax Press.

Langer, E.J. (1993). A mindful education. *Educational Psychologist*, 28, 43–50.

Langer, E.J. (1992). Matters of mind: Mindfulness/mindlessness in perspective. *Consciousness and Cognition*, 1, 289–305.

Langer, E.J. (1989). *Mindfulness*. Cambridge, MA: Da Capo Press.

Langer, E.J., Bashner, R., & Chanowitz, B. (1985). Decreasing prejudice by increasing discrimination. *Journal of Personality and Social Psychology*, 49, 113–120.

Langer, E.J., Beck, P., Janoff-Bulman, R., & Timko, C. (1984). An exploration of relationships among mindfulness, longevity, and senility. *Academic Psychology Bulletin*, 6, 2, 211-226.

Langer, E.J., Blank, A., & Chanowitz, B. (1978). The mindlessness of ostensibly thoughtful action: The role of ‘‘placebic” information in interpersonal interaction. *Journal of Personality and Social Psychology*, 36, 635–64.

Langer, E.J., Djikic, M., Pirson, M., Madenci, A. & Donohue, R. (2010). Believing is seeing: Using mindlessness (mindfully) to improve visual acuity. *Psychological Science*, 21 (5): 661-666.

Langer, E.J., Hatem, M., Joss, J., & Howell, M. (1989). Conditional teaching and mindful learning: The role of uncertainty in education. *Creativity Research Journal*, 2, 139–150.

Langer, E. J., Heffernan, D., & Kiester, M. (1988). *Reducing Burnout in an Institutional Setting: An Experimental Investigation*. Cambridge, MA: Harvard University Press.

Langer, E.J., & Imber, L.G. (1979). When practice makes imperfect: Debilitating effects of overlearning. *Journal of Personality and Social Psychology*, 37, 2014–2024.

Langer, E.J., Janis, I., & Wolfer, J. (1975). Reduction of psychological stress in surgical patients. *Journal of Experimental Social Psychology*, 11, 155–165.

Langer, E.J., & Moldoveanu, M. (2000). The construct of mindfulness. *Journal of Social Issues*, 56(1), 1–9.

Langer, E.J., & Piper, A.I. (1987). The prevention of mindlessness. *Journal of Personality and Social Psychology*, 53, 280–287.

Langer, E.J., & Rodin, J. (1976). The effects of enhanced personal responsibility for the aged: A field experiment in and institutional setting. *Journal of Personality and Social Psychology*, 34, 191–198.

Lau, M.A., Bishop, S.R., Segal, Z.V., Buis, T., Anderson, N.D., Carlson, L., & Carmody, J. (2006). The Toronto Mindfulness Scale: Development and validation. *Journal of Clinical Psychology, 62*, 1445–1467.

Levy, B., & Langer, E.J. (1999). Aging. In M.A. Runco & S.R. Pritzker (Eds.), *Encyclopedia of Creativity* (Vol 1, pp. 45-52). CA: academic press.

Levy, B., & Langer, E.J. (1994). Aging free from negative stereotypes Successful memory in China and among the American deaf. *Journal of Personality and Social Psychology,* 66, 989–997

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

Lykins, E., & Baer, R.A. (2009). Psychological functioning in a sample of long-term practitioners of mindfulness meditation. *Journal of Cognitive Psychotherapy*: *An International Quarterly*, 23, 226–241.

Lyubomirsky , S . (2011). *The How of Happiness: A Scientific Approach to Getting the Life You Want* . New York : Penguin Press.

Marchand, W.R., (2012). MBSR, Mindfulness-based cognitive therapy, and Zen meditation for depression, anxiety, pain, and psychological distress. *Journal of Psychiatric Practice*.18, 233-252.

Masicampo, E.J. & Baumeister, R.F. (2007). Relating Mindfulness and Self-Regulatory Processes, *Psychological Inquiry*, 18, 255 – 258.

Muraven, M.R., & Baumeister, R.F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin,* 126, 247–259.

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.

Nakamura, J. & Csikszentmihalyi, M. (2005). The concept of flow. In C.R. Snyder & S.J. Lopez (Eds). *Handbook of Positive Psychology* (pp. 89-105). Oxford: Oxford University Press.

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 loma prieta earthquake. *Journal of Personality and Social Psychology*, 61, 115–121.

Nyklíček, I., & Kuipers, 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.

Oaten, M., & Cheng, K. (2006). Improved self-control: The benefits of a regular program of academic study. *Basic and Applied Social Psychology, 28,* 1–16.

Olendzki, A. (2009). Mindfulness and meditation. In F. Didonna (Ed.), *Clinical Handbook of Mindfulness* (pp. 37-44). New York, NY: Springer.

Oman, D., Shapiro, S.L., Thoresen, C.E., Plante, T.G., & Flinders, T. (2008). Meditation lowers stress and supports forgiveness among college students. *Journal of American College Health*, 56, 569–578.

Ospina, M.B., Bond, K., Karkhaneh, M., Tjosvold, L., Vandermeer, B., Liang, Y., Bialy, L., Hooton, N., Buscemi, N., Dryden, D.M., & Klassen, T.P. (2007). *Meditation Practices for Health: State of the Research.* AHRQ Publication No. 07-E010. MD: Rockville: Agency for Healthcare Research and Quality U.S.

Pirson, M., Langer, E.J., Bodner, T., & Zilcha, S. (2012). The Development and Validation of the Langer Mindfulness Scale - Enabling a Socio-Cognitive Perspective of Mindfulness in Organizational Contexts. *Fordham University Schools of Business Research Paper.* SSRN doi.org/10.2139/ssrn.2158921.

Randolph, P.D., Caldera, Y.M., Tacone, A.M., & Greak, M.L. (1999). The long-term combined effects of medical treatment and a mindfulness-based behavioral program for the multidisciplinary management of chronic pain in west Texas. *Pain Digest, 9,* 103–112.

Ritchart, R., & Langer, E.J. (1997). Teaching mathematical procedures mindfully: Exploring the conditional presentation of information in mathematics. In J.A. Dossey, J.O. Swafford, M. Parmantie & A.E. Dossey (Eds.), *Proceedings of the nineteenth annual meeting of the North American chapter of the international group for the psychology of mathematics education.* Columbus, OH: ERIC Clearinghouse for Science Mathematics, and Environmental Education.

Robins, C.J., Keng, S.L. 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.

Rodin, J., & Langer, E. (1977). Long-term effects of a control relevant intervention among the institutionalized aged. *Journal of Personality and Social Psychology,* 35, 897–902.

Rosenzweig, S., Reibel, D.K., Greeson, J.F. Edman, J.S. Jasser, S.A. McMearty, K.D., & Goldstein, B.J. (2007) Mindfulness-based stress reduction is associated with improved Glycemic control in type 2 diabetes mellitus: a pilot study. *Alternative Therapies,* 13, 36-38.

Saxe, G.A., Hebert, J.R., Carmody, J.F., Kabat-Zinn, J., Rosenzweig, P.H., Jarzobski, D., Reed, G., & Blute, R. (2001). Can diet, in conjunction with stress reduction, affect the rate

of increase in prostate-specific antigen after biochemical recurrence of prostate cancer? *Journal of Urology*, 166, 2202–2207.

Schmeichel, B.J., Vohs, K.D., & Baumeister, R.F. (2003). Intellectual performance and ego depletion: Role of the self in logical reasoning and other information processing. *Journal of Personality and Social Psychology*, 85, 33–46.

Segal, Z.V., Williams, M.G., & Teasdale, J.D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York: Guilford Press.

Sephton, S.E., Salmon, P., Weissbecker, I., Ulmer, C., Floyd, A., Hoover, K., & Studts, J.L. (2007). Mindfulness meditation alleviates depressive symptoms in women with fibromyalgia: Results of a randomized clinical trial. *Arthritis and Rheumatism*, 57, 77–85.

Shapiro, D.H. (1980). *Meditation: Self-regulation strategy and altered state of consciousness*. New York: Aldine.

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., Bootzin, R.R., Figueredo, A.J., Lopez, A.M., & Schwartz, G.E. (2003). The efficacy of mindfulness-based stress reduction in the treatment of sleep disturbance in women with breast cancer: An exploratory study. *Journal of Psychosomatic Research*, 54, 85–91.

Shapiro, S.L., Brown, K.W., & Biegel, G. (2007). Teaching self-care to caregivers: The 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., 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.

Shapiro, S.L., Carlson L.E., & Astin J.A. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62,* 373– 386.

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.

Shapiro, S.L., Schwartz, G.E., & Bonner, G. (1998). Effects of mindfulness-based stress reduction on medical and premedical students. *Journal of Behavioral Medicine, 21,* 581–599.

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). New York: Academic Press.

Shapiro, S.L., Schwartz, G.R., & Santerre, C. (2005). Meditation and Positive Psychology. In Snyder. C.R. & Lopez, S.J. *Handbook of Positive Psychology* (pp.632-645). Oxford: Oxford University Press.

Shapiro, S.L., Walsh, R., & Britton, W.B. (2003). An analysis of recent meditation research and suggestions for future directions. *Journal of Meditation and Meditation Research*, 3, 69-90.

Siegel, R.D., Germer, C.K., & Oldenzki, A. (2009). Mindfulness: what is it? where does it come from?. In F. Didonna (Ed.), *Clinical Handbook of Mindfulness* (pp. 17-36). NY: Springer.

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.

Sternberg, R.J. (2000). Images of mindfulness. *Journal of Social Issues,* 56, 11–26.

Tacon, A.M., McComb, J., Caldera, Y., & Randolph, P. (2003). Mindfulness meditation, anxiety reduction, and heart disease: a pilot study. *Family & Community Health,* 26, 25–33.

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, 2, 271-323.

University of Massachusetts Medical School, (2012) MBSR Brochure Center for Mindfulness in Medicine, Health Care, and Society www.umassmed.edu/uploadedFiles/cfm2/SRP_for_desktop_printing.pdf.

Vohs, K.D., & Baumeister, R.F. (2011). *Handbook of Self-regulation: Research, Theory, and Applications* (2nd edition). New York, NY: Guilford.

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.

Wallace, B.A. (2005). *Balancing the mind*. Ithaca, NY: Snow Lion.

Walsh, R.N. (1983). Meditation practice and research. *Journal of Humanistic Psychology*, 23, 18-50.

Weick, K., & Putnam, T. (2006). Organizing for mindfulness eastern wisdom and western Knowledge. *Journal of Management Inquiry*, 15, 275-287.

Weissbecker, I., Salmon, P., Studts, J.L., Floyd, A.R., Dedert, E.A., & Sephton, S.E. (2002). Mindfulness-based stress reduction and sense of coherence among women with fibromyalgia. *Journal of Clinical Psychology in Medical Settings*, 9, 297–307.

Williams, K.A., Kolar, M.M., Reger, B.E., & Pearson, J.C. (2001). Evaluation of a Wellness-Based Mindfulness Stress Reduction intervention: A controlled trial. *American Journal of Health Promotion*, 15, 422–432.

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.

Notes

[i] Three additional widely used mindfulness interventions developed by others - MBCT (Segal, Williams & Teasdale, 2002), DBT (Linehan, 1993), and ACT (Hayes, Strosahl & Wilson, 1999) are not reviewed here.