

**Toward the Integration of Meditation  
into Higher Education:  
A Review of Research**

**DRAFT**

**Prepared for the Center for Contemplative Mind in Society**  
by

**Shauna L. Shapiro**  
Santa Clara University

**Kirk Warren Brown**  
Virginia Commonwealth University

**John A. Astin**  
California Pacific Medical Center

*Supplemental research and editing: Maia Duerr, Five Directions Consulting*

## **Abstract**

There is growing interest in the integration of meditation into higher education (Bush, 2006). This paper reviews empirical evidence related to the use of meditation to facilitate the achievement of traditional educational goals, to help support student mental health under academic stress, and to enhance education of the “whole person.” Drawing on four decades of research conducted with two primary forms of meditation, we demonstrate how these practices may help to foster important cognitive skills of attention and information processing, as well as help to build stress resilience and adaptive interpersonal capacities. This paper also offers directions for future research, highlighting the importance of theory-based investigations, increased methodological rigor, expansion of the scope of education-related outcomes studied, and the study of best practices for teaching meditation in educational settings.

## **Meditation and Higher Education: Key Research Findings**

### **Cognitive and Academic Performance**

- Mindfulness meditation may improve ability to maintain preparedness and orient attention.
- Mindfulness meditation may improve ability to process information quickly and accurately.
- Concentration-based meditation, practiced over a long-term, may have a positive impact on academic achievement.

### **Mental Health and Psychological Well-Being**

- Mindfulness meditation may decrease stress, anxiety, and depression.
- Mindfulness meditation supports better regulation of emotional reactions and the cultivation of positive psychological states.

### **Development of the Whole Person**

- Meditation can support the development of creativity.
- Meditation supports and enhances the development of skills needed for interpersonal relationships.
- Empathetic responses are increased with meditation and mindfulness practices.
- Meditation may help to cultivate self-compassion.

## Contents

|  |           |
|--|-----------|
| <b>I. Introduction</b>   | <b>5</b>  |
| <b>II. Empirical Evidence: Review of the Research</b>                  | <b>9</b>  |
| A. Effects of Meditation on Cognitive and Academic Performance         | 9         |
| 1. Ability to maintain preparedness and orient attention               | 9         |
| 2. Ability to process information                                      | 12        |
| 3. Academic achievement  | 13        |
| B. Effects of Meditation on Mental Health and Psychological Well-Being | 13        |
| 1. Stress, anxiety, and depression                                     | 14        |
| 2. Regulation of emotional affect                                      | 16        |
| C. Effects of Meditation on Development of the Whole Person            | 18        |
| 1. Creativity  | 19        |
| 2. Interpersonal relationship skills                                   | 19        |
| 3. Empathy   | 20        |
| 4. Self-compassion   | 21        |
| <b>III. Future Research Directions</b>                                 | <b>23</b> |
| A. Theory-Based Investigation  | 23        |
| 1. Attention   | 24        |
| 2. Metacognition   | 25        |
| 3. Transformative Learning   | 26        |
| 4. Emotional Intelligence  | 28        |
| B. Methodological Rigor  | 29        |
| C. Investigation of a Broader Scope of Outcomes                        | 32        |
| D. Best Practices  | 32        |
| <b>IV. Conclusions</b>   | <b>34</b> |
| <b>V. References</b>   | <b>35</b> |

## **Toward the Integration of Meditation into Higher Education: A Review of Research**

*Real education consists in drawing the best out of yourself.* ~ Mahatma Gandhi

### **I. Introduction**

- Mindfulness training enhances the ability to focus attention, according to performance-based measures of cognitive function in research conducted by two neuroscientists at the University of Pennsylvania (Jha, Krompinger, & Baime, 2007).
- Scientists at the Flinders Medical Centre for Neuroscience, measuring electrical activity with an EEG, found clear changes in brain activity as subjects progressed deeper into meditative states. They observed an increase in alpha brainwaves, associated with focus and attention, and a decrease in delta brainwaves, linked to drowsiness (*Sydney Morning Herald*, 2007).
- Regions of the brain involved with empathetic responses are impacted through the practice of meditation, according to a study conducted by Dr. Richard Davidson and Dr. Antoine Lutz at the University of Wisconsin-Madison. The capacity to cultivate compassion, which involves regulating thoughts and emotions, may also be useful for alleviating depression, as well as preventing bullying and aggressive behavior in children and adolescents (Land, 2008).

These are but a few examples from a growing body of research indicating that regular meditation can have a dramatic effect on brain functions. At the same time, there is an increasing interest in the application of meditation techniques to secular settings, including education (Duerr, 2004).

This paper illustrates how meditation complements and enhances educational goals by helping to develop traditionally valued academic skills. Additionally, the practice of meditation can support important affective and interpersonal capacities that foster psychological well-being and the development of the “whole person.” A review of the current research will explore how these outcomes of meditation practice may be applied in higher education settings.

This paper also outlines directions for future research in this relatively new area of inquiry, including suggestions for theoretical models, methodologies, and important questions for future study.

### **What Is Meditation?**

Meditation is an essential element in all of the world’s major contemplative spiritual and philosophical traditions (Goleman, 1988; Walsh, 1999). In recent years, meditative practices have been taught in secular forms that do not require adherence to cultural and religious beliefs (Hart, 2007; Duerr, 2004; Kabat-Zinn, 1996).

“Meditation,” as the word is used in this paper, is an umbrella term that encompasses a wide variety of practices such as mindfulness meditation and Zen meditation (also called “zazen”). While techniques may differ, all types of meditation share the common goal of training an individual’s attention and awareness so that consciousness becomes more finely attuned to events and experiences in the present.

Daniel Goleman (1972) suggests that the family of meditation techniques can be broadly divided into two groups: concentrative meditation and mindfulness meditation. See the table below for characteristics of each of these types of meditations.

| <b>Concentrative Meditation</b>  | <b>Mindfulness Meditation</b>  |
|--|--|
| Disciplined, single-pointed focus of attention.  | Opening and expanding to an awareness of thoughts and feelings as they pass through the mind, but not focusing on a single purpose.  |
| Attention is focused in a non-analytical, unemotional way, with the intent to directly experience the object of meditation. Meditator may focus attention on breath, a word (Benson & Proctor, 1984), or specific sounds (see Carrington, 1998). | Involves three core elements: <i>intention, attention, and attitude</i> (Shapiro, Carlson, Astin & Freedman, 2006). <ul style="list-style-type: none"> <li>• Intention involves consciously and purposefully regulating attention.</li> <li>• Attention is the ability to sustain attention in the present moment without interpretation, discrimination or evaluation; “a bare registering of the facts observed” (Brown, Ryan &amp; Creswell, 2007).</li> <li>• Attitude is a frame of mind brought to mindfulness meditation; commonly described as openness, acceptance, or nonjudgmentality.</li> </ul> |
| Like the zoom lens on a camera.  | Like the wide angle lens on a camera.  |

Some meditative practices integrate elements of both concentrative and mindfulness types. For example, a person may focus on breathing (Zen and Vipassana meditation) or a mantra (e.g., Transcendental Meditation), but be willing to allow attention to focus on other stimuli if they become predominant before returning to the object of attention.

Meditation is different from relaxation training (e.g., Kabat-Zinn, 1996), which is characterized by progressive muscle relaxation and autogenic training. First, meditation involves witnessing events and experiences as they present themselves on a moment-to-moment basis; relaxation training involves the pursuit of a particular psychophysical state of reduced autonomic arousal (Shapiro, Schwartz, & Santerre, 2002). Relaxation may be a by-product of meditation, but it is not an objective of the practice. Second, relaxation is taught as a stress management technique to be used during stressful or anxiety provoking situations. Meditation, in contrast, is not a technique whose use is contingent upon stressful situations, but rather is conceived of as a “way of being” that is to be cultivated regardless of day-to-day circumstances (Kabat-Zinn, 1996).<sup>1</sup>

<sup>1</sup> It is also important to distinguish between meditation (as described here) and Benson’s Relaxation Response (e.g., Benson & Klipper, 1975), which has elements of both relaxation training and concentration meditation. It is also important to distinguish present use of the term “mindfulness” from the conception of mindfulness described by Langer (e.g., 2002). While both forms of mindfulness include an engagement with current events and experience, the former concerns an alert presence to what is taking place without attempts to change it, while the latter concerns active, cognitive manipulation of stimuli to serve self-chosen ends.

## **II. Empirical Evidence: A Review of the Research**



Meditation may both augment and expand current approaches to higher education. The research reviewed in this paper points to three ways in which meditation can be applied to higher education:

- Enhancement of cognitive and academic performance
- Management of academic-related stress
- Development of the “whole person”

Four decades of research provide evidence of the significant effects of meditation on education-related variables. In this section, we highlight major findings in three areas: Cognitive and Academic Performance; Mental Health and Psychological Well-Being; and Development of the Whole Person.

### ***A. Effects of Meditation on Cognitive and Academic Performance***

Several aspects of cognitive functioning are central to successful higher academic performance, including the ability to focus attention on specific tasks and to process information quickly and effectively. Research on concentration and mindfulness forms of meditation supports the use of both in academic settings. Preliminary research suggests that meditation impacts academic performance as well.

#### **1. Ability to maintain preparedness and orient attention**

***Key Research Finding: Mindfulness meditation may improve ability to maintain preparedness and orient attention.***

Attention is critically important to the mental processing central to learning (LaBerge, 1995). Attention is increasingly divided in the modern world, as information flow increases and individuals seek to perform multiple activities simultaneously or seek multiple stimulus inputs. Division of attention can have deleterious effects on student performance, however. For example, in a recent study of multitasking (Foerde, Knowlton, & Poldrack, 2006), the presence of a secondary task produced primarily rote learning. In contrast, attention to a single task produced an additional ability to generalize the learned information to new situations.

Despite its importance to learning, focused attention is rarely if ever systematically trained or cultivated in most educational settings. And yet, attentional training has been the hallmark of meditative disciplines for centuries, and thus the incorporation of these practices into higher education could be of great benefit. Practitioners of concentrative meditations first set and attempt to retain focus on a particular object (such as the sensation of breathing or a word), notice when the intended focus is lost, discontinue the unintended focus (e.g., worrying about some impending task) once it is noticed, and then restore the intended focus (Dunne, 2007). Research suggests that meditative practices can, in fact, enhance specific aspects or subsystems of attention. Such research is important to demonstrate the value of meditation in educational settings, where attentional skills are central to successful learning. For example, close attention to a task can inhibit distraction by non-relevant stimuli in the task environment (Simons & Chabris, 1999).

Several recent studies with adults offer evidence that meditation may enhance attentional capacities and attention-related behavioral responses.

A study by Jha et al. (2007) found enhanced alerting attention effects after a month-long mindfulness meditation retreat and also found enhanced orienting attention among those receiving MBSR mindfulness training. The researchers examined three functionally and neuroanatomically distinct but overlapping attentional subsystems: alerting, orienting, and conflict monitoring. Alerting involves achieving and maintaining a state of preparedness,

orienting directs and limits attention to a subset of possible stimulus inputs, and conflict monitoring prioritizes among competing tasks and responses. All three subsystems have clear relevance to learning situations. Jha et al. (2007) used the Attention Network Test (ANT) (Fan, McCandliss, Sommer, Raz, & Posner, 2002) to assess the effects of meditation, primarily of a concentrative form, on these forms of attention in three groups differing in extent of meditation practice ( $n = 17$  in each): One group, among whom many had an extensive meditation practice history, completed a month-long residential mindfulness meditation retreat with a 10-12 hour per day practice schedule (mean age 35 years); a second group naïve to meditation completed an 8-week Mindfulness-Based Stress Reduction (MBSR) program with one 3-hour class per week and a recommended 30 minutes per day of meditation practice (mean age 24 years); and a third group without meditation experience served as controls (mean age 22 years).

At pre-test, participants in the retreat group demonstrated improved conflict monitoring performance relative to those in the MBSR and control groups. At post-test, participants in the MBSR course demonstrated significantly improved ability to orient attention in comparison with the control and retreat participants, while retreat group members demonstrated heightened alerting relative to control and MBSR participants. The groups did not differ in conflict monitoring performance at post-test.

The human cerebral cortex plays a central role in many complex brain functions including memory, attention, perceptual awareness, “thinking,” language and consciousness, and cortical thickness has been correlated with intelligence (Narr et al., 2007). Lazar et al. (2005) found that brain regions associated with attention, interoception, and sensory processing, including the prefrontal cortex and right anterior insula, were thicker in meditation participants than control participants matched for age, gender, race, and years of education. Further, thickening in selected brain regions in the meditators was correlated with amount (in years) of meditation practice.

While preliminary, this research suggests that attention and the behavioral responses associated with it may be flexible skills that can be cultivated through concentration and mindfulness meditation practices (see also Valentine & Sweet, 1999). Of additional relevance to education, recent research also suggests that meditative practice may help to ameliorate the deficits associated with Attention Deficit Hyperactivity Disorder (ADHD), as assessed by computer-based tasks in controlled laboratory settings and parental report (Zylowska, Ackerman, Yang, Futrell, & Horton, 2008; Woolacott, 2007).

## **2. Ability to process information**

***Key Research Finding: Mindfulness meditation may improve ability to process information quickly and accurately.***

Information processing is a complex cognitive process which requires different levels of elaboration to take place as stimuli are first attended to, perceived, labeled, and finally assigned meaning based on memory (e.g., Bransford, 1979; Craik & Lockhart, 1972). For a number of theorists (e.g., Sternberg, 1984), information processing is closely related to intelligence, as the ability to attend to, remember, and mentally manipulate information is considered important to general cognitive ability and to academic success.

A study by Slagter et al. (2007) examined the effect of meditative practice on the expansion of attentional limits through investigation of a phenomenon known as “attentional blink.” When two meaningful stimuli embedded in a rapid stream of events occur in close temporal proximity, the second stimulus is often not seen. This is thought to occur due to

suboptimal attentional resource sharing; that is, if too much attention is allocated to one stimulus, a later, equally meaningful stimulus is easily missed.

In this study, 17 participants completed computerized attentional tasks before and after a 3-month mindfulness retreat, during which they meditated 10-12 hours per day, first in stabilizing attention (concentration) then in cultivating a non-reactive sensory awareness. The attentional blink task involved attending to and then recording target numbers embedded in a series of letters that were quickly flashed on a computer screen. The findings demonstrated that compared to 23 control participants, who were novice meditators meditating 20 min/day for 1 week prior to each assessment, retreatants showed lower attentional blink in a non-meditative state; that is, they more accurately identified the second stimulus, which was dependent upon efficient processing of the first stimulus.

### **3. Academic achievement**

***Key Research Finding: Concentration-based meditation, practiced over a long-term, may have a positive impact on academic achievement.***

Academic achievement measured in terms of course and examination grades, degree completion rates, and other concrete criteria, usually represents a “bottom line” for any new educational supplement. One study has examined the effect of meditative practice on examination grades among both college and middle school students.

In a randomized controlled trial with college students, Hall (1999) randomly assigned 56 undergraduates to two study groups, one of which included concentration-based meditation. The meditation intervention included a one-hour session of meditation instruction twice a week for the academic semester, which included guidance in simple attentional focusing and in relaxation exercises. Meditation was practiced for 10 minutes at the start and conclusion of each one-hour study group session, and this group was instructed to meditate at home and before exams. The control group also met for one hour of study a week but was not introduced to meditation. The groups did not differ in grade point average (GPA) at the beginning of the study, but at the end of the Spring academic semester after the Fall semester training, the treatment group had significantly higher GPA scores compared to the control group.

#### ***B. Effects of Meditation on Mental Health and Psychological Well-Being***

For many students, higher education can be a stressful experience as they grapple with various personal, developmental, social and academic challenges as well as the transitional nature of college life (Deckro et al., 2002; Towbes & Cohen, 1996). The demands of learning new, sometimes complex material, and often under time pressures imposed by the competing demands of full course loads and part-time jobs, can result in considerable stress and adversely affect psychological well-being in undergraduate, graduate, and professional students. The stresses of higher education have been related to numerous mental and physical health problems (Segrin, 1999; Labbe et al., 1997) and may adversely affect academic and cognitive performance (Hill, 1984; Keogh, Bond, & Flaxman, 2006; Eysenck, 1996).

#### **1. Stress, anxiety, and depression**

***Key Research Finding: Mindfulness meditation may decrease stress, anxiety, and depression.***

While some degree of stress may help to enhance such performance, too much can inhibit cognitive faculties that are crucial to learning and to demonstrations of it (e.g., examinations). For example, the presence of emotional states like anxiety and depression can inhibit the

capacity to screen out irrelevant stimuli, thereby increasing distractibility, as well as contribute to poor organizational skills, and make attentional focus on specific tasks for extended periods more difficult. There is also evidence linking the presence of excessive stress and negative affect to memory impairment, with obvious implications for learning (Bremner & Narayan, 1998).

As Daniel Goleman (2006, p. 268) notes, stress “handicaps our abilities for learning, for holding information in working memory, for reacting flexibly and creatively, for focusing attention at will, and for planning and organizing effectively.”

Four decades of research with adult student, community, and clinical populations has provided evidence that meditation reduces negative mental health symptoms, including stress and anxiety, and enhances psychological well-being (e.g., Baer, 2003; Brown, Ryan, & Creswell, 2007; Murphy & Donovan, 1997). Several such studies have been conducted with students in higher education settings (e.g., Jain, Shapiro, Swanick, Roesch, Bell, & Schwartz, 2007; Rosenzweig et al., 2003; Shapiro, Schwartz, & Bonner, 1998). Much of this research has examined the potential benefits of mindfulness-based meditation using the MBSR intervention model.

In a randomized, wait-list controlled study with 78 medical and premedical students, Shapiro, et al. (1998) examined the effects of an 8-week MBSR program on symptoms of anxiety and depression, both of which are elevated in medical student populations (Dyrbye, Thomas, & Shanafelt, 2006). Results indicated decreased levels of anxiety and depression in the MBSR group as compared to the wait-list control group. These reductions were maintained even during a stressful final exam period, and findings were replicated when participants in the wait-list control group received the MBSR intervention.

A more recent study examined the effects of a MBSR course on stress and mental health symptoms in graduate counseling psychology students (Shapiro, Brown, & Biegel, 2007). This semester-long, 10-week course followed the MBSR program model and included weekly instruction in a variety of mindfulness meditative techniques and home-based practice. Relative to matched, cohort control participants taking didactic courses, student participants in the MBSR course showed significant pre-post declines in perceived stress, negative affect, rumination, state and trait anxiety, and significant increases in positive affect. MBSR participation was also associated with increases in self-reported mindfulness. This enhancement was significantly related to several of the beneficial effects of MBSR participation, including perceived stress, anxiety, and rumination. This finding provides support for the claim (Shapiro, Carlson, Astin & Freedman, 2006) that the enhancement of mindfulness is partially responsible for these beneficial effects.

Another recent study found evidence to suggest that meditation-based stress-management practices reduce stress among college graduates (Oman, Shapiro, et al, 2008). In addition, the researchers found a correlation between participation in the meditation program and forgiveness.

In a study that indicates college students may benefit from shorter term meditation courses, Tang et al (2007) assigned a group of 40 undergraduate Chinese students to 5 days of meditation training using a technique called the integrative body-mind training (IBMT). Compared with a control group, the IBMT group showed greater improvement in conflict scores on the Attention Network Test, lower anxiety, depression, anger, and fatigue, and higher vigor on the Profile of Mood States scale, a significant decrease in stress-related cortisol, and an increase in immunoreactivity.

## **2. Regulation of emotional affect**

***Key Research Finding: Mindfulness meditation supports better regulation of emotional affect and the cultivation of positive psychological states.***

Recent research indicates that mindfulness, both as a disposition and as a state induced in the laboratory, is related to better affect regulation. Baer, Smith, Hopkins, Krietemeyer, and Toney (2006) as well as Brown and Ryan (2003) found that dispositional mindfulness was related to several indicators of emotion regulation. In an fMRI study with college students, Creswell, Way, Eisenberger, and Lieberman (2007) found that those higher in MAAS-measured dispositional mindfulness showed less reactivity to emotionally threatening visual stimuli, as indexed by lower amygdala activation, as well as stronger prefrontal cortical (PFC) activation, suggestive of better executive control. More mindful students also showed a stronger inhibitory association between the PFC and amygdala, suggesting better regulation of emotional reactions. Other recent research has shown that induced mindful states can produce a quicker recovery from negative mood states, in comparison to other, common regulatory strategies like distraction and rumination (e.g., Broderick, 2005). These findings are important because mindfulness is a capacity developed through practice. The direct link between meditation and emotional regulation awaits future study.

The effects of mindfulness meditation on stress and mental health in students appear to extend beyond those of basic relaxation. When an individual is able to successfully self-regulate through relaxation techniques (such as imagery or guided mental, emotional, or somatic exercises) they experience a release of physical tension that acts to oppose the stress response and creates a calm state of mind and body. In contrast, mindfulness meditation involves a simple noticing of what is taking place in the mind and body without attempts to alter the experience. Relaxation may or may not be a byproduct. Recent research provides evidence for unique patterns of psychophysiological response in mindfulness-based versus relaxation-based practices (Ditto, Eclache, & Goldman, 2006).

Differences between these practices also appear to translate into psychological effects. In a randomized controlled trial with 83 medical students, graduate nursing students, and undergraduate students majoring in premedical or pre-health studies, all of whom reported distress, Jain et al. (2007) found that month-long programs in mindfulness meditation and somatic relaxation produced similar salutary effects on distress reduction and enhancement of positive mood relative to no-treatment control students. However, those enrolled in the mindfulness meditation program had a more specific ability to reduce distractive and ruminative thoughts and behaviors (cf., Shapiro et al., 2007). This reduction helped to explain the effect of mindfulness meditation on the reduction of distress in these students.

These studies suggest that mindfulness-based training may enhance students' capacities to tolerate the stresses of higher education, reflected in self-reported decreases in stress, negative emotion, and other psychological symptoms. This research also suggests that mindfulness practice may enhance positive psychological states (see also Davidson et al., 2003; and Shapiro, Santerre & Schwartz, 2002, for review). This is potentially important in educational contexts, since positive emotions have been shown to enhance abilities to process and retain new information, and to create patterns of thought that are flexible and creative (Fredrickson, 1998). Further, individuals who report more positive emotions show more constructive and flexible coping, more abstract and long-term thinking, and more successful affect regulation following stressful events (Fredrickson, 1998).

***C. Effects of Meditation on Development of the Whole Person***

The development of the "whole person" is increasingly valued in higher education circles. In seeking to complement the existing pedagogy that focuses almost exclusively on critical

reasoning, quantitative analysis, and objective external technologies (Zajonc, 2006; Duerr, Zajonc, & Dana 2003), educators have begun to expand the focus of higher education to foster the development of interpersonal skills, emotional balance, and other forms of intelligence (e.g., Gardner, 1983; Goleman, 1995, 2006). As Lief (2007), notes, “balanced education cultivates abilities beyond the verbal and conceptual to include matters of heart, character, creativity, self-knowledge, concentration, openness and mental flexibility.” Evidence suggests that meditative training offers an effective means to develop some of these qualities valued by educators and others with interests in human development.

As discussed by Astin (2004), many of the literary works and philosophical traditions that initially formed the core or centerpiece of liberal arts education were grounded in the maxim, “Know Thyself.” Despite this, most colleges and universities give minimal attention to the development of self-awareness or self-understanding. The development of such insight may be a central skill enabling individuals to understand themselves, the behavior of others, resolve conflict, and so on. As Astin et al. (2007, p. 34) note, “... while we are justifiably proud of our ‘outer’ development in fields such as science, medicine, technology, and commerce, we have increasingly come to neglect our ‘inner’ development—the sphere of values and beliefs, emotional maturity, moral development, spirituality, and self-understanding.”

Meditative practice traditionally values the cultivation of creativity, positive social relationships, compassion for self and others, and empathy (Walsh & Shapiro, 2006). Most research in this area is newer than in the other domains of inquiry reviewed, but it offers promise for application to education, where creative expression, social skills, and other psychological strengths and virtues may enhance learning and healthy learning climates.

## 1. Creativity

### ***Key Research Finding: Meditation can support the development of creativity.***

Creativity traits and capacities include perceptual skill, ideational fluency, openness to experience, and emotional flexibility (Csikszentmihalyi, 1996). Related to but distinct from intelligence, creativity is a key aspect of the educational experience, and key to success in professions that require creative achievement. Thus, primary, secondary, and higher education researchers have a keen interest in identifying factors that may promote creativity.

In a small trial comparing the effects of Zazen meditation to relaxation on creativity, Cowger and Torrance (1982) had participants in both groups practice for 30 minutes a day for 17-21 sessions. Based on the Torrance Tests of Creative Thinking, the meditators showed significant gains in creativity, as defined by heightened consciousness of problems, perceived change, invention, sensory experience, expression of emotion/feeling, humor, and fantasy.

## 2. Interpersonal relationship skills

### ***Key Research Finding: Meditation supports and enhances the development of skills needed for interpersonal relationship.***

Practices for the cultivation of empathy, compassion, and other qualities with consequences for interpersonal behavior have a long tradition in the meditative disciplines (Walsh, 1999). Mindfulness practice, for example, is believed to lead to a felt sense of trust and closeness with others and an enhanced ability to approach stressful interpersonal events as challenges rather than threats (Kabat-Zinn, 1996), perhaps by promoting a capacity to witness thought and emotion so as not to react impulsively and destructively.

Meditation may foster not only day-to-day interpersonal functioning but also adaptive responses to social conflict. Research examining the effects of meditation on such positive interpersonal functioning is worth noting, given the importance of a sense of closeness and belonging for psychological well-being (Baumeister & Leary, 1995; Ryan & Deci, 2000) and the relevance of positive interpersonal behavior for healthy learning climates (Goleman, 2006).

Tloczynski and Tantriella (1998) examined the effects of Zen breath meditation on college adjustment. Seventy-five undergraduates reporting heightened anxiety were randomized into meditation, relaxation, and control groups. While anxiety and depressive symptoms significantly decreased in both meditation and relaxation groups as compared to the control group, only the meditation group showed a significant positive change in self-reported interpersonal relationship quality.

Other research examining the effects of the MBSR program (and adaptations of it) have also shown positive effects on interpersonal relationships (e.g., Carson, Carson, & Baucam, 2004). Recent research has also shown that dispositional mindfulness, measured with the Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003), predicts a felt sense of relatedness and interpersonal closeness (Barnes, Brown, Krusemark, Campbell, & Rogge, 2007; Brown, 2007) as well as more adaptive responses to social stress (Barnes et al., 2007; Creswell, Eisenberger, & Lieberman, 2007). Since meditation practice has been shown to increase dispositional mindfulness, as assessed with the MAAS (Cohen-Katz, Wiley, Capuano, Baker, & Shapiro, 2005; Shapiro et al., 2007), these findings lend support to the claim that meditation may help to enhance interpersonal relationship.

### 3. Empathy

#### ***Key Research Finding: Empathetic responses are increased with meditation and mindfulness practices.***

All schools of meditation emphasize the cultivation of empathic capacities (Shapiro & Walsh, 2003; Walsh, 1999). Two recent studies with graduate students suggest that mindfulness training encourages empathic tendencies. Shapiro and colleagues (1998) found that MBSR increased levels of self-reported empathy in premedical and medical students relative to wait-list controls. As with other outcomes in this study reported already, these results held during a stressful exam period, and were replicated when participants in the wait-list control group received the mindfulness intervention.

Another study discussed earlier, which examined the effects of mindfulness training on a number of psychological variables in graduate counseling psychology students, included self-reported empathy (Shapiro et al., 2007). Counseling students who participated in a 10-week MBSR-based stress management course showed significant pre-post increases in empathic concern for others relative to a matched cohort control group. This study also showed that increases in MAAS-assessed mindfulness were related to these increases in empathy (Shapiro & Brown, 2007).

Lutz et al (2008) assessed brain activity using functional magnetic resonance imaging (fMRI) while novice and expert meditation practitioners generated a loving-kindness-compassion meditation state. Research subjects were presented emotional and neutral sounds. During meditation, activation in insula was greater in the expert compared to the novice meditators during presentation of negative sounds. The findings of the study support the role of the limbic circuitry in emotion sharing, which is a key component of empathy and compassion, and point to how long-term meditation practice can sensitize this limbic circuitry.

## 4. Self-compassion

### ***Key Research Finding: Meditation may help to cultivate self-compassion.***

Self-compassion, a relatively new construct under study in psychology, has been defined as being kind and understanding toward oneself in instances of pain or failure; perceiving one's experiences as part of the larger human experience; and holding painful thoughts and feelings in balanced awareness rather than over-identifying with them (Neff, Rude, & Kirkpatrick, 2007). Self-compassion is important to whole person development because it has been related to other positive psychological features, including wisdom, personal initiative, curiosity and exploration, happiness, optimism, and positive affect, even after controlling for personality style and other qualities related to these features (e.g., Neff et al., 2007).

Two recent studies, one with health professionals (Shapiro, Astin, Cordova, & Bishop, 2005) and the other with graduate students (Shapiro et al., 2007), demonstrated significant increases in self-compassion through MBSR participation. Self-compassion may be particularly important in dealing with unpleasant life events. Leary, Tate, Adams, Allen, and Hancock (2007) found that self-compassion attenuated college students' reactions to negative personal and interpersonal events in ways that, under some circumstances, were even more beneficial than self-esteem.

The research reviewed here suggests that meditation, particularly mindfulness-based, contributes to qualities that produce well-rounded persons, reflected in higher creativity and greater capacities for positive interpersonal behavior and healthy social relationships.

## III. Future Research Directions

As this review suggests, there is great promise for integrating meditation into higher education. Still, while the body of meditation research is growing, comparatively little research has been devoted to applications in educational contexts specifically, and even less so in higher education. Thoughtful, rigorous study is needed to elucidate how and to what extent meditation may complement the higher education enterprise. In this final section we make five recommendations for future research, drawing upon both the strengths and weaknesses of extant studies. These recommendations concern:

- the importance of theory-driven investigation
- the need for methodological rigor in future research
- an expansion of the scope of outcomes studied
- the study of best practices for teaching and researching meditation in educational settings

### ***A. Theory-Based Investigation***

Theory allows researchers to make logical predictions about behavior, to explain it, and to apply research-derived principles of behavior to real-world settings. As such, theory offers a valuable guide to research investigations. Several cognitive, developmental, and educational theoretical models offer promise as guides for the study of meditation in higher education. Four models have garnered considerable empirical support:

- Attention
- Metacognition in learning (e.g., Flavell, 1979)
- Transformative learning (e.g., Mezirow, 2000)
- Emotional intelligence (including stress management and affect regulation) (e.g., Salovey & Mayer, 1990)

Collectively, these models address the three domains of research inquiry reviewed in this report. These theoretical perspectives may serve as valuable starting points for future investigation. Because these perspectives already have empirical foundations, they can help to provide firm footing for research on meditation in educational settings. This brief survey is not meant to exclude theoretical perspectives that also have promising application to the study of meditation in education, including Self-determination Theory (e.g., Deci & Ryan, 2002), Flow Theory (Csikszentmihalyi, 1990), and others.

## 1. Attention

Fundamentally, meditation involves training in attention, and attention is a key cognitive capacity in learning. Attention has three primary functions: alerting, orienting, and conflict monitoring, and each of these functions is supported by unique attention networks in the brain (Posner & Rothbart, 2007; Raz & Buhle, 2006):

- Alerting attention concerns a steady, uninterrupted attention to one's experience. The alerting attention network functions to maintain response readiness and alertness, primarily through the steady monitoring and maintenance of sustained attention (Raz & Buhle, 2006; Robertson & Garavan, 2004).
- Orienting attention, to date the most studied function of attention, involves effective scanning and situationally appropriate selection of information in the perceptual field. It is studied through tasks that assess speed of orientation to a cued location (Raz & Buhle, 2006).
- Conflict monitoring, also called executive attention, monitors and resolves conflicts among competing behavioral responses and has been associated with effortful control, planning and decision making, error monitoring, cognitive and emotion regulation, and the ability to overcome habitual actions (Fernandez-Duque, Baird, & Posner, 2000; Raz & Buhle, 2006; Zylowska et al., 2008). This capacity may also be called a metacognitive skill.

All three forms of attention are invoked in learning and education contexts, and future research could explore whether meditation enhances attentional capacities in ways that improve academic performance, as well as important social and emotional capacities that foster whole person development. To date, no such research has been conducted, but recent evidence (Jha et al, 2007) suggests that both alerting and orienting attention may be enhanced by meditation, especially mindfulness training. Mindfulness may also be associated with enhancements in executive attention in situations requiring self-regulation.

Evidence reviewed by Brown et al. (2007) supports links between dispositional mindfulness, as assessed by the MAAS, and more effective behavioral regulation, emotion regulation, and self-control. The study by Zylowska et al. (2008) reviewed earlier also suggests that mindfulness training (MBSR) may improve executive attention in adolescents and adults with attention deficit disorder. Well-validated laboratory tasks exist to assess all three forms of attention discussed here, including the ANT (Fan et al., 2002). Education researchers could seek convergence between performance on such tasks and education-relevant outcomes.

## 2. Metacognition

Metacognition represents the capacity to be aware of, reflect upon, and exercise control over one's cognitive processes (Statt, 1998), including those important to learning. Examples include planning the approach to a particular task, monitoring one's comprehension of material

being read or listened to, and evaluating progress toward the completion of learning tasks. Also implicated in metacognition is the ability to monitor or be aware of one's present knowledge state (i.e., what one knows, what one doesn't yet understand, what remains to be learned). Sternberg (1986) has argued that the ability to allocate cognitive resources, such as determining when and how a particular task will best be accomplished, is a central feature of intelligence.

Meditation practices are hypothesized to strengthen certain aspects of metacognition, particularly the capacity to be aware of one's mental processes through monitoring or observation of the activity of the discursive mind (Segal, Williams, & Teasdale, 2002).<sup>2</sup> Meditation also increases awareness of one's habitual thought patterns, including those that may weaken concentration, information retention, and otherwise impede learning. Examples of dysfunctional patterns (beliefs) include "Even if I study hard, I won't do well on this test," or "I always do poorly in math." Since such cognitions often operate outside of conscious awareness, the capacity to dispute their irrational and sometimes absolute nature (cf., Beck, 1976; Ellis, 1962) rests upon first becoming aware that they are present.

Emotional habits, such as being anxious before an exam, are also frequently supported and sustained by dysfunctional beliefs (Wells, 2002). For example, a student prone to worry may hold a belief that "If I worry, I'll be better prepared," thereby reinforcing stress. Meditative awareness of these patterns challenges the veracity of dysfunctional thoughts and encourages one to adopt alternative perspectives (Segal, Teasdale, & Williams, 2002). A mindfulness-based approach to cognitive therapy has shown considerable success in alleviating a debilitating mood disorder (chronic depression) that is often driven by dysfunctional thought patterns (Ma & Teasdale, 2004; Teasdale, Segal, Williams, Ridgeway, Soulsby, & Lau, 2000).

### 3. Transformative Learning

Theories of transformative learning offer promise for guiding research into the potential value of meditative practices to foster whole person education, as well as critical thinking skills. Prominent among these theoretical perspectives is Mezirow's (e.g., 1978) "perspective transformation," which posits that a primary function of education should be to transform students' perspectives by fostering a particular type of metacognitive awareness, namely greater insight into how the assumptions students hold serve to "constrain the way they perceive, understand, and feel about their world" (Mezirow, 1991; p. 167). By recognizing this, there is opportunity to "change these structures of habitual expectation to make possible a more inclusive, discriminating, and integrating perspective, and, finally, make choices or otherwise act upon these new understandings" (p. 167).

The capacity to take in new information or adopt new models of reality requires that there be some openness to considering alternative perspectives and viewpoints, recognizing and appreciating that these perspectives are likely to differ from those we've previously held to be true. This requires a willingness and ability to observe our own viewpoints—that is, to not be entirely embedded in or subject to them. Harvard developmentalist Robert Kegan (e.g., 1982; 1994) suggests that this process of turning subject into object is a hallmark of human development across the lifespan.

Meditative practices may strengthen the capacity to observe one's own internal, cognitive-emotional processes, including biases, beliefs, and mental perspectives, and through that observation, lessen personal identification with or attachment to them, a process that Shapiro

---

<sup>2</sup> In discussing metacognition it is important to note that this term refers to a set of cognitive processes that involve planning and monitoring cognitive activities and checking or testing goal-related outcomes (Schwartz & Perfect, 2002). In the present context, we focus only on the limited aspect of metacognition that concerns a monitoring of cognitive activities.

et al. (2006) have termed “re-perceiving.” By learning to bring attention/awareness to preferences, biases, and mental perspectives, the student can begin to see that what is *aware* of a particular viewpoint or perspective is not caught in or limited by that viewpoint or perspective. By bringing awareness to personal, or idiosyncratic viewpoints, the student may cease to be wholly defined by, and potentially limited by, those viewpoints. This should aid in the development of critical thinking skills, including the ability to examine assumptions, discern hidden values, evaluate evidence, and assess conclusions.

Like a view from the mountain top, meditative awareness can help an individual to broaden perspectives and see things in new ways and with greater clarity. In this way, meditation may help to further the mission of educational institutions that are committed to helping students develop broader, more inclusive perspectives on themselves, others, and the world.

#### **4. Emotional Intelligence**

Howard Gardner’s theory of multiple intelligences (e.g., 1983; 1993) attempts to account for a wider range of human intelligence than that tested by standard IQ tests. He posited eight intelligences: linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, and more recently, naturalist. Salovey & Mayer (1990) introduced the concept of “emotional intelligence” (EI) which “involves the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth” (Mayer & Salovey, 1997, p.8; see Goleman, 1995, for an extensive treatment of this construct). The construct of EI appears to map onto two of Gardner’s proposed intelligences, intrapersonal and interpersonal.

Meditative practices foster the development of intrapersonal and interpersonal (i.e., emotional) intelligence through the cultivation of greater awareness of one’s internal (i.e., cognitive, affective, and somatic) states, with the resulting ability to regulate emotions more effectively.

Mindfulness and other meditative practices may provide students with additional skills for managing the stresses and challenges they typically face, including the often competing demands of school and work, peer and family relationship issues, and existential questions related to identity formation and future life choices. In contrast to many cognitive-behavioral approaches to managing stress and negative affect, meditative practices, in particular mindfulness-based approaches, emphasize emotion-focused coping through allowing or accepting difficult cognitive and emotional states. In other words, the emphasis in such meditative practices is on changing one’s *relationship* to the contents of awareness (e.g., thoughts, feelings, sensations) rather than attempting to change or control the content itself, which isn’t always possible or adaptive. That said, recent research indicates that mindfulness is not incompatible with active, problem-solving forms of coping, but it appears to be inversely related to tendencies toward maladaptive forms of coping with stress, including denial and behavioral disengagement through alcohol, drugs, and other behaviors with mental and physical health costs (Weinstein, Brown, & Ryan, 2007). More generally, meditative training appears to offer more “degrees of freedom”—including greater choice and self-endorsed action—in response to stressful events and experiences (e.g., Brown & Ryan, 2003; Levesque & Brown, 2007).

Given the research pointing to the effectiveness of meditation for stress management and affect regulation and the focus in many of these practices on heightening awareness of one’s characteristic cognitive-emotional states, these practices hold the potential to strengthen the

following areas identified by Salovey & Mayer (1990) and Goleman (1995) as central components of emotional intelligence:

- 1) being aware of one's emotions
- 2) being able to manage one's emotions
- 3) being sensitive to the emotions of others
- 4) being able to respond to and negotiate with other people emotionally

### ***B. Methodological Rigor***

There are six aspects of research design that will benefit future investigations of the application of meditation to higher education.

#### **• Specify type of meditation studied**

It is important to identify whether a concentration practice or mindfulness practice is being used in the study. For example, Transcendental Meditation practice involves a focusing of attention onto a perceptual object, which appears to represent a concentration practice. Mindfulness-based interventions involve both concentration and mindfulness practices.

Research that studies each form separately will aid our understanding of meditative effects. For example, concentration practices are thought to foster sustained attention and concentration, increased clarity, and calmness of mind, while mindfulness practices are believed to enhance self-insight, self-regulation, compassion, wisdom, and other outcomes (e.g., Shapiro & Walsh, 2003). A new research effort underway by Saron, Wallace, and colleagues ([www.shambhalamountain.org/shamatha](http://www.shambhalamountain.org/shamatha)) on a clearly specified form of concentration practice called shamatha provides an example of such research. With electroencephalogram (EEG) caps, attention measurements, emotion testing, and meditation practice, researchers hope to answer a key question about the brain systems that regulate attention and emotion: How much can those systems change with effort, how much is plasticity at work?

#### **• Develop appropriate assessment tools**

The careful use of cognitive, affective, and interpersonal assessment tools is important. Well-validated, reliable instruments tapping first-person (subjective), second-person (e.g., peer or teacher report), and third-person (e.g., behavioral tasks or observations, neurological measures, especially the fMRI) will be important to provide convergent evidence, where possible. Some research, including that investigating new phenomena or those currently difficult to quantify, may include qualitative reports of phenomenological changes experienced through meditative practice. This is also important because meditation experiences can be subtle and complex and may not easily lend themselves to quantification by existing measures. Qualitative research can also provide the internal frames of reference on subjective experiences that facilitate the development of quantitative measures.

#### **• Use of appropriate research design**

Some meditation research – that examining effects of long-term practice, for example – necessitate correlational designs, but study of the effects of meditation as, for example, a newly introduced educational activity, is well-suited to quasi-experimental and experimental designs, where participants in different groups are matched on a key set of characteristics (quasi-experimental) or randomly assigned to meditation or control conditions (experimental). Ideally, a control condition will be “active,” involving a non-meditative program that controls for instructor attention, time commitment, and other elements that provide structural equivalence to

the meditation intervention. Such well-controlled designs allow researchers to better determine whether meditation practice itself is responsible for observed effects.

- **Use of active controls**

Use of active controls also helps to deal with a fourth methodological issue, that of expectancy effects. When students in both treatment and control groups are offered desirable programs, the effects obtained are less likely to be influenced by an expectation of improvement in the intervention group, and a lack thereof in the (inactive) control group. Researchers would also do well to measure participants' expectation of benefit at the beginning of the study.

- **Longitudinal studies**

Longer-term follow-up assessment of meditation interventions is important to determine whether the effects of meditation are stable and enduring or fleeting. In this regard, clinical psychological and behavioral medicine research on mindfulness meditation has provided good models (Randolph et al, 1999; Riebel, et al, 2001; Williams et al, 2001).

- **Larger sample size**

Large samples drawn from representative student populations will help researchers and educators to determine whether results obtained are robust and can be generalized to a variety of academic institutions. At some higher education sites, potential student participant pools are small, and researchers at different sites may do well to work collaboratively to perform single, standardized research protocols. Such research would not only increase sample sizes but also enhance the representativeness of the results obtained.

### ***C. Investigation of a Broader Scope of Outcomes***

Within each of the domains reviewed here--cognitive performance, mental health, and whole person variables--there is room for deeper, more rigorous investigation of the phenomena currently under study (e.g., attention, information processing, course grades, affect regulation, empathy). There is also room for study of related phenomena that will help educators to better understand the breadth of impact of meditative practices on student experience and behavior. It may be useful to expand the traditional definitions of education to include the development of social, emotional and other valuable forms of intelligence relevant to occupational accomplishment, life satisfaction, ethics, and pro-social engagement (e.g., Gardner, 1993). Such research may require the development or implementation of new tools to assess phenomena, including emotional or social intelligence, that have received less research attention than traditional indicators of learning.

### ***D. Best Practices***

Future research should explore factors and processes relevant to educational settings. Under what conditions are the effects of meditation in an academic setting optimized?

Several have been proposed, including attentional refinement, metacognitive skill enhancement, and increased self-regulatory abilities (e.g., Baer, 2003; Brown et al., in press; Shapiro et al., 2006). Efforts to understand such processes can lead to a refinement of meditative instruction and perhaps facilitate the development of new meditation-based instructional approaches.

Meditation researchers are interested in how the amount of time spent in meditation affects the outcomes under investigation. To date, research results on this question have been mixed, with some reporting positive effects of practice duration or frequency on outcomes (e.g.,

Carson et al., 2004) and others reporting null findings (e.g., Davidson et al., 2003). There may be thresholds above which meditative practice is more likely to show direct effects on outcomes (Shapiro et al., 2007), and effects may be other than the linear relations typically examined in research. It will also be important for researchers to study not only *quantity* of practice time but also *quality* of time spent in meditation, given the wide variation in subjective experience that is possible in such activity (e.g., from sleep to acute alertness).

The study of meditation in educational settings comes with questions about how best to teach it in the unique climates of colleges and universities. What are the differences between incorporating it into an existing course and teaching it as a course in and of itself? Should students be screened in some way, given the potential risks that may be associated with certain forms of meditation (e.g., Lansky, & St. Louis, 2006; but see Chalmers, 2005)? Investigation of pre-existing psychological factors that predict success in meditation (e.g., personality traits, motivation) will also be helpful.

Another important consideration for future research is the expertise of the meditation teacher. Some (e.g., Kabat-Zinn, 2003) have argued that personal, regular practice in meditation is essential for instructors. Without this, an instructor cannot speak with authority about meditation nor adequately address student experiences (Schumacher, 1977). Personal practice experience may also facilitate the mirroring process that takes place in educational contexts, in which the engagement, focus, and presence of the teacher can help to activate those states in the student (Goleman, 2006). A fuller treatment of teacher training in meditation is available in a report on contemplative practices in K-12 education (Garrison Institute, 2005).

#### IV. Conclusions

The applications of meditation in higher education are potentially broad, affecting cognitive, emotional, and interpersonal domains. Research reviewed here suggests that meditation can have a positive impact on academic performance, psychological well-being, and interpersonal experience for students in college, medical school, and other higher education settings.

While there is a growing body of research to support these findings, there is a need for thoughtful, well-designed research to guide educators in integrating meditative and other contemplative practices into the academy. Building on the extant literature, theory-driven investigation can begin to ask more precise questions such as:

- How do we best incorporate meditation into education?
- What outcome measures and methodologies most effectively capture the multidimensional effects of meditation?
- What are the processes underlying the effects of various meditative practices?

## V. References

- Astin, A. W. (2004). Why spirituality deserves a central place in liberal education. *Liberal Education*, 90, 34–41.
- Astin, A. W., Astin, H. S., Chopp, R., Delbanco, A., & Speers, S. (2007). A forum on helping students engage the “big questions”. *Liberal Education*, 93 (2), 28.
- Baer, R. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, 10, 125–143.
- Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13, 27–45.
- Barnes, S., Brown, K. W., Krusemark, E., Campbell, W. K., & Rogge, R. D. (2007). The role of mindfulness in romantic relationship satisfaction and responses to relationship stress. *Journal of Marital and Family Therapy*, 33 (4), 482–500.
- Baumeister, R. F. & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497–529.
- Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York: International Universities Press.
- Benson, H., & Klipper, M. Z. (1975). *The relaxation response*. New York: William Morrow & Co.
- Benson, H., & Proctor, W. (1984). *Beyond the relaxation response*. New York: Putnam/Berkley.
- Bransford, J. (1979). *Human cognition: Learning, understanding, and remembering*. Belmont, CA: Wadsworth.
- Bremner, J. D. & Narayan, M. (1998). The effects of stress on memory and the hippocampus throughout the life cycle: Implications for childhood development and aging. *Development & Psychopathology*, 10, 871–885.
- 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. (2007). *Love the one you're with: Mindfulness in the expression of relatedness*. Paper presented at the 3rd International Conference on Self-determination Theory, University of Toronto, Canada.
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84, 822–848.
- Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry*, 18, 211–237.
- Bush, M. (2006). Foreword. *Teachers College Record*, 108, 1721–1722.
- Carrington, P. (1998). *The book of meditation*. Boston: Element Books.
- Carson, J., Carson, K., Gil, K., & Baucom, D., (2004). Mindfulness-based relationship enhancement. *Behavior Therapy*, 35, 471–494.
- Chalmers R. (2005). Transcendental meditation does not predispose to epilepsy. *Medical Hypotheses*, 65, 624–625.
- 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.
- Cowger, E. L., & Torrance, E. P. (1982). Further examination of the quality of changes in creative functioning resulting from meditation (zazen) training. *The Creative Child and Adult Quarterly*, 7 (4), 211–217.
- Craik, F., & Lockhart, R. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Thinking and Verbal Behavior*, 11, 671–684.

- Creswell, J. D., Way, B. M., Eisenberger, N. I., & Lieberman, M. D. (2007). Neural correlates of mindfulness and affect regulation. *Psychosomatic Medicine*, *69*, 560–565.
- Creswell, J. D., Eisenberger, N. I., & Lieberman, M. D. (2007). *Neurobehavioral correlates of mindfulness during social exclusion*. Unpublished data, University of California, Los Angeles.
- Csikszentmihályi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.
- Csikszentmihályi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: Harper Perennial.
- Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkrantz, M., Muller, D., & Santorelli, S. F., (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine*, *65*, 564–570.
- Deckro, G. R., Ballinger, K. M., Hoyt, M., Wilcher, M., Dusek, J., Myers, P., et al. (2002). The evaluation of a mind/body intervention to reduce psychological distress and perceived stress in college students. *Journal of American College Health*, *50*, 281–287.
- Deci, E. L. & Ryan, R. M. (Eds.), (2002). *Handbook of self-determination research*. Rochester, NY: University of Rochester Press.
- Ditto, B., Eclache, M., & Goldman, N. (2006). Short-term autonomic and cardiovascular effects of mindfulness body scan meditation. *Annals of Behavioral Medicine*, *32*, 227–234.
- Duerr, M. (2004). *A Powerful Silence: The role of meditation and other contemplative practices in American life and work*. Northampton, MA: Center for Contemplative Mind in Society.
- Duerr, M., Zajonc, A., & Dana, D. (2003). Survey of transformative and spiritual dimensions of higher education. *Journal of Transformative Education*, *1*, 177–211.
- Dunne, J. (2007). *Mindfulness and Buddhist contemplative theory*. Paper presented at the 5<sup>th</sup> Annual International Scientific Conference Integrating Mindfulness-Based Interventions Into Medicine, Health Care & Society, Worcester, MA.
- Dyrbye, L. N., Thomas, M. R., & Shanafelt, T. D. (2006). Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Academic Medicine*, *81*, 354–373.
- Ellis, A. (1962). *Reason and emotion in psychotherapy*. New York: Lyle Stuart.
- Eysenck, H. (1996). Personality and the experimental study of education. *European Journal of Personality*, *10* (5), 427–439.
- Fan, J., McCandliss, B. D., Sommer, T., Raz, A., & Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. *Journal of Cognitive Neuroscience*, *14*, 340–347.
- Fernandez-Duque, D., Baird, J. A., & Posner, M. I. (2000). Executive attention and metacognitive regulation. *Consciousness and Cognition*, *9*, 288–307.
- Flavell, J.H. (1979). Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist*, *34*, 906–911.
- Fredrickson, B. (1998). What good are positive emotions? *Review of General Psychology*, *2*, 300–319.
- Foerde, K., Knowlton, B. J., Poldrack, R. (2006). Modulation of competing memory systems by distraction. *Proceedings of the National Academy of Sciences*, *103*, 11778–11783.
- Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic.
- Gardner, H. (1993). *Multiple intelligences: The theory in practice*. New York: Basic.
- Garrison Institute (2005). *Contemplation and education: A survey of programs using contemplative techniques in K-12 educational settings: A mapping report*. Garrison, NY: Garrison Institute.

- Goleman, D. (1972). The Buddha on meditation and states of consciousness, Part I: The teaching; Part II: A typology of meditation techniques. *The Journal of Transpersonal Psychology*, 4 (1-2), 1–44, 151–210.
- Goleman, D. (1988). *The meditation mind*. Los Angeles: Tarcher.
- Goleman, D. (1995). *Emotional intelligence*. New York: Bantam.
- Goleman, D. (2006). *Social intelligence*. New York: Bantam.
- Hall, P. D. (1999). The effect of meditation on the academic performance of African American college students. *Journal of Black Studies*, 29 (3), 408–415.
- Hart, J. (2007). Clinical applications for meditation: A review and recommendation. *Alternative & Complementary Therapies*, 13 (1), 24–29.
- Hill, K. T. (1984). Debilitating motivation and testing: A major educational problem, possible solutions, and policy applications. In P. Ames & C. Ames (Eds.), *Research on motivation in education: Student motivation* (pp. 245–274). New York: Academic Press.
- Jain, S., Shapiro, S. L., Swanick, S., Roesch, S., Mills, P., Bell, I., & Schwartz, G. (2007). A Randomized controlled trial of mindfulness meditation versus relaxation training: Effects on distress, positive states of mind, rumination, and distraction. *Annals of Behavioral Medicine*, 33, 11–21.
- Jha, A., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience*, 7, 109–119.
- 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. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10 (2), 144–156.
- Kegan, R. (1982). *The evolving self*. Cambridge, MA: Harvard University Press.
- Kegan, R. (1994). *In over our heads: The mental demands of modern life*. Cambridge, MA: Harvard University Press.
- Keogh, E., Bond, F. W. & Flaxman, P. E. (2006). Improving academic performance and mental health through a stress management intervention: Outcomes and mediators of change. *Behaviour Research and Therapy*, 44, 339–357.
- Labbe, E. E., Murphy, L., & O'Brien, C. (1997). Psychosocial factors and prediction of headaches in college adults. *Headache*, 37, 1–5.
- LaBerge, D. (1995). *Attentional processing: The brain's art of mindfulness*. Cambridge, MA: Harvard University Press.
- Land, D. (2008, March 25). Study shows compassion meditation changes the brain. *University of Wisconsin News*. Retrieved from <http://www.news.wisc.edu/14944>
- Langer, E. (2002). Well-being: Mindfulness versus positive evaluation. In Snyder, C. R. & Lopez, S. J. (Eds.), *Handbook of positive psychology* (pp. 214–230). New York: Oxford University Press.
- Lansky, E. P. & St. Louis, E. K. (2006). Transcendental meditation: A double-edged sword in epilepsy? *Epilepsy & Behavior*, 9, 394–400.
- Lazar, S. W., Kerr, C., Wasserman, R. H., Gray, J. R., Greve, D., et al. (2005). Meditation experience is associated with increased cortical thickness. *NeuroReport*, 16, 1893–1897.
- Leary, M. R., Tate, E. B., Adams, C. E., & Hancock, J. (2007). Self-compassion and reactions to unpleasant self-relevant events: The implications of treating oneself kindly. *Journal of Personality and Social Psychology*, 92, 887–904.
- Lief, J. (2007). *Contemplative education: The spark of East and West working within*. Retrieved from [http://www.naropa.edu/conted/conted\\_primer.cfm](http://www.naropa.edu/conted/conted_primer.cfm)

- Levesque, C. and Brown, K. W. (2007). Overriding motivational automaticity: Mindfulness as a moderator of the influence of implicit motivation on day-to-day behavior. Unpublished manuscript, Missouri State University.
- Lutz, A., Brefczynski-Lewis, J., Johnstone, T., Davidson, R. J. (2008). Regulation of the neural circuitry of emotion by compassion meditation: Effects of meditative expertise. *PLoS ONE* 3(3): e1897. doi:10.1371/journal.pone.0001897
- Ma, S. H., & Teasdale, J. D. (2004). Mindfulness-based cognitive therapy for depression: Replication and exploration of differential relapse prevention effects. *Journal of Consulting and Clinical Psychology*, 72 (1), 31–40.
- Mayer, J. D. & Salovey, P. (1997). What is emotional intelligence? In P. Salovey & D. Sluyter (Eds), *Emotional development and emotional intelligence: Implications for educators* (pp. 3–31). New York: Basic Books.
- Mezirow, J. (2000). *Learning as transformation: Critical perspectives on a theory in progress*. San Francisco: Jossey-Bass.
- Mezirow, J. (1991). *Transformative dimensions of adult learning*. San Francisco: Jossey-Bass.
- Mezirow, J. (1978). Perspective transformation. *Adult Education*, 28, 100–110.
- Murphy, M. & Donovan, S. (1997). *The physical and psychological effects of meditation (2nd ed.)*. Petaluma, CA: Institute of Noetic Sciences.
- Narr, K. L., Woods, R. P., Thompson, P. M., Szeszko, P., Robinson, D., et al. (2007). Relationships between IQ and regional cortical gray matter thickness in healthy adults. *Cerebral Cortex*, 17 (9), 2163–2171.
- Neff, K. D., Rude, S. S., & Kirkpatrick, K. L. (2007). An examination of self-compassion in relation to positive psychological functioning and personality traits. *Journal of Research in Personality*, 41, 908-916.
- Oman, D., Shapiro, S. L., Thoresen, C. E., Plante, T. G., Flinders, T. (2008). Meditation lowers stress and supports forgiveness among college students: A randomized controlled trial. *Journal of American College Health*, 56 (5), 569–578.
- Posner, M. I. & Rothbart, M. K. (2007). Research on attention networks as a model for the integration of psychological science. *Annual Review of Psychology*, 58, 1–23.
- 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.
- Raz, A. & Buhle, J. (2006). Typologies of attentional networks. *Nature Reviews Neuroscience*, 7, 367–379.
- Reibel D. K., Greeson, J. M., Brainard, G. C., Rosenzweig, S. (2001). Mindfulness-based stress reduction and health-related quality of life in a heterogeneous patient population. *General Hospital Psychiatry*, 23, 183–192.
- Robertson, I. H., & Garavan, H. (2004). Vigilant attention. In M. S. Gazzaniga (Ed.), *The cognitive neurosciences* (pp. 631–640). New York: MIT Press.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68–78.
- Rosenzweig, S., Reibel, D. K., Greeson, J. M., Brainard, G. C., Hojat, M. (2003). Mindfulness-based stress reduction lowers psychological distress in medical students. *Teaching and Learning in Medicine*, 15, 88–92.
- Salovey, P. & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition, and Personality*, 9, 185-211.
- Saron, C. & Wallace, B. A. *Shamatha project*. Retrieved July 31, 2008, from <http://www.shambhalamountain.org/shamatha/>

- Schumacher, E. (1977). *A guide for the perplexed*. New York: Harper and Row.
- Segal, Z., Williams, J. M. & Teasdale, J. (2002). *Mindfulness-based cognitive therapy for depression*. New York: Guilford Press.
- Segrin, C. (1999). Social skills, stressful life events, and the development of psychosocial problems. *Journal of Social and Clinical Psychology, 18*, 14–34.
- Shapiro, S. L. & Brown, K. W. (2007). The relation of mindfulness enhancement to increases in empathy in a mindfulness-based stress reduction program. Unpublished data, Santa Clara University.
- Shapiro S. L., Walsh, R. (2003). An analysis of recent meditation research and suggestions for future directions. *Journal of Humanistic Psychology, 31* (2–3), 86–114.
- Shapiro, S. L., Schwartz, G. E. R. & Bonner, G. (1998). The effects of mindfulness-based stress reduction on medical and pre-medical students. *Journal of Behavioral Medicine, 21*, 581–599.
- Shapiro, S. L., Schwartz, G. E., & Santerre, C. (2002). Meditation and positive psychology. In C. R. Snyder and S. Lopez (Eds.), *Handbook of positive psychology*, (pp. 632–645). Oxford, UK: Oxford University Press.
- 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., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*, 373–386.
- Shapiro, S. L., Brown, K., Biegel, G. (2007). Self-care for health care professionals: Effects of MBSR on mental well being of counseling psychology students. *Training and Education in Professional Psychology, 1*, 105–115.
- Schwartz, B. L., & Perfect, T. J. (2002). Introduction: Toward an applied metacognition. In T. J. Perfect & B. L. Schwartz (Eds.), *Applied metacognition* (pp. 1–11). New York: Cambridge University Press.
- Simons, D., & Chabris, C. (1999). Gorillas in our midst: sustained inattention blindness for dynamic events. *Perception, 28*, 1059–1074.
- Slagter, H. A., Lutz, A., Greischar, L. L., Francis, A. D., Nieuwenhuis, S., et al. (2007). Mental training affects distribution of limited brain resources. *PLoS Biology, 5*, e138.
- Statt, D. A. (1998). *The concise dictionary of psychology (3rd edition)*. London and New York: Routledge.
- Sternberg, R. J. (1986). Inside intelligence. *American Scientist, 74*, 137–143.
- Sternberg, R. J. (1984). *Human abilities: An information processing approach*. San Francisco: Freeman.
- Sydney Morning Herald. (2007, July 9). *Meditation sharpens brain*. Retrieved from <http://www.smh.com.au/news/National/Meditation-sharpens-brain-scientists/2007/07/09/1183833405072.html>
- Tang, Y.-Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q., Yu, Q., Sui, D., Rothbart, M. K., Fan, M., and Posner, M. I. (2007). Short-term meditation training improves attention and self-regulation. *Proceedings of the National Academy of Sciences, 104* (43), 17152–17156.
- Teasdale, J. D., Segal, Z. V., Williams, J. M. G., Ridgeway, V., Soulsby, J., & Lau, M. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68*, 615–23.
- Towbes, L. C., & Cohen, L. H. (1996). Chronic stress in the lives of college students: Scale development and prospective prediction of distress. *Journal of Youth and Adolescence, 25*, 199–217.

- Tloczynski, J., & Tantriella, M. (1998). A comparison of the effects of Zen breath meditation or relaxation on college adjustment. *Psychologia: An International Journal of Psychology in the Orient*, *41*, 32–43.
- Valentine, E. R., Sweet, P. L. G. (1999). Meditation and attention: A comparison of the effects of concentrative and mindfulness meditation on sustained attention. *Mental Health, Religion and Culture*, *2*, 59–70.
- Walsh, R. (1999). *Essential spirituality: The seven central practices*. New York: Wiley & Sons.
- Walsh R., & Shapiro, S. L. (2006). The meeting of meditative disciplines and Western Psychology: A mutually enriching dialogue. *American Psychologist*, *61* (3), 227–239.
- Weinstein, N., Brown, K. W., & Ryan, R. M. (2007). *Dispositional mindfulness facilitates adaptive coping and stress responses*. Unpublished manuscript, University of Rochester.
- Wells, A. (2002). GAD, metacognition, and mindfulness: An information processing analysis. *Clinical Psychology Research & Practice*, *9*, 95–100.
- 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.
- Woolacott, M. (2007). *The effects of meditation on the efficiency of attentional processing: Physiological and behavioral measures*. Paper presented at the 5th Annual International Scientific Conference Integrating Mindfulness-Based Interventions Into Medicine, Health Care & Society, Worcester, MA.
- Zajonc, A. (2006). *Teachers College Record*, *108*, 1742–1759.
- Zylowska, L., Ackerman, D. L., Yang, M. H., Futrell, J. L., Horton, N. L., Hale, T. S., Pataki, C., & Smalley, S. L. (2008). Mindfulness meditation training in adults and adolescents With ADHD. *Journal of Attention Disorders*, *11* (6), 737–746.