The Effects of classroom-based mindfulness meditation on MBA student mindfulness

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THE EFFECTS OF CLASSROOM-BASED MINDFULNESS MEDITATION ON MBA STUDENT MINDFULNESS

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ABSTRACT

THE EFFECTS OF CLASSROOM-BASED MINDFULNESS MEDITATION ON MBA STUDENT MINDFULNESS

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This study was an experimental trial of a classroom-based intervention to influence mindfulness among MBA students at the Sloan School of Management at the Massachusetts Institute of Technology (MIT). MBA students at MIT Sloan and elsewhere are conditioned to look forward and reflect on the past only to the degree that it helps plan for the future. They are rarely taught to be aware of what is occurring in the current moment. Training students to be more mindful, that is better able to be aware of and to pay attention to present moment experience would contribute to the mission of MBA programs to create leaders by giving students meaningful insight into their own thoughts, feelings, and actions. Within the literatures of medicine, neuroscience, psychology, and education, investigators have found that mindfulness has been positively correlated with improved well-being, reduced stress, better decision-making and perspective-taking, as well as improved personal relationships (Brown and Ryan, 2003; Block-Lerner, Adair, Plumb, Rhatigan, & Orsillo, 2007; Dekeyser, Raes, Leijssen, Leysen, & Dewulf, 2008; De Dea Roglio & Light, 2009; Kabat-Zinn, 1994).

While the potential benefits of mindfulness have been established in multiple fields, there is scant research on mindfulness and MBA students. This research study explored whether brief mindfulness meditation exercises, embedded in an existing course, would influence MBA students' levels of mindfulness as measured by the Mindful

Attention Awareness Scale (MAAS) (Brown & Ryan, 2003). In the fall 2014 semester, a sample of 158 first-year MBA students from MIT Sloan participated in an experiment with modified randomization of a pre/post design. Data analysis revealed that participant scores on the MAAS decreased significantly from pretest to posttest, though less so in the treatment group. These findings suggest that the intervention was not robust enough to exert a positive influence on participants' levels of mindfulness in the graduate business school context. This research contributes to the literature by providing important information about the requisite exposure to and scalability of the intervention in research on mindfulness meditation in higher education.

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Chapter I: Overview of the Study

Statement of the Problem

Master's in Business Administration (MBA) programs do not focus enough on the development of students' internal capacities that are important for their own personal development and their future careers in business. In particular, MBA curricula do not systematically cultivate students' self-awareness nor do they address how that awareness may be used to make better decisions and improve relationships—both skills that are important to succeeding in business (De Dea Roglio & Light, 2009). MBA programs also do not train students how to focus their attention, which is an essential life skill for a young professional navigating information overload (Dean & Webb, 2011). Writing over 130 years ago the philosopher and psychologist William James (1890/1950) saw both the value of cultivating attention and the appropriateness of doing so in an academic context: "And the faculty of voluntarily bringing back a wandering attention, over and over again, is the very root of judgment, character, and will…An education which should improve this faculty would be *the* education *par excellence* [emphasis in the original]" (p. 424).

Mindfulness is the moment-to-moment awareness and non-judgmental acceptance of what is occurring in one's thoughts, feelings, and sensations (Kabat-Zinn, 1994). Mindfulness meditation exercises have the potential to help MBA students become more mindful (Hunter & Scherer, 2009). There is no concerted effort to develop mindfulness-related capacities in the MBA population or in students in general (MacDonald & Shirley, 2009). Williams and Kabat-Zinn (2011) note that "While we get a great deal of training in our education systems in thinking of all kinds, we have almost no exposure to the

cultivation of intimacy with that other innate capacity of ours called *awareness* [emphasis in the original]" (p. 15). Nor do we teach students how to focus their attention on the here-and-now, preferring instead to train them to think about the future and reflect on past actions (Hunter & Chaskalson, 2013). This is due primarily to the fact that contemplative practices, such as mindfulness, are not considered to be an educational priority, though momentum for the inclusion of mindfulness-based practices in the K-12 sector of education is growing (Schoeberlein, Koffler, & Jha, 2005). Even still, the challenges associated with measuring mindfulness may also hamper its inclusion in results-driven academic settings. There is also the challenge of figuring out where mindfulness "fits" in higher-education, as it is not aligned solely with one particular academic discipline.

For the majority of students, their MBA program is the last time they will be in an educational system dedicated to their development. This development, historically, has been focused on learning quantitative skills and a management style that prioritizes maximizing shareholder value (Khurana, 2007; Waddock & Lozano, 2012). This method misses a critical aspect of students' personal development. Giacalone (2004) goes so far as to say that "…in a search of a personal or corporate gain, proponents of this instruction aid and abet physical, psychological, and spiritual toxins for our students, the organizations they work for, and society at large" (p. 415). While Giacalone's (2004) viewpoint is a minority one, MBA programs have long been criticized for their programmatic shortcomings.

Rubin and Dierdorff (2013) analyzed the literature published in the leading management education journal, *The Academy of Management Learning and Education*

(AMLE), and found that 59% of the articles related to MBA programs published in the *AMLE* focused on the curriculum. The general consensus was that MBA programs are not sufficiently robust in their subject offerings and approaches to management (Rubin & Dierdorff, 2013). The second highest percentage of articles in Rubin and Dierdorff's (2013) review focused on student learning and outcomes. In particular, scholars have questioned if and to what degree the skills taught in MBA programs prepare students for the challenges they will find on the job.

Benjamin and O'Reilly (2011) investigated this question thoroughly in their study "Becoming a leader: Early career challenges faced by MBA graduates." The researchers found that role, business, and personal transitions were the biggest challenges young managers faced and that these challenges could further be broken down into two categories: managing others and managing oneself. Benjamin and O'Reilly (2011) state:

> Although the proximal problems described by young managers often began with the challenges of managing others, many of our informants ultimately recognized that their own thinking needed to change if they were to be effective leaders longer term…In short, to be effective they had to shift their mind-set about who they were… (p. 463)

A prerequisite for shifting a mindset is knowing what your mindset is. It is self-awareness. Thus, implicit in Benjamin and O'Reilly's (2011) research findings is that in order to successfully face the challenges of leading and managing, one needs to be self-aware. Despite the evidence that awareness is a skill that helps young business people on the job, it is not cultivated in MBA programs (Sadler-Smith & Shefy, 2007).

Instead, MBA curricula continue to emphasize quantitative skills as measured against managerial skills needed at work—a finding voiced by business school alumni in the Association to Advance Collegiate Schools of Business's (AACSB) (2002) report,

Management Education at Risk, and affirmed in Rubin and Dierdorff's (2009) analysis of 373 MBA programs. There is a powerful and influential legacy of relying on technical analysis to solve rational management problems (Sadler-Smith & Shefy, 2007). This is due in part to the reward structure and dominant teaching style in business schools that values hard skills over soft skills, which are often thought of as lacking substance and also require different teaching methods (Mintzberg, 2004; Waddock & Lozano, 2013). At a minimum, students need new ways and broader perspectives to approach ill-structured, complex problems that cannot be solved with logical analyses alone (Mintzberg, 2004; Sadler-Smith & Shefy, 2007). There are many ways to broaden students' ways of knowing. Among them is the cultivation of mindfulness, which has been associated with increased ability in perspective-taking (Block-Lerner, Adair, Plumb, Rhatigan, & Orsillo, 2007).

The overemphasis on quantitative learning is further compounded by the fact that the majority of students who pursue an MBA have an undergraduate degree in business and thus have already been inculcated into the typical technical skill set characteristic of MBA programs (Rubin & Dierdorff, 2013). Rubin and Dierdorff's (2013) analysis lead them to state "One conclusion from these facts may be that for a large percentage of MBA students, their education is not only redundant but represents an empty credential that does little to address their real education and career needs" (p. 136). Scholars have suggested that one way to bolster the MBA curricula is to focus on the development of the whole person (Boyatzis, Stubbs, & Taylor, 2002).

A focus on the whole person could fall under the guise of leadership development, which is a popular theme in many MBA programs. Toward the goal of becoming better

leaders MBA students are encouraged to participate in self-assessment, feedback, and reflective exercises. Thus, there is a precedent for non-quantitative, non-technical teaching and learning in MBA programs though the goals are generally externally focused, i.e. improved interaction with other people. There is scant training related to improving understanding of one's self and one's ability to regulate thoughts and feelings. Specifically, MBA students would benefit from greater awareness and the ability to focus in the moment, which they may cultivate through mindfulness meditation training. Such training would be, in essence, building leaders from the inside out (Joiner & Josephs, 2007).

Research Question

The research question addressed in this dissertation is: Will classroom-based mindfulness meditation training influence MBA students' levels of mindfulness as measured by the Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003)? In considering this question, it is important to state that there is consensus that mindfulness can be learned (Brown & Ryan, 2003, 2004; Olendzki, 2009; Shapiro, Carlson, Astin, & Freedman, 2006). Brief mindfulness meditation exercises were chosen as the treatment in this experiment because of the documented ability of meditation to influence participants' levels of mindfulness as defined by the MAAS (Kemeny et al., 2012). To assess whether mindfulness training can be included in within current MBA curricula, which would increase its scalability, a short treatment was embedded in an existing, core MBA class. Scalability is also the reason a brief treatment was chosen—its brevity increases the chances that it could be replicated with greater ease in other academic settings. In addition, the scientific evidence supporting the efficacy of

mindfulness meditation gives it the requisite credibility for inclusion in the academic curriculum. Based on the evidence from this study, future research can explore additional channels and settings in which management educators can cultivate mindfulness in their graduate students.

While much empirical evidence affirms the positive benefits of mindfulness and mindfulness training in other populations, it is unknown whether these results would generalize to the MBA population or typical MBA intervention sites. Therefore specific research is necessary to investigate how mindfulness meditation training influences MBA students' levels of mindfulness through classroom-based interventions. As previously stated, the conversation on mindfulness in graduate schools needs to be nurtured so that the practical and pedagogical utility of the concept is investigated through rigorous research. This study hopes to contribute to that conversation.

Theoretical Propositions

The theoretical proposition for this research draws from two main sources. The first is the Eastern, Buddhist-based theory of mindfulness. The second is the theory that mindfulness can be cultivated in Western secular contexts through mindfulness meditation that is divorced from Buddhist religious or spiritual connotations.

The Eastern, Buddhist-based theory of mindfulness claims that it cultivates insight and reduces suffering (Bodhi, 2011; Fennell & Segal, 2011; Vago & Silbersweig, 2012). In describing the concept of suffering, Olendzki (2009) states: "The bulk of our difficulties, he [The Buddha] discerned, come not from the existential challenges themselves, but from internally generated maladaptive responses activated by the relentless and unreflective pursuit of pleasure and avoidance from pain" (p. 41). Such

responses could include focusing relentlessly on the past or being preoccupied with the future, as opposed to being satisfied with the present. They could also include the pursuit of extrinsic rewards to the point of debilitating stress and burn out, which is a condition of high-achieving populations such as elite MBA students. Mindfulness is achieved by training the mind to be focused in the moment on whatever is occurring and accepting it without judgment (Bodhi, 2011). Mindfulness theory parses a select number of facets that comprise mindfulness (Bodhi, 2011). This dissertation research will elaborate on the facets of awareness and attention as central to the construct of mindfulness and of primary utility to MBA student development. The Mindful Attention Awareness Scale "is focused on the presence or absence of attention to and awareness of what is occurring in the present" (Brown & Ryan, 2003, p. 824). Awareness and attention are interwoven; however, the two facets will be described separately here to illustrate their distinct properties.

Awareness can be defined as "the conscious registration of stimuli, including the five physical senses, the kinesthetic senses, and the activities of the mind. Awareness is our direct, most immediate contact with reality" (Brown, Ryan, & Creswell, 2007, p. 212). Mindfulness cultivates awareness of a practioner's thoughts and feelings (Brown et al., 2007). It is one's own subjective perception of what is occurring at any given moment. Mindfulness does this by teaching the practioner to still the mind sufficiently that one is simply aware of what is occurring in the mind, body, and heart in the present moment.

Greater awareness allows for greater clarity of what is occurring, thus giving the MBA student a more informed sense of reality from which she can make more informed

decisions. In leadership terms germane to MBA students, Joiner and Josephs (2007) state: "…when you repeatedly cultivate a new level of awareness in the midst of action, your mental and emotional capacities develop accordingly. These capacities, in turn, support more agile leadership behavior" (p. 225).

In theory, a mindful MBA student in an intense team meeting may be able to learn from his thoughts, feelings, and physical sensations that he feels threatened. With awareness, for example, he can observe that emotion and then decide what to do about it, if anything. In contrast, a student who is unaware of her reaction has limited options: suppress the threatening feeling and withdraw from the team meeting, act impulsively as a result of being threatened, or lash out at her team members. This example suggests that mindfulness helps not only the individual in this situation but also the team members who will get a more productive behavioral response from their mindful teammate.

This example demonstrates how mindfulness encompasses awareness (I am experiencing a feeling of being threatened), perspective (I have options for how to manage this), and decision-making (I'm going to choose to sit with this and let it pass). This type of awareness is freeing in the sense that the mindful student can better understand thoughts, feelings, and sensations and also in the sense that it allows for new, more skillful choices to be made. The theory suggests that what occurred in this situation is that the mindful student was able to break a habitual automatic or reactive response to a threatening situation—withdrawal or lashing out—and decide upon a different and more appropriate course of action as a result of increased awareness. It has been shown that repeated and consistent practice of mindfulness meditation helps people by breaking patterns of ingrained responses (Chambers, Allen, & Lo, 2007). Without such an

intervention, it has been hypothesized (Brown et al., 2007) that people respond and react without thinking, which can be detrimental depending on the context. For example, if the student above did lash out she could have damaged her own reputation as well as her relationships with her teammates.

Work environments require employees to be able to work well with others (Jaeger, 2003). The literature does extend the concept of awareness to teams, which are a foundational part of management education and a work unit required of many MBA employers. Goleman, Boyatzis, and McKee (2002) suggest that:

> A team expresses its self-awareness by being mindful of shared moods as well as the emotions of individuals within the group. In other words, members of a self-aware team are attuned to the emotional undercurrents of individuals and the group as a whole. They have empathy for each other, and there are norms to support vigilance and mutual understanding. (p. 178)

Implicit in this description is that the individuals in the team are not only aware of others but they are also paying attention to them in a more focused manner.

The awareness facet of mindfulness has particular relevance for business students; however, there is no explicit incentive in MBA programs to develop it further (Sadler-Smith & Shefy, 2007). The theoretical propositions described here support the assumption that every effort should be made to provide MBA students the skills to be aware of their own feelings, thoughts, and actions.

The second facet of mindfulness of interest to this study is attention. Mindfulness theory suggests that by specifically focusing on the present, practioners can pay greater attention to what is occurring moment by moment (Jha, Krompinger, & Baime, 2007; Kabat-Zinn, 2002). Attention can be defined as: "a focusing of awareness to highlight selected aspects of that reality" (Brown & Ryan, 2004, p. 243). When one pays attention

one is choosing to respond to either internal or external stimuli for a particular duration of time and with a particular intensity. This is important because it frees the mind and the brain's limited attention from thinking about the past or the future so that it can concentrate on what matters now. Such focusing is not at the expense of meaningful reflection or thoughtful planning; in fact, it is consciously focusing on whatever one is doing, which could be, for example, reflecting on the outcomes of a recent negotiation.

Mindfulness theory suggests that there are potential benefits of controlling one's attention. These include: deeper understanding of one's own emotions, less impulsivity, decreased mind wandering and better use of the brain's resources (Kabat-Zinn, 2002; Moore & Malinowski, 2009; Moore, Gruber, DeRose, & Malinowski, 2012; Mrazek, Franklin, Phillips, Baird, & Schooler, 2013; Vago & Silbersweig, 2012). An MBA student has much to gain in learning how to focus her attention, as each of the potential benefits just listed increases self-knowledge, allows for greater equanimity in managing herself and others, blocks out distracting thoughts, and allocates her mind's limited resources to the experience of the moment. Hunter and Scherer (2009) state attention is critical for self-management "for the knowledge worker, focused attention is what gets work done. It is the engine of productivity" (p. 179). Given that MBA students pursue careers in environments that are marked by demanding situations, competition, and interaction, the ability to pay attention becomes a necessary skill to cultivate.

The theoretical propositions underlying these findings suggest that the Eastern concept of mindfulness is applicable to secular, Western contexts as a way to improve the mental and physical health of its practioners. When mindfulness theory has been applied to clinical populations it has been shown to reduce stress, decrease the symptoms of

chronic pain, improve well-being, and contribute to changes in the brain related to thinking and feeling (Brown & Ryan, 2004; Kabat-Zinn, 1990; Treadway & Lazar, 2009). This research tested the theory that mindfulness meditation training in a graduate business school context will influence the mindfulness levels of a healthy population of MBA students.

The theoretical rationale for mindfulness meditation as the choice of treatment in this experiment is supported by the interdisciplinary literatures affirming it as an effective way to cultivate mindfulness (Kabat-Zinn, 1990). Mindfulness meditation, with its emphasis on focusing the mind, is the cornerstone of the widespread Mindfulness Based Stress Reduction (MBSR) program, and in that context been studied extensively over the past 30 years. (See Grossman, Niemann, Schmidt, and Walach [2004] for a meta-analysis on MBSR's health benefits.) In describing mindfulness meditation (Olendzki, 2009) states:

> All mindfulness meditation requires a certain degree of concentration in order to gather and focus the powers of the mind…mindfulness practice allows the mind to follow whatever is arising in experience. There is less a sense of controlling *what* [emphasis in the original] the awareness is resting upon and more care given to *how* [emphasis in the original] awareness is manifesting. (p. 42)

Mindfulness meditation has been shown to be effective in both clinical and non-clinical populations and with sick and healthy people alike. There is precedent for the use of mindfulness meditation in higher education settings where investigators have used it to help undergraduate students manage stress, eat healthier, and curtail addictive behaviors (Caldwell, Harrison, Adams, Quin, & Greeson, 2010; Leigh, Bowen, & Marlatt, 2005).

While the theories of mindfulness have yet to be repeatedly tested on MBA students, Jeremy Hunter has been investigating its practical utility for this population

through his work at the Drucker School of Management at Claremont Graduate University. Through mindfulness training, Hunter (2013) found that MBA students "begin…seeing how the filters in their minds affect perceptions, decisions, strategies…" (p. 57) and then can act with fuller awareness, greater clarity, and less reactivity (Hunter & Scherer, 2009). Further research needs to be conducted to affirm these positive benefits of mindfulness and extend the ways in which mindfulness-training exercises can be embedded in the MBA classroom for the fuller development of the MBA student.

Research Design

This was a quantitative research study. An experimental control/treatment trial with modified randomization and a pretest/posttest design was executed to study the effect of a mindfulness meditation intervention on the mindfulness levels of MBA students. This design was chosen because it allows for the necessary comparison of data before and after the treatment. Mindfulness was operationalized in accordance with the Mindful Attention Awareness Scale (MAAS) that was used (Brown & Ryan, 2003). In discussing pretest/posttest control group design, Fraenkel, Wallen, and Hyun (2012) argue that its value lies in its ability to control specific threats to internal validity. In particular, it has strength in controlling subject characteristics threat, loss of subjects, maturation, and regression threat (Fraenkel et al., 2012).

This research used a stratified sampling procedure because logistical constraints at the site of the study did not allow for random sampling. Upon entering MIT Sloan, the MBA Program office placed all first-year MBA students into one of 12 cohorts that were populated to ensure homogeneity across a range of demographic characteristics including age, gender, race, citizenship, academic training, and work history. These 12 cohorts

were then placed in mandatory courses for the fall 2014 semester. One of these courses, Communication for Leaders, was the site of this study. The researcher is an instructor at MIT Sloan who teaches the Communication for Leaders class and thus had the requisite access to the students.

Two additional MIT faculty members, both of whom were teaching the Communications for Leaders course with the same syllabi and same assignments, facilitated the experiment. Each of the three faculty had one section that received the treatment and one section that did not. Each section had about 34 students and treatment and control groups were of equal size.

MIT Sloan ranks in the top ten business schools worldwide and accepts only 13% of the students who apply. In addition to researcher's access, MIT Sloan MBA students were selected for this study because of their status as elite graduate students and their high-achieving predispositions. MIT Sloan's alumni have distinguished themselves in the corporate ranks: twenty percent have been presidents and CEOs of companies (MIT, 2014a). MIT Sloan alumni have an entrepreneurial bent, too, and collectively have founded more than 650 companies (MIT, 2014a). MIT Sloan asserts: "If the active companies founded by MIT graduates formed an independent nation, their revenues would make that nation at least the seventeenth-largest economy in the world" (MIT, 2014a).

The treatment group was invited to participate in a five-minute mindfulness meditation exercise at the start of 10 class sessions in the fall 2014 semester. The treatment across groups was standardized using a strict protocol that included a voice-recorded guided mindfulness meditation exercise.

All participants filled out an informed consent form, demographic questionnaire, and a pretest MAAS prior to Class #1 during their Orientation in August 2014. All participants filled out a questionnaire and a posttest MAAS again in December 2014. The MAAS yields a single score that indicates participants' levels of mindfulness. As described in Chapter III, the instrument has acceptable psychometric properties and has been used with university students and both meditating and non-meditating populations (Brown & Ryan, 2003; MacKillop & Anderson, 2007).

Dissertation Outline

There are five chapters in this dissertation. Chapter II is a review of the interdisciplinary literatures that pertain to this study. As noted earlier, the most robust literatures in which scholars discuss the practical applications of mindfulness are the medical and psychology literatures, followed by the neuroscience literature. These conversations focus on the utility of mindfulness to help improve the mental and physical conditions of clinical and non-clinical populations. Scientists are also investigating how the neuroplasticity of the brain is influenced by mindfulness meditation. Finally, education scholars have been studying the potential benefits of mindfulness in school settings, primarily the K-12 environment. Chapter II synthesizes the conversations across these literatures to inform and place this research study in context.

Chapter III details the methodology of this experiment. It explains the choice of a quantitative method as an effective way to answer the proposed research question, details the population and sample of interest in this study, and describes the treatment. It discusses the use of the MAAS as the pretest and posttest instrument. The chapter concludes with a review of how data generated from the experiment were analyzed.

Chapter IV presents the findings of the experiment and an analysis of the pretest and posttest MAAS questionnaires. Lastly, Chapter V interprets and discusses the implications of the findings. Of particular interest is how this experiment may inform processes by which mindfulness may be incorporated into graduate programs to help students be more aware, focus their attention, and accept their thoughts and feelings. Chapter V also discusses the possibilities for future research.

Chapter II: A Survey of The Literature

This literature review begins by situating mindfulness in the present day and defining the construct of mindfulness for this proposal. It then investigates, analyzes, and critiques the scholarly conversations in peer-reviewed journals that relate to the potential applicability of mindfulness and MBA students, conversations that start in the medical, psychology, and neuroscience literatures and make their way into the education and organizational behavior literatures. It continues with an analysis of two facets—awareness and attention—that constitute how mindfulness is operationalized and measured through the Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003) used in this study. It concludes with observations from the literature about management education and learning.

Brief Background of Mindfulness: Buddhist Roots to Secular Applications

Mindfulness (translated from the Pali word *sati*) as a quality of insight derives from the teachings of the Buddha in the 5th century BC (Bodhi, 2011; Gunaratana, 1991). The intervening 2,500 years, the multiple sects of Buddhism, and the geographic dispersion of its teachings across Asia make mindfulness a complex concept to capture. What is consistent over time and interpretation is that mindfulness concerns the cultivation of insight and reduction of suffering (Bodhi, 2011; Fennell & Segal, 2011; Vago & Silbersweig, 2012). This insight allows for self-knowledge that can affect how we are in this world in general, but also in very specific ways, such as how we manage our thoughts, feelings, and behaviors on a daily basis. The emphasis on the reduction of suffering is important to understand even in secular contexts. As Gunaratana (1991) states, suffering concerns not just physical ills but also "…that deep, subtle sense of

unsatisfactoriness which is a part of every mind moment and which results directly from the mental treadmill" (p. 11). This resonates for anyone who is interested and has a stake in helping graduate students reduce the formidable stress they experience from the academic demands of their programs (Oswalt & Riddock, 2007).

This Eastern notion of mindfulness gained popularity in the West in the late 1970s due in part to Jon Kabat-Zinn's founding of the Stress Reduction Clinic at the University of Massachusetts's Medical Center, which based its teachings on mindfulness meditation (Bodhi, 2011; Kabat-Zinn, 1990; Maex, 2011; Vago & Silbersweig, 2012). Kabat-Zinn's approach evolved into the Mindfulness-based Stress Reduction (MBSR) program that became the standard for the integration of mindfulness in clinical settings (Grossman et al., 2004; Kabat-Zinn, 1990). The goal of MBSR, supported by empirical evidence, is to alleviate mental or physical suffering of the participants (Grossman et al., 2004). In the MBSR course, groups of up to 30 participants meet weekly for eight weeks to learn about and practice mindfulness meditation. There is homework that asks participants to engage in mindfulness meditation for 45 minutes per day as well as one day-long more intensive meditation session (Baer, 2003). MBSR draws from Buddhist practices but is not itself a spiritual or religious training. It is possible to see the adaptability of a modified MBSR program in the graduate school classroom.

Kabat-Zinn's appropriation of an Eastern concept for application in Western medicine was the beginning of a growing trend. Mindfulness has since been applied and studied in psychology, neuroscience, and to a lesser (but now increasing) degree in K-12 education and business (Williams & Kabat-Zinn, 2011). Three things contribute to its interdisciplinary popularity: its transformative potential; its universality—anyone can

practice it; and its cost effectiveness—it is free and one does not need a prescription, equipment, or much time to practice it. In the Western clinical, educational, and business contexts, mindfulness has been divorced from religious or spiritual teachings, which does result in some tensions in the literature but for practical purposes allows for broader applicability of the practice.

The ancient roots of Buddhism and the numerous and varied applications of mindfulness in Western settings, both clinical and non-clinical, have produced varied definitions of mindfulness. There is, however, a clear bifurcation in the contemporary literature on mindfulness in present-day, secular settings.

Definition of Mindfulness

The branch that will be discussed in this literature review derives from Eastern Buddhist teachings. It is summarized in Kabat-Zinn's (2012) oft-cited definition: "Mindfulness is awareness, cultivated by paying attention in a sustained and particular way: on purpose, in the present moment, and non-judgmentally" (p. 1). While scholars in this conversation have placed different emphases on what mindfulness is, two characteristics define this interpretation of the concept: 1) attention to and awareness of in-the-moment experiences (thoughts, feelings, sensations), and 2) open, accepting, non-judgmental acceptance of those thoughts, feelings, and sensations (Chambers et al., 2007). In this way a mindful person is consciously aware and attending to whatever may be arising in the moment without judgment. For example, a mindful MBA student in a negotiation may be aware of rising feelings of defensiveness and can allow those feelings to pass, thus allowing for better equanimity in the moment.

Buddhist scholars (Olendzki, 2009) note that it is important that mindfulness not be seen solely as a concept of awareness and attention because such a narrow definition ignores the openness, acceptance, and kindness that are equally important to the historical roots of the term. If one is not open, accepting, or kind, one cannot be aware of, welcoming to, refrain from judging, or control one's mind. Using the example above, the mindful student's openness allowed for the feeling of defensiveness, acceptance allowed it to pass (instead of fighting against it) thus allowing her to stay calmly focused in the present moment of the negotiation.

While there is consensus in the literature on an acceptable definition of contemplative mindfulness, scholars have argued for an operational definition to allow for more specific empirical investigation about how mindfulness does what it does (Bishop et al., 2004; Brown & Ryan, 2004; Vago & Silbersweig, 2012). There are also other scholars (Baer, 2011; Dreyfus, 2011) who have expressed concern that mindfulness as currently interpreted may not correctly make use of historical Buddhist teachings. Such tension is to be expected when a construct with such ancient historical and philosophical roots is applied to modern-day, secular applications. It is said that the Buddha adapted his language depending on his audience (Makransky, 2003) and this, again, is happening as contemporary teachers adapt mindfulness for their audiences (Maex, 2011).

The other branch in the literatures on mindfulness is concerned with a Western concept popularized by Ellen Langer (2000) that uses the term mindfulness to describe the cognitive process of paying attention to new things (Dane, 2011; Langer, 2000). Within this branch it is offered as an antidote to mindless thinking (Langer, 2000; Langer

& Moldoveanu, 2000; Weick, Sutcliffe, & Obstfeld, 1999). It is cultivated by learning to change perspectives and think about objects as open to interpretation, as opposed to thinking of them as being of a fixed condition (Langer, 2000; Langer & Moldoveanu, 2000). As such, Langer's (2000) definition is focused more narrowly on cognitive operations. There are certainly other traditions that focus on quieting the mind toward the pursuit of spiritual or religious ends. In fact, Ferguson, Willemsen, and Castañeto (2010) conducted research on the effects of Christian Centering Prayer on the stress levels of a sample of Roman Catholic congregants as well as on their influence their relationship with God. Religious-based contemplative practices are not appropriate for inclusion in secular higher education and as such were not included in this literature review.

This literature review focuses solely on the concept of mindfulness derived from contemplative practices of Buddhism because it encompasses a wider scope of a person's affective, cognitive, and somatic functions that when accessed may contribute to greater insight, which is of primary interest to the research question at hand. This Eastern-derived branch is more widespread in terms of practical applications.

In the relevant literatures, mindfulness has been categorized as a trait and a state (Bishop et al., 2004; Brown & Ryan, 2004; Davidson, 2010). Some scholars (Brown & Ryan, 2003, 2004) are interested in measuring trait-level mindfulness, which is a person's inherent level of mindfulness. Many other scholars (Farb et al., 2010, Kabat-Zinn, 1990; Hargus, Crane, Barnhofer, & Williams, 2010; Moore et al., 2012) are interested in measuring the mindfulness state that follows a mindfulness-based intervention such as meditation training. The state/trait distinction matters because it affects how and what is

measured in mindfulness research. For the purposes of this review, these ways of looking at mindfulness—trait and state—are both considered in order to get the full view of the literature.

Scholars (Brown & Ryan, 2004; Kuan, 2012; Shapiro et al., 2006) have also debated the concept of mindfulness as one of metacognition. Kuan (2012) and Shapiro et al. (2006) say mindfulness includes knowing about thinking, discriminating experience, and being able to switch attention between phenomena. Brown and Ryan (2004) contend that mindfulness is the unbiased viewing of thought, not thought itself. What these debates signal is that the field is still emerging (Brown & Ryan, 2004; Williams & Kabat-Zinn, 2011) and that future research will continue to investigate how and in what ways mindfulness will be defined, applied, and measured.

Cultivation of Mindfulness

Mindfulness can be cultivated through different contemplative practices (Bodhi, 2011; Dreyfus, 2011; Fennell & Segal, 2011). The most prevalent practice used in the research studies is a Buddhist-based (though secular) technique referred to as mindfulness meditation (Chambers et al., 2007; Kabat-Zinn, 1994, 2002; Hanh, 1975; Olendzki, 2009; Shapiro, Oman, Thoresen, Plante & Flinders, 2008). Mindfulness meditation, as its name suggests, is about the focusing of the mind (Maex, 2011; Olendzki, 2009). There is one critical component of mindfulness meditation that may be difficult for striving MBA students to accept: that there is no goal to mindfulness meditation. In fact mindfulness meditation is characterized by nonstriving (Baer, 2003; Brown & Ryan, 2003). Entering into a mindfulness meditation with the point of finding enlightenment, making yourself a better person, or reducing your stress is

counterproductive. The only thing to do is to observe whatever may occur. In the US culture of achievement that is particularly magnified in MBA programs, this may be a difficult concept to accept.

Two distinct and complementary types of mindfulness meditation are frequently cited in the literature on mindfulness: concentration (*samatha)* meditation and insight (*vipassana)* meditation (Guanratana, 1991; Helber, Zook, & Immergut, 2012; Kuan, 2012). Concentration meditation focuses attention on an object or sensation (Brown & Ryan, 2004; Kabat-Zinn, 2002; Kuan, 2012; Olendzki, 2009). A popular concentration meditation guides a student to focus her attention on the breath or a morsel of food, such as a raisin, and to be aware of all sensations related to the object of focus in a very deep way. Such concentration training helps marshal the mind's limited attention span to the task at hand. The ability to stay focused is critical in the current culture that promotes the near-constant engagement with digital devices that are designed to interrupt users. This is particularly problematic given that studies have shown that interruptions hinder performance on complex tasks (Goleman, 2013; Speier, Valacich & Vessey, 1999).

In contrast to concentration meditation, insight meditation focuses attention on the stream of consciousness in the present moment (Brown & Ryan, 2004; Kabat-Zinn, 1994; Kuan, 2012; Olendzki, 2009). What occurs during insight meditation is that thoughts, feelings, and sensations are observed as momentary occurrences that one observes with the understanding that such thoughts, feelings, and sensations do not constitute oneself (Davidson, 2010; Goldstein, 1993). This distance from one's thoughts and feelings allows for greater perspective, clarity, and equanimity (Brown et al., 2007). For example, a mindful MBA student feeling stress about a mid-term may be able to recognize the

feeling but be able to keep some distance from it, e.g. "I'm noticing a feeling of stress" as opposed to "I am stressed."

The two practices are said to be complementary because concentration meditation sharpens attention and insight meditation cultivates awareness. According to Buddhist teachings, together they can be used to reach nirvana (Kuan, 2012) which here connotes the end of suffering (Vago & Silbersweig, 2012). In the literature, both types of meditation have been employed in studies investigating mindfulness. It should be noted that while mindfulness meditation involves observing the occurrence of thoughts, feelings, and sensations; it does *not* involve the investigation of the content of these thoughts, feelings, and sensations. For example, a meditating MBA student may notice a feeling of anxiety but would not pursue why he has a feeling of anxiety—just that he has it at all. He would then observe whatever thought, feeling, or sensation arises next. This distinction, too, is one of the things that separates meditation and psychotherapy both of which are concerned with the cultivation of insights (Goldstein, 1993).

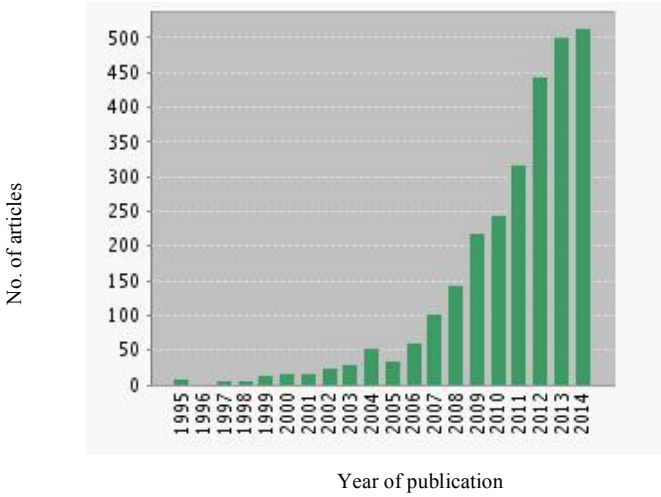
Mindfulness meditation can be practiced in a number of ways, the most popular of which is sitting meditation (Kabat-Zinn, 1990). The variety of ways in which one can meditate increases its accessibility—variety also gives educators multiple options in thinking of which type of training might suit their students. What is constant among the various meditative practices is the aspect of unambiguous awareness (Kabat-Zinn, 2002), meaning that whatever a person is doing, she is doing with acute perception. One basic way of meditating is to sit quietly on the ground in a crossed-leg position, focusing exclusively on the breath. If and when thoughts enter the mind, one acknowledges them

without judgment and lets them pass returning focus to the breath (Kabat-Zinn, 1994, 2002; Shapiro et al., 2006).

For those dedicated to fidelity with Buddhist teachings, there is concern about who is teaching mindfulness meditation and what they are teaching. There is apprehension that the quality of meditation teachers may decline with the rise in popularity of secular meditation practices (Maex, 2011). In addition, Buddhist scholars wonder if secular teachers misrepresent or dilute the historical foundations and intentions of mindfulness training (Fennell & Segal, 2011; Maex, 2011; Williams & Kabat-Zinn, 2011).

This literature review will focus on the past three decades, which have seen a dramatic rise in journal articles on mindfulness, see Figure 1, below. This increase in the investigation and application of mindfulness in hospitals, treatment centers, therapists' offices, and to a lesser extent, schools and organizations demonstrates the coming together of contemplative practices and science in the pursuit of its potential benefits (Williams & Kabat-Zinn, 2011). Scholars see mindfulness as having relevance in many fields (Brown & Ryan, 2004).

Figure 1. Search results of journal articles with "mindfulness" as topic in Web of Science database since 1995 (November 28, 2014).



Relevant Literatures

Mindfulness in the Medical Literature

The literature on mindfulness in medicine is robust. The publications are heavily weighted toward empirical research studies published in reputable, peer-reviewed journals using a variety of methods and instruments. In the simplest of terms, the studies have focused on ways mindfulness can help make people feel better—it has been used to treat an increasing variety of medical problems. As the Mindfulness-based Stress Reduction program was the pioneer of incorporating mindfulness in clinical settings, a large literature has grown around the use of MBSR to help people manage their symptoms and their illnesses (Astin, 1997; Kabat-Zinn, 1990). The studies demonstrate that mindfulness training has been shown to reduce stress (Baer, 2003; Brown & Ryan, 2003; Kabat-Zinn, 2003, 2012) and to help patients manage chronic pain (Kabat-Zinn, Lipworth, & Burney, 1985).

In 2004, Grossman, Niemann, Schmidt, and Walach conducted a frequently-cited meta-analysis of the literature on MBSR and physical and mental health. Of the 64 empirical studies reviewed by Grossman et al. (2004), 20 met the criteria to be included in the meta-analysis. Selection criteria included: quantitative measurements, valid instruments, inclusion of effect sizes, and interventions based on Kabat-Zinn's (1990) MBSR teachings. Populations in the accepted studies ranged from medical and mental health patients to prisoners, and otherwise healthy people seeking relief from stress (Grossman et al., 2004).

Grossman et al. (2004) concluded that MBSR is an intervention that helps people suffering from a range of diagnoses (cancer to obesity to anxiety) of varying severity to cope with their conditions. This meta-analysis is important because it affirms that mindfulness training has scientific validity and acceptance in Western science. It is also important because it makes manifest the potential relief mindfulness training can offer to patients and people who are suffering physical and mental ills. Grossman et al. (2004) cautioned that future research must be done with continued rigor to affirm and extend these findings. While the scholarly conversations in the medical literature focus on mindfulness as intervention to help patient populations, there is some discussion about the relevance of mindfulness to the training of medical students.

Writing in the *Journal of American Medical Association*, Epstein (1999) called for mindfulness to be part of the training of medical students in order to improve their professional practice, particularly their relationship to patients. Epstein (1999) argues the particular relevance of mindfulness to the medical student is the willingness to look inward, the ability to be aware of what is happening in the present moment, and to act

with clarity and compassion when making decisions for themselves and for their patients. Teaching mindfulness, Epstein (1999) notes, is a departure from traditional forms of pedagogy in higher education in that the teacher does not impart knowledge to the student. The teacher can only show the student that there is a path to mindfulness.

Mindfulness in the Psychology Literature

The literature on mindfulness in psychology is robust and dominated by empirical studies published in reputable, peer-reviewed journals. The studies on mindfulness have described mindfulness as a way to help people become aware of and respond skillfully to their problems (Bishop et al., 2004). This literature is growing as investigators seek to explore the possibilities of how this construct might ease people's suffering as well as how it may expand the capacities of our mind.

One prevalent intervention studied in the psychology literature is Mindfulness-based Cognitive Therapy (MBCT), which derives from MBSR (Bishop et al., 2004; Segal, Williams, & Teasdale, 2002). The premise behind MBCT is that mindfulness can help people who ruminate on depressive thoughts get perspective on, and distance from those thoughts through awareness, attention, and nonjudgmental acceptance (Baer, 2003). For example, a depressed student in a MBCT program would be guided to shift the focus of "I am worthless" to "I am experiencing a feeling of unworthiness that will pass…" Mindful processing of attention to emotions and the ability to accept them nonjudgmentally are skills that can help people with moderate to severe mood disorders as MBCT has been shown to reduce symptoms and relapses of general depression (Astin, 1997; Chambers et al., 2007; Williams, Russell, & Russell, 2008) and suicidal depression

(Hargus et al., 2010). The acceptance that mindfulness training cultivates has also been shown to reduce avoidant behavior such as abusing drugs or alcohol is (Baer, 2003).

Brown and Ryan (2003) conducted widely-cited research on the relationship between mindfulness and psychological well-being. In particular they found that the awareness and attention facets of mindfulness were related to people's ability to regulate their behavior and experience positive emotions (Brown & Ryan, 2003). In another study focused on the relationship between mindfulness and emotion, Farb et al. (2010) found mindfulness training to reduce sadness. The idea is that the mind can only marshal so much attention and when the mind is released from ruminating it is able to access more information in the present moment including information that allows it greater perspective (Bishop et al., 2004). The potential benefits of mindfulness to mental health bolstered by this body of research and could have relevance for MBA students managing the daily stressors of graduate student life.

In the *Clinical Psychology Review,* Chiesa et al. (2011) reviewed 23 studies that used mindfulness meditation practices to investigate the broad category of cognitive functions, which they operationalize as attention, memory, and executive function. Chiesa et al. (2011) reported that the bulk of the studies found a positive relationship between mindfulness meditation and attention. Schmertz, Anderson, and Robins (2008) found that undergraduate students who reported higher levels of mindfulness performed better on an attention task than those who reported lower levels of mindfulness.

More experienced meditators were found to have stronger attention skills than novice meditators, suggesting that the benefits of mindfulness training accrue over time. In addition, Chiesa et al.'s (2011) review found that more meditation experience was

significantly related to observed changes in the brain, which helps establish the credibility of mindfulness meditation practice in scientific circles. Chiesa et al. (2011) also found that mindfulness training positively influences working memory, which is a person's ability to hold and manipulate information at the same time—this may have meaningful potential for academic performance. All of these findings help build a case for the inclusion of mindfulness training in higher education.

Mindfulness and Neuroscience

This review of literature on mindfulness and the brain, which appears to be sophisticated and is growing, is dominated by empirical research studies published in peer-reviewed journals. Neuroscientists are investigating how mindfulness works, including what parts of the brain are involved, in what ways, and to what effect (Treadway & Lazar, 2009). This falls under the umbrella of research studying the neuroplasticity of the brain, which is how the brain changes based on what is experienced (Davidson & Lutz, 2008; Leung et al., 2013). For example, some research studies collect data about brain activity and others collect data about structural changes in the brain. This research (Davidson, 2010; Davidson & Lutz, 2008) includes studying the mental processes and related brain activity that lie underneath mindfulness meditation. Neuroscientists have also measured changes in brain activity using electroencephalogram (EEG) tests and neuroimaging scans that each have particular strengths and limitations (Treadway & Lazar, 2009). Scholars (Jha et al., 2007) note the importance of this research as it suggests a possible way to advance neuroscience by *improving* brain functionality as opposed to being limited by research aimed at fixing damaged brain functionality.

The neuroscience research literature shows the adult brain can change as a result of mindfulness-based interventions (Davidson et al., 2003; Hölzel, Carmody, & Vangel, 2011). This lends scientific credence to a practice that can sometimes be perceived as lacking substance. It also affirms that the adult brain can be trained in meaningful ways, which is of particular relevance to adult educators. In particular, mindfulness meditation has been shown to make changes in the brain in areas that relate to how people think and feel (Treadway & Lazar, 2009). The demonstrated influence on cognitive and affective changes make this a potentially powerful concept in both the sciences and in education.

In the published literature, the attention facet of mindfulness has drawn considerable study. As has been found in other literatures, mindfulness training has been shown to improve a person's ability to pay attention (Jha et al., 2007; Treadway & Lazar, 2009; Vago & Silbersweig, 2012). The studies break down the types of attention and corresponding areas of the brain that are affected in highly specific scientific terms. For the purposes of this review, it is sufficient to say that there is empirical support for the positive relationship between mindfulness and attention.

Neuroscientists have also investigated brain structure as it relates to mindfulness training. Davidson and Lutz's (2008) ground-breaking study, "Buddha's Brain: Neuroplasticity and Meditation" tracked brain changes in Tibetan Buddhist monks to assess if and how their long-term meditation practices altered their brains. Using fMRI technology Davidson & Lutz (2008) found, among other things, a relationship between meditation practice and parts of the brain related to attention. In a longitudinal study of participants in an MBSR course, investigators (Hölzel et al., 2011) found structural

changes in areas of the brain, in this case the concentration of gray matter, associated with memory, management of emotions, and processing information related to oneself and others. The researchers collected data from MRI scans and a self-report questionnaire to analyze the effects of the mindfulness training. Other scientists (Lazar, Kerr, & Wasserman, 2005) also used MRIs to investigate structural brain changes in mindfulness meditators and found changes in the region of the brain (specifically a thickening of parts of the cerebral cortex) associated with processing information.

Davidson et al. (2003) also found that an eight-week training program in MBSR activated the part of the brain associated with positive feelings and increased immune function in the study's healthy subjects. This is important because it provides empirical evidence of a mind/body connection established through mindfulness-based interventions. (It is equally important, though less relevant for this review, for the finding that mindfulness-based training positively influences immune function.)

The types and duration of mindfulness training used in the neuroscience literature includes eight-week long MBSR programs, 10-day meditation retreats, and three hours of meditation training (Davidson et al., 2003; Jha et al., 2007; Moore et al., 2012). Zeidan et al. (2010) published a study, "Mindfulness Meditation Improves Cognition: Evidence of Brief Mental Training," that showed increased mindfulness after only four twenty-minute long sessions of meditation training. This variety of intervention type and duration is beneficial for researchers interested in mindfulness training in the higher education context who have particular time constraints and limited resources. Now that it has been fairly well established that mindfulness-based interventions influence brain

activity, the neuroscience literature is also investigating how this occurs and how the variables under investigation are related.

Mindfulness and Education

Higher Education. As noted earlier, the literature investigating mindfulness and graduate students is very limited; peer-reviewed journal articles on mindfulness and MBA students are almost non-existent. As previously mentioned, there are some articles discussing the mindfulness training of doctors and psychologists (Dobie, 2007; Epstein, 1999) but there are no systematic or coherent conversations exploring the theory of mindfulness or investigating its practical utility in graduate MBA programs with the exception of Hunter's work at the Drucker School of Management at Claremont Graduate University.

The research on mindfulness in higher education focuses on undergraduate student well-being. This is not surprising given the established benefits of mindfulness in clinical populations and the well-documented high levels of stress of college students. According to the American College Health Association-National College Health Assessment (ACHA-NCHA) (2013), college students report stress as the number one factor that negatively impacts their academic performance (Oswalt & Riddock, 2007) and the number of students reporting this has increased over the past five years. Students manage both the life-event stress of entering a new phase of their lives (post-secondary education) as well as the chronic stresses, e.g. financing their education, studying for classes, that they manage on a daily basis (Oswalt & Riddock, 2007). In terms of undergraduate counseling center use, the literature is mixed. Schwartz (2006) reported that the number of clients has not increased over the ten-year period between 1992-1993

and 2001-2002 but that the prescription of medications has increased markedly over that time. Although an analysis of general student stress levels is outside the scope of this paper, the overall picture of college student mental health suggests that more students are struggling with more problems of a severe nature.

A review of the higher education literature reveals a negative relationship between mindfulness and stress in college students (Caldwell et al., 2010; Oman, Shapiro, Thoresen, Plante, & Flinders, 2008; Palmer & Rodger, 2009). Mindfulness-based interventions have been found to lower stress in this population (Caldwell et al., 2010; Oman et al., 2008). This is important because it suggests mindfulness training as a potentially valuable way to reduce stress in a greater proportion of the college population including graduate students. Sample sizes for these studies range from 44 students to 166 students; a variety of mindfulness-based trainings were used, including MBSR, and data were collected through self-report questionnaires.

A positive relationship between mindfulness and adaptive coping styles has also been shown in the college population (Palmer & Rodger, 2009). This is valuable because it suggests that the more mindful college students are the better able they are to cope with their problems. And coping strategies are of importance as the complexity of students' problems has increased over time (Benton, Robertson, Tseng, Newton, & Benton, 2003). The potential of mindfulness-based practices to replace maladaptive coping strategies like substance abuse in the college student population have been investigated (Leigh et al., 2005). As noted above in the literature on mindfulness and psychology, it appears that the facets of awareness and acceptance are important to help people in this regard.

Mindfulness has also been shown to be related to college students' physical health (Caldwell et al., 2010; Grinnell, Green, Melanson, Blissmer, & Lofgren, 2011; Murphy, Mermelstein, Edwards, & Gidycz, 2012). Each of these studies had distinct investigative paths: Caldwell et al. (2010) assessed students mindfulness after participation in a specific movement class; Grinnell et al. (2011), took body measurements such as weight and blood pressure and consulted self-report measures to research a connection and Murphy et al. (2012) used only self-report surveys over the course of five semesters. The sample sizes for these studies range from 75 to 441 participants; one study focused only on first-year college students, another just female students. Findings are not generalizable to other populations.

The positive relationship between mindfulness and physical health of college students is important because it has been shown that undergraduates gain more weight than the average adult and get insufficient exercise (Grinnell et al., 2011; Murphy et. al., 2012). Thus, it is a population that needs support to stay healthy. Mindfulness as a training option is attractive because of its universal appeal: anyone (except for the severely ill) can practice mindfulness and it does not cost any money to do so. This has prompted researchers to investigate whether mindfulness training can help students where traditional health programs have failed (Caldwell et al., 2010; Grinnell et al., 2011).

Researchers (Bahl, Milne, Ross, & Chan, 2013; Grinnell et al., 2011) found that students with higher levels of mindfulness had greater control over their eating habits and were shown to eat healthier and sleep better (Murphy et al., 2012). What is evident in this research is that mindfulness permeates a number of interrelated health factors that build upon one another. For example, students with higher levels of mindfulness were

more apt to exercise (Grinnell et al., 2011) and specific exercise classes have been shown to increase mindfulness of college students (Caldwell et al., 2010). Thus it appears possible that mindfulness training could help students deal with a number of different challenges that may afflict them during college.

While literature on mindfulness in undergraduate educations focuses on student mental and physical health, there is another, smaller conversation in the literature about mindfulness, cognition, and academic performance. Mrazek et al. (2013) found that mindfulness training improved people's ability to remember information while simultaneously manipulating that or other information (working memory). The training also increased student scores on the GRE reading test by reducing mind wandering. In this randomized control/treatment study, 48 undergraduate students participated in either a mindfulness class or a nutrition class that met a total of eight times over two weeks for 45 minutes. The mindfulness class included learning about mindfulness and practicing mindfulness meditation. This portion of the study design could serve as a model for how to teach mindfulness in higher education contexts. Pretest and posttest measures revealed that those in the mindful class scored higher on the GRE reading test. The authors posit that this is because mindfulness helps the student pay attention and block out distracting thoughts (Mrazek et al., 2013). This evidence supporting the positive relationship between mindfulness and cognitive function in college students has the potential to shift how we think about college student development.

Ramsburg and Youmans' (2013) study, "Meditation in the Higher-Education Classroom: Meditation Training Improves Student Knowledge Retention during Lectures," has particular resonance for this study not only in terms of its findings that

meditation can influence cognition in healthy student populations, but also in terms of the methodology employed. In their study, Ramsburg and Youmans (2013) used a brief meditation intervention that was embedded in a class. The self-focused meditation was six minutes long and was conducted at the start of a psychology class—this study used a five-minute recorded, guided meditation at the start of a communications class.

In a separate study investigating the relationship between meditation and cognition in undergraduate students, Helber et al. (2012) did not find differences in cognitive function to be associated with mindfulness meditation, but suggests that this was due to a methodological design issue; the authors recommend more stringent procedures. Such procedures are also something that would help bolster the K-12 literature on mindfulness, which will be discussed next.

K-12 Education. Scholars have been studying and writing about mindfulness in primary and secondary education contexts longer than they have been studying mindfulness in tertiary education. The K-12 literature on mindfulness explores how the construct can be used to improve the experience in the classroom for both teachers and students. The publications seem to include more commentaries and opinion pieces than empirical research studies.

MacDonald and Shirley (2009) explored the power of mindfulness as both a personal and pedagogical tool to improve teachers' experiences in and of the classroom in their book *The Mindful Teacher*. The authors describe the concept of mindful teaching "as a form of teaching that is informed by contemplative practices and teacher inquiry that enables teachers to interrupt their harried lifestyles, come to themselves through participation in a collegial community of inquiry and practice..." (p. 4). In this vein,

mindfulness was studied by Gold et al. (2009) as an antidote to the burnout teachers often feel as a result of the relentless and competing demands they must manage from a number of directions. Gold et al.'s (2009) research used the MBSR program as an intervention to assess the impact of mindfulness on teachers' stress. The only outcome of this study that was statistically significant was the teachers' ability to accept without judgment. A deeper investigation on this population may yield additional insight into the relationship of mindfulness and teachers.

K-12 literature is focused on investigating how mindfulness can help children control their behavior in school and manage a range of psychological ailments that affect their well-being and their ability to interact with others. Because this K-12 research focuses on a much younger population of students facing distinct challenges from adults in graduate school, this literature will be covered briefly.

Burke (2009) conducted a review of available studies that used MBSR or MBCT interventions in treating children. She found 15 studies that met inclusion criteria—one for preschool-aged children, six on elementary school students and eight on high school students. Burke (2009) concluded that the mindfulness-based interventions are feasible but that there is no standard base of evidence to demonstrate the effectiveness of these interventions. A few studies are noted below, which illustrate the methodological concerns.

Semple, Reid, and Miller (2005) have been looking at the way mindfulness might help anxious children. In an "open clinical trial" of five students, they found that mindfulness training exercises, though not meditation, to be helpful in dealing with symptoms related to anxiety. The very small sample size and other methodological

limitations hamper the generalizability of these outcomes. Beauchemin, Hutchins, and Patterson (2008) worked with a larger sample of 34 students and found mindfulness intervention, including meditation, helped students with learning disabilities feel less anxious, do better at school, and socialize more easily. Singh et al. (2007) found mindfulness training to help children reduce their aggressive behavior in school. Again, this study had a small sample size: only three seventh grade students so while results may indicate potential but cannot be generalized. In one of the stronger studies, Napoli, Krech, and Holley (2005) investigated the effect of mindfulness training on elementary school students' attention. In 12 classes held over 24 weeks, 97 students learned about mindfulness through exercises in their physical education classes (97 students were also in a control group). Napoli et al. (2005) found statistically significant differences in measures of attention, favoring those students who were assigned to the mindfulness-training group.

Organizational Behavior

This review includes the organizational behavior and management literatures because of their connection to management education. In the organizational behavior literature, there is a (mostly theoretical) conversation regarding organizational mindfulness, which concerns processes at the institutional level. It does not have particular relevance for investigating mindfulness and MBA students; however, it will be noted because any potential introduction of mindfulness in an MBA program needs to understand related concepts in organizations.

Mindfulness came into organizational theory with Weick et al.'s (1999) article "Organizing for High Reliability: Processes for Collective Mindfulness." High reliability

organizations (HROs) are those where the stakes are very high: the environment is politically and socially charged, experimentation is limited or nonexistent due to the extreme consequences of the work, and operations and technology are complex, e.g., nuclear power plants and space agencies (Weick et al., 1999).

Weick et al. (1999) argue that there are cognitive processes unique to HROs that allow them to focus on failure (instead of just success) and manage change adeptly. In short, the HRO literature suggests that when organizations cultivate a way of processing information that goes beyond the usual routines of work, decision-making is improved. Ross, Weick, and Sutcliffe (2006) note that the awareness, attention, and focus that characterize mindfulness are central to the success of HROs if they are able going to be able to manage their formidable challenges and crises. It is worth noting that Ray, Baker, and Plowman (2011) suggest that the concept of organizational mindfulness applies to business schools because they share the turbulent environment characteristic of HROs, specifically: fewer resources, tighter obligations to donors, and blame for lapses in ethical training of their students.

In the management literature, there is a more relevant though still extremely limited discussion about mindfulness and the well-being of individuals at work. Hülsheger, Alberts, Feinholdt, and Lang (2013) found that mindfulness training was negatively related to emotional exhaustion and positively related to job satisfaction. This was a two-part study; in study one, 169 people filled out diaries that were analyzed by the authors; in study two, 64 participants were assigned to a mindfulness training or control group. Both studies affirmed the results noted above: people with mindfulness meditation training reported less emotional exhaustion than the control group. The

authors (Hülsheger et al., 2013) point out it is possible that those who were more emotionally exhausted did not have the resources to be mindful, so further research would investigate how the variables are interrelated. In terms of job satisfaction, if a person can perceive stressful events in their work lives more objectively (by not evaluating them and/or attaching meaning to them) they are not as negatively affected by these events. In the authors' words, "At work, where individuals are confronted with challenging situations every day, mindfulness can facilitate adaptive appraisal to stressful events" (Hülsheger et al., 2013, p. 312).

In attempting to see if a brief mindfulness intervention could increase employees' mindfulness, reduce their psychological stress, and improve client relationships, Gregoire and Lachance (2014) conducted a study with call center employees of a financial organization. Participants listened to a guided meditation at their desk with headphones twice during the day (once for 10 minutes and once for five minutes) for five weeks. Participants' levels of mindfulness, as measured by the Mindful Attention Awareness Scale, increased over time and stress and negative feelings decreased (Gregoire & Lachance, 2014).

Goldman-Schulyer (2010), in her investigation of mind training (which is distinct from mindfulness) and business people, comments that leadership training is primarily cognitively-based and argues that trainers need to reach leaders at the level of tacit knowledge, which she defines as: "…familiarity with a subject that lets a person act effectively without being able to fully describe how. It is from this part of human 'knowing' that change in values and long-standing habits is believed to be possible" (p.

24). Goldman-Schulyer (2010) argues for deeper personal introspection and that this has a better chance than more superficial treatments at cultivating leaders with integrity.

Ruedy and Schweitzer (2010) conducted research on mindfulness and ethics and argue that individuals who are not paying as much attention to what is happening around them may not be as attuned to ethical challenges. Ruedy and Schweitzer (2010) state that with present-centered, non-judgmental awareness, practioners can accept and reflect on information that might in other ways negatively influence their decision-making. Given the ethical lapses of some of our corporate leaders, this research is a relevant conversation to follow.

Management Education and Learning

There is an energetic, scholarly conversation in the field on management learning and education contesting the content, method, and goals of MBA education. This conversation includes essays, opinion pieces, and commentaries by faculty with experience teaching in these programs. The field could benefit from empirical studies testing the theories debated in this conversation.

As noted earlier in a review of *The Academy of Management Learning and Education's* (AMLE) first decade of publications, Rubin and Dierdorff (2013) found that the majority of the articles focused on MBA curriculum. These critiques are directed at foundational and very specific aspects of MBA curricula. A common refrain is the narrowness of the dominant management style that is taught in MBA programs (Mintzberg, 2004; Rubin & Dierdorff, 2013). This management style is one that focuses on maximizing shareholder value above anything else. In short, it is about making money. Waddock and Lozano (2012) document their attempts to respond to this criticism

by offering novel approaches to management education in their home institutions (Boston College and Ramon Llull University, respectively). They summarize these approaches by saying "through experiential, interactive, dialogic, and action-learning pedagogies, these programs aim to instill a more holistic and practice-grounded orientation o management education" (Waddock & Lozano, 2012, p. 266). While these concrete explorations of alternatives are laudable, it is unclear how much traction they are getting in MBA programs.

In questioning why curricular improvements, particularly related to the teaching of ethics, have failed to bring about changes in business behavior, Giacalone (2004) suggests it is because MBA programs lack higher aims that go beyond improving the bottom line. Comparing business students with medical students, he observes a gap in aspirational goals—doctors aim to help people, but how do business people contribute to the greater good? This is an open question without an easy answer or expedient solution. Giacalone (2004) suggests that business schools start by taking responsibility for their part in the mis-education of MBA students and commit to teaching them with broader, better goals in mind: "It is our task to help them learn the transcendent parallel: that insensitive decision-making, selfishness, a disinterest in those who follow them, and the singular pursuit of wealth define an ineffective human being" (p. 419). Mindfulness training is an alternative way of cultivating MBA students' capacities that is worth investigating further.

Relevant Facets for Mindfulness for MBA Students

There is no body of scholarly work investigating the effects of mindfulness on MBA students. As such, this section of the literature review will draw from the different

disciplines noted above to highlight two facets of mindfulness that are most salient to its operationalization in this study: awareness and attention. It will also discuss the practical outcomes that may result from the cultivation mindfulness.

The research studies in the literature affirm that mindfulness can be learned (Brown & Ryan, 2003, 2004; Olendzki, 2009; Shapiro et al., 2006). This is critical is assessing the feasibility of the experiment proposed in this study. From this starting point, it is possible to consider each of these two facets of mindfulness, awareness and attention, as capacities that normally functioning humans possess but that can be cultivated to allow for insight into ourselves and, by extension, others.

Awareness

Awareness "refers to the subjective experience of internal and external phenomena; it is the pure apperception and perception of the field of events that encompass our reality at any given moment" (Brown & Ryan, 2004). It is observing what is thought and felt in both an emotional and physical sense. Mindfulness is characterized by a heightening of this awareness (Block-Lerner et al., 2007). Normally functioning individuals are aware—it is a condition for survival. However, individuals differ in their levels of self-awareness. And, as it is a systematic capacity individuals are born with it is not broadly considered something individuals can or should cultivate. As such, it is not surprising that it is not a skill included in academic curricula at any age much less in a graduate program populated by adults who, culturally, are seen as fully developed.

Mindfulness meditation may facilitate awareness by creating room for a person to pause and observe her thoughts, feelings, and sensations—to see what is there (Brown & Ryan, 2004). For example, a mindful MBA student in an intense job interview may be

able to sense that she feels overwhelmed by the questioning and can observe that emotion and then consider an appropriate course of action such as asking for an additional moment to consider the next question or simply taking in a few calming breaths. This contrasts with a student who tries to suppress the overwhelming feeling and ends up at a loss for words and flushed with embarrassment.

This example shows how mindfulness changes how information is processed. In the first moment, there is awareness, i.e. "I am experiencing a feeling of being overwhelmed." In the next moment, there is a broadening of perspective, i.e. "I can manage this in a few different ways." In the moment after that, there is more informed decision-making, i.e. "I'm going to ask for a moment to collect my thoughts." The awareness exhibited in this example led to an informed choice about how to react. It offered an alternative to the habitual way of responding that can be very helpful for students navigating complex school and work contexts (Brown et al., 2007).

Increased self-awareness can contribute to better regulation of emotions and behavior (Baer, 2003; Brown & Ryan, 2003; Brown et al., 2007), fuller perspective-taking (Block-Lerner et al. 2007) and clearer decision-making (De Dea Roglio & Light, 2009; Hunter & Chaskalson, 2013). These are all faculties that, if cultivated, would allow a student to reach more of her potential both in graduate school and beyond.

De Dea Roglio and Light (2009) have investigated how to cultivate reflection as a leadership skill for executive MBA students—typically mid-career professionals who take a year to complete an accelerated MBA program. One part of De Dea Roglio and Light's theory (2009) suggests that self-awareness is critical to developing an accurate sense of a leader's current reality.

Self-awareness is critical to successful interpersonal relationships and allows individuals to know other people in a deep and meaningful way (Goleman, 2011). Block-Lerner et al. (2007) argue that it is difficult to know others if you lack awareness about your own self. And the relationship between mindfulness and awareness is solidified in the literature; according to Teasdale et al.: "Through mindfulness generated meta-cognitive awareness, individuals can develop the capacity to understand their own internal emotional processes, which can help them better understand the emotional processes of others" (as quoted in Glomb, Duffy, Bono, & Yang, 2011, p.132).

Attention

Like awareness, attention is central to the construct of mindfulness. In describing the mechanisms of mindfulness, Shapiro et al. (2006) state: "In the context of mindfulness practice, paying attention involves observing the operation's of one's moment-to-moment, internal and external experience" (p. 376). The medical and psychology literatures contain some very specific and complex conversations on the component parts of attention. At the broadest level, attention can be thought of having two modes. It is possible to focus one's attention on a specific stimulus—a type of concentrative attention. It is also possible to pull back and pay attention to multiple stimuli. The process of shifting focus is referred to as "attention switching" in the literatures and there is research suggesting that long-term meditation practice may facilitate this ability (Chiesa et al., 2011).

The literature suggests that there are potential benefits of sharpening one's attention and these include: deeper understanding of one's own emotions (Kabat-Zinn, 2002; Moore & Malinowski, 2009), less impulsivity (Vago & Silbersweig, 2012),

decreased mind wandering (Mrazek et al., 2013), and better use of the brain's resources (Moore et al., 2012). Dane (2011) found that in constantly changing work environments the ability to pay attention to a wide-range of external occurrences can improve how well a person does a discrete task.

For the purposes of this research study, it seems most important to note that attention can be strengthened through mindfulness practice (Moore et al., 2012). The literature is conclusive in the finding that mindfulness meditation helps to sharpen and sustain the focus of one's attention (Chambers et al., 2007; Helber et al., 2012; Moore et al., 2012). The empirical evidence that supports this relationship is robust and growing as investigators across disciplines examine the quality and duration of attention as well as how mindfulness meditation influences the areas of the brain related to attention.

MBA students could gain a lot by knowing how to strengthen and focus their attention given the chorus of complaints about the stress they feel from their frantic and fragmented lives. Mindfulness exercises can help them ignore distracting thoughts and stay focused on what is happening in the moment. The research shows that this could result in improved well-being, task performance, and interpersonal relationships (Dane, 2011; Dekeyser, Raes, Leijssen, Leysen, & Dewulf, 2008).

Acceptance

The facet of acceptance is included in this discussion because of its importance in understanding the overall construct of mindfulness. In their efforts to operationalize mindfulness in the literature, Bishop et al. (2004) describe acceptance in this way: "It is an active process in that the client chooses to take what is offered with an attitude of openness and receptivity to whatever happens to occur in the field of awareness" (p. 233).

Acceptance is not suppression nor is it attachment: it is letting things be (Goldstein, 1993). This requires one to face one's experiences, which takes courage and practice, of the type that mindfulness meditation can foster. The groundedness of this practice is evident in the way that the nonjudgmental and accepting quality of mindfulness allows the person to be highly self-aware without being self-involved (Lakey, Kernis, Heppner, & Lance, 2008).

A key characteristic of mindfulness meditation is that the lack of discrimination among thoughts, feelings, and sensations. Instead, one observes and allows what arises, including unpleasant, uncomfortable, or painful experiences. This can be difficult and is what makes acceptance a critical facet of mindfulness. It is through acceptance that one is better able to see the reality of the moment and to gain insight (Brown et al., 2007; Goldstein, 1993).

The potential benefits of acceptance have been addressed in the literature. Chief among them is the finding that acceptance mediates the degree to which peoples' feelings and thoughts affect them and what reaction they will have, if any, to those thoughts and feelings (Baer, 2003; Bishop et al., 2004; Chambers et al., 2007; Hargus et al., 2010). For example, sitting with uncomfortable feelings such as anxiety can reduce the emotional reactions to these feelings over time (Baer, 2003). And if students can accept that they feel nervous and that it will pass, the situation can then be tolerated with equanimity (Baer, 2003; Chambers et al., 2007). The equanimity that can accompany acceptance can improve interpersonal skills.

Research on the effects of mindfulness on interpersonal relationships is emergent though it has been suggested that the acceptance facet of mindfulness, in particular, can

allow for greater and deeper understanding between individuals (Brown et al., 2007). The ability to observe but not react to the thoughts, feelings, and sensations one is experiencing helps reduce defensiveness. In one research study, Lakey et al. (2008) found that the more mindful people are, the less verbally defensive they are. Specific communication tasks that would benefit from an absence of verbal defensiveness include handling difficult conversations, giving and receiving feedback, advocating and defending ideas, and working with others on teams.

Stress reduction

The mindfulness facets of attention and awareness are important for an MBA student's development and the potential benefits justify further investigation within this population. There is one other benefit of mindfulness to the MBA student: it has been shown to help reduce stress (Grossman et al, 2004). Hodgson and Simoni (1995) found that academic performance, finances, social support, and satisfaction with the graduate program were sources of stress for graduate students. Thus the stress reduction byproduct of mindfulness can be advantageous to MBA students given both stressors of their daily lives as students and in preparation for significant stressors that they may encounter in management positions (Hunter & Chaskalson, 2013). There is some indication that breathing exercises, which can be a part of mindfulness meditation practices, help MBA students experience less stress (Hobson & Delunas, 2009).

In a study on graduate use of mental health services, Hyun, Quinn, Madon, and Lustig (2006) found that students in professional schools (such as MBA programs) were less likely to say they needed mental health support than students in humanities. While the study does not hypothesize why this might be the case, it could be interpreted that

alternative forms of support—perhaps embedded in the curriculum—may be a more acceptable way for students in professional schools to seek support for and foster their well-being. This invites investigation about how support services are delivered and cultural and contextual barriers might be contributing to this trend.

In closing, Harvard Business School Professor Bill George (2012), articulates how mindfulness can be useful for the aspiring leaders—MBA students:

> The practice of mindful leadership gives you tools to measure and manage your life as you're living it. It teaches you to pay attention to the present moment, recognizing your feelings and emotions and keeping them under control, especially when faced with highly stressful situations. When you are mindful, you're aware of your presence and the ways you impact other people. You're able to both observe and participate in each moment, while recognizing the implications of your actions for the longer term. And that prevents you from slipping into a life that pulls you away from your values. (p. 1)

The potential of mindfulness to transform the lives of MBA students in both big and small ways makes it a necessary relationship to study; this will be discussed in the next sections after limitations in the literatures are addressed.

Limitations

In the varied literatures covered in this review, there are limitations related to the assessment of mindfulness and challenges to its application in secular contexts. There are also gaps in the literature that deserve attention given the potential benefits of mindfulness that have been established. In summary, the literatures on mindfulness in medicine, psychology, and neuroscience are robust. They are dominated by empirical studies in reputable peer-reviewed journals. Induction, intervention, and psychometric studies of mindfulness have been conducted in the discipline of psychology (Brown et al., 2007). The medical, psychology, and neuroscience literatures had helpful review articles

that provided meta-analyses of published research. Commentaries exist for perspective on the state of the mindfulness research, its place in secular contexts, and its relationship to Buddhism. As Brown and Ryan (2004) state "…it (the research) indicates that mindfulness is a reliably and validly measured characteristic that has a significant role to play in a variety of aspects of mental health" (p. 844).

The literature on mindfulness in higher education has potential but needs more and better empirical research to investigate the potential benefits of mindfulness to the specific population of students in educational contexts. As previously stated, the conversation on mindfulness in graduate schools needs to be nurtured so that the practical and pedagogical utility of the concept is investigated thoroughly through empirical research. The literature on organizational behavior has little to add to this discussion at this time, though that may change in the future if the conversations shift in such a way that there is utility in comparing and contrasting institutional mindfulness with individual mindfulness. The management literature touches on facets of mindfulness, particularly awareness and attention, but not on the concept as a whole.

In the interdisciplinary literatures on mindfulness there is an informed but limited conversation on how to assess mindfulness (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Baer, 2011; Brown & Ryan, 2004; Davidson, 2010). The different ways mindfulness is defined, particularly the specific facets (awareness, acceptance) said to comprise mindfulness, present measurement challenges (Baer et al., 2006; Brown & Ryan, 2004) because researchers may place their emphases in different facets and use different language to describe similar facets thus making it different to compare and contrast studies. Depending on how the researcher defines mindfulness—as a trait or a

state or both—it can be difficult to discern the boundaries of mindfulness. Davidson (2010) suggests remedying this by having investigators say exactly how the term mindfulness is being used in the research—in short, through strict attention to how mindfulness is operationalized.

As noted in this review, a number of the studies on mindfulness include an intervention introduced to induce a state of mindfulness. There are a few main challenges to this method. One is that there can be variability in the intensity and quality of the intervention; as noted earlier, scholars have noted their concern about the necessity of trained and experienced meditation teachers for those studies using mindfulness meditation as the intervention (Grossman et al., 2004). Another is the difficulty of knowing the quality or duration of a person's mindfulness given there is no standardized, external manifestation of its presence (Baer, 2011; Davidson, 2010). In short, one cannot see mindfulness. In addition, some programs, including MBSR (Kabat-Zinn, 1990) ask participants to meditate on their own. This is subject to the same concerns of quality, duration, and intensity for the self-guided portion of a training program.

The lack of research studies conducted with a comparison group poses challenges in identifying the factors that induce mindfulness which are distinct from other existing factors (Davidson, 2010). For example, does a student exhibit more mindfulness because of neurological changes resulting from the training or because the group setting motivated her to be more aware and to pay better attention? Also, there is the problem of completion rates for these research studies in both people withdrawing from a study and for those that remain: do they remain, perhaps, because they are more inclined or

interested in mindfulness training and how does that affect the results of a study (Baer, 2003)?

An additional limitation in the research on mindfulness is the generalizability of the research results. Since the majority of the mindfulness research has been conducted in the fields of medicine, psychology, and neuroscience, many, though not all, of the target populations have been patients observed in clinical settings and findings may not be generalizable to the broader population. The same is true for the majority of research studies conducted with college students: they are not generalizable outside the sample population. More studies with varied populations across different contexts would further affirm the empirical evidence that points to the positive benefits of mindfulness training. There also is little discussion in the literature about how identity factors (age, gender, race, etc.) or socio-economic status relate to a person's mindfulness. For the most part, the literature on mindfulness in higher education using student populations does not separate findings based on students' gender, race, age, ethnicity, or socio-economic status; this makes it difficult to make any nuanced meaning from the data about how mindfulness training may vary with sub-populations of undergraduates. However, Masuda, Wendell, Chou, and Feinstein (2010) did investigate the relationship of mindfulness in the Asian American college population and found a positive relationship between mindfulness and psychological well-being.

Many of the research studies involve a mindfulness–based intervention the effects of which are measured with a self-report questionnaire. There are five such questionnaires that dominate the interdisciplinary literatures and which have been found to be psychometrically sound (Baer et al., 2006; Baer, 2011). (See Table 1, below.) One

challenge is that in most cases, scientists, not Buddhist scholars, created the instruments, so while they have expertise in their discipline, they often do not have the deep knowledge of the roots of the concepts they are studying (Baer, 2011).

Table 1.
Prevalent mindfulness questionnaires used across the literatures (Baer et al., 2006).

Mindfulness Questionnaires	*Authors/Date*	*Number of items*	*Measuring*
Mindfulness Attention Awareness Scale (MAAS)	Brown & Ryan, 2003	15	State-level mindfulness
Freiburg Mindfulness Inventory (FMI)	Bucheld, Grossman, & Walach, 2001	30	Non-judging observation; Openness
Kentucky Inventory of Mindfulness Skills (KIMS)	Baer, Smith, & Allen, 2004	39	Observation Describing Acting with awareness Accepting w/o judging
Cognitive and Affective Mindfulness Scale (CAMS)	Feldman, Hayes, Kumar, & Greeson, 2004	12	Attention Awareness Present-focus Acceptance
The Mindfulness Questionnaire (MQ)	Chadwick, Hember, Mead, Lilley, & Dagnan, 2005	16	Mindfulness vis a vis upsetting thoughts and feelings

Baer (2011) suggests the continued development of alternatives to self-report questionnaires to measure mindfulness, including the continued development of brain imaging tests that show neurological changes. Scholars have noted that future research must deepen the empirical evidence supporting mindfulness by investigating *how* the changes from mindfulness occur and not just that they did occur (Baer, 2011; Davidson, 2010).

It is important to state that mindfulness is not for everyone. Scholars suggest that mindfulness interventions may be contraindicated for those suffering from psychotic disorders, but also note that there has been some support for the use of specific mindfulness techniques with this population (Kocovski, Segal, & Battista, 2009; Maex, 2011). For clinical populations, mindfulness interventions need to be specifically

matched to and designed for the type of disorder that they are attempting to ameliorate. Dobkin, Irving, and Amar (2011) reviewed the MBSR literature to understand for whom that specific intervention may be contraindicated and found that studies were lacking the necessary information to answer the question with any definitiveness. The general themes the scholars deduced from their review that are applicable to educational contexts were the following: screen participants in MBSR interventions for serious psychological disorders, set expectations with participants that MBSR can be challenging, have a referral system in place if participants need outside help, and make it clear that participants know best how to manage their well-being and should engage or disengage in practices accordingly.

Hülsheger et al. (2013) also raise the important question about the possible negative side effects of mindfulness, particularly in the context of the workplace. Specifically, if an employee cultivates her mindfulness and upon becoming more aware of her thoughts and feelings is motivated to pay greater attention to non-work pursuits, perhaps the cultivation of mindfulness is contrary to the organization's success.

What is pertinent to this review is that there are sound ways to gather empirical evidence in sample populations both clinical and non-clinical but also limitations to methods of collection and the measurement instruments. Also, the field is in the nascent stage of development where a lack of consensus about what and how to measure a complicated construct, such as mindfulness, is to be expected (Brown et al., 2007).

Future Research

The literatures reviewed highlight important facets of mindfulness that relate to self-management: awareness, attention, and acceptance. While the empirical evidence

affirms these facets and supports the positive benefits of mindfulness, its lack of generalizability makes it difficult to extend the results to the MBA population. As such, future research can be extended in a few key ways. Interdisciplinary studies can attempt to do research that allows for greater generalizability. Doctors, psychologists, and neuroscientists can extend their research to further explore, with greater detail and for deeper understanding, how mindfulness changes our brain, our thoughts, feelings, and behaviors. And they can continue to investigate how mindfulness might be able to help us improve our minds for greater insight. Scientists may also need to investigate the questions of potential downsides to mindfulness; what they are and how they could be avoided.

At the same time, it is necessary to look more closely at mindfulness in higher education contexts. Bush (2011) raises important questions about the place of contemplative practices in higher education and Hunter (2013) rightly asks whether business schools should be concerned with student well-being at all. These open questions not withstanding, it will be important to conduct deeper and more rigorous research exploring mindfulness and graduate students, particularly MBA students. Numerous factors would need to be considered, including: how do the goals of MBA programs influence what type of mindfulness-based training there is or how mindfulness as a concept is received? What are the contextual factors of a business school that might influence mindfulness training? Where would mindfulness training fit in and how? Mindfulness-based interventions are, by definition, experiences in the present (Fennell & Segal, 2011) so perhaps they can fit within the long tradition of experiential education.

Contemplative studies scholar Mirabai Bush (2011) writes that contemplative higher education is increasing and cites examples of mindfulness in the curriculum in a number of disciplines including law, political science, architecture, chemistry, art, religious studies; she cites no examples from business schools. Chapter III proposes an experiment that seeks to investigate the intersection of mindfulness and management education through a research design that invites students to participate in mindfulness meditation.

Chapter III: Methodology

Research Question

This research study attempts to answer the question: Will classroom-based mindfulness meditation training influence MBA students' levels of mindfulness? This is an important question to study because it could contribute to important aspects of MBA students' development—their ability to cultivate a heightened sense of awareness and attention. As noted in the previous chapter, the benefits of mindfulness on various populations have been established across interdisciplinary literatures; however, there is not sufficient research investigating its effects on the MBA student population. Furthermore, research investigating brief mindfulness-based treatments is also limited. This research contributes to that conversation, which is an important one in terms of trying to scale mindfulness treatments into MBA curricula. The pursuit of this question is affirmed by the empirical evidence showing that mindfulness can be learned (Brown & Ryan, 2003, 2004; Olendzki, 2009; Shapiro et al., 2006).

Mindfulness meditation was chosen as the treatment in this research study. There is established empirical support for the relationship between mindfulness meditation exercises and the cultivation of mindfulness as operationalized by Brown and Ryan (2003). The treatment was embedded in an existing MBA course for two reasons. The first was to assess the placement of mindfulness training in academic curricula versus placement in an extra-curricular offering such as a wellness workshop. The second was that embedding the treatment within an established course increases the potential for scalability—faculty would not need to invest human and fiscal resources into developing a new course if they were interested in facilitating mindfulness training.

Description of the Sample

This study used a sample of convenience. The researcher is an instructor at MIT Sloan School of Management and thus had the requisite access to its first-year, first-semester MBA students—the population of interest in this study. The researcher also had relationships with faculty at MIT Sloan who could help facilitate the treatment in their classrooms. All first-year, first semester MIT Sloan students are automatically enrolled in a core course, Communication for Leaders. In the fall of 2014, there was a teaching team of seven instructors who taught this course and the researcher was one of these instructors. All sections of this course used a common syllabus: readings, assignments, and grading criteria were the same. All course sections were held Tuesday afternoons, meeting at 1:00, 2:30, or 4:00 PM. Each class was 80 minutes long. Access to the target population and faculty support made the Communication for Leaders course the practical choice for the site of the intervention.

A critical part of research design is determining the size of the study's sample. For this experiment, G*Power was used to conduct sample size. An a-priori power analysis indicated that for a dependent means t-test (two-tailed) with an alpha-level of .05, a sample size of 199 was needed to indicate a small (.2) effect size between pretest and posttest MAAS scores. This effect size is based on Cohen's (1988) index where $d = 0.2$ is a small effect, $d = 0.5$ is a medium effect, and $d = 0.8$ is a large effect (Field, 2013). The effect size was estimated in consultation with published studies assessing the effects of mindfulness-based interventions on participants' levels of mindfulness using the MAAS (Carlson & Brown, 2005; Chambers et al., 2007; Shapiro et al., 2006).

Based on this analysis, 204 first-year, first-semester MIT Sloan students across six classrooms were invited to participate and 158 students (74.5%) completed this study. It should be noted that it became evident that a mixed ANOVA was a more appropriate test for this research question and a subsequent G*Power analysis indicated that for a mixed ANOVA, two-tailed test with an alpha-level of .05, a sample size of only 76 students was needed to detect a small (.2) effect between pretest and posttest MAAS scores. Thus, the final sample size of 158 students was sufficient.

MIT Sloan's MBA Program Office, independent of this study, arranged the core classes in such a way that there was homogeneity of demographic characteristics across each classroom. These demographic characteristics included gender, age, citizenship, work experience, undergraduate institution, and marital status. Each classroom had approximately 34 first-year MBA students. As it was a mandatory course, no first-year MIT Sloan MBA student in the participating classrooms was excluded from the study and no first-year student in the study dropped out of the MBA program in the fall of 2014.

MIT Sloan's admission's materials are explicit in stating the type of student they want to recruit: "We seek thought-leaders with exceptional intellectual abilities and the drive and determination to put their stamp on the world" (MIT Sloan, 2014b). In terms of intellectual abilities (as determined by standardized testing) MIT Sloan students are high-performing: the average GMAT score is 713 out of a total possible score of 800 (MIT Sloan, 2014c). There is a distinct international component to the MIT Sloan student body—45% are non-US citizens. National and global surveys consistently rank MIT Sloan in the top ten MBA programs in the world (BloombergBusinessweek, 2014; Financial Times, 2014).

Data on this sample were collected and analyzed to affirm equivalency across groups. Treatment and control groups were statistically equivalent on gender, age category, race, and citizenship at pretest. See Table 2.

Table 2.
Participant Demographics

Variable		Frequency, *n*	Percent of sample
Gender	Male	96	60.8
	Female	62	39.2
Age	20-24	10	6.3
	25-29	131	82.9
	30-39	17	10.8
Citizenship	US	93	58.9
	Non-US	65	41.1
Ethnicity	Hispanic or Latino	28	17.7
	Non-Hispanic or Latino	130	82.3
Race	Asian	37	23.4
	White	100	63.3
	Other	21	13.3

Research Design

This was a quantitative study of the effect of mindfulness meditation training on MBA students' levels of mindfulness. A quantitative study was pursued for two main reasons: 1) the literature on mindfulness calls for more studies to quantify the effects on mindfulness training on affective processes (Davidson, 2010; Keng et al., 2013; Shapiro et al., 2006); 2) there is a widely-used, valid instrument that measures individual's mindfulness in a single score, the Mindful Attention Awareness Scale (MAAS, Brown & Ryan, 2003), thus making quantitative comparisons between treatment and control groups practical and efficient. The data were analyzed using the Statistical Package for the Social Sciences (SPSS, Version 21 for Mac).

Research Methodology

This study used an experimental design with classrooms randomly assigned to treatment and control conditions. The random assignment was modified to place one treatment group and one control group with each facilitator to minimize implementation threats. Scholars studying contemplative practices in higher education have affirmed the utility of using experimental and quasi-experimental designs to investigate the effects of meditation in the classroom (Shapiro et al., 2011). This experimental design was used to evaluate the effects of brief mindfulness training on MBA students' levels of mindfulness.

Part of what accounts for the quality of these types of experiments is the control that the researcher has in structuring the design, implementation, and follow up of a study. These design decisions include setting the criteria for eligibility in the research study, pre-defining hypotheses, determining clear start and end times, monitoring the treatment implementation, and systematically analyzing the data. These strict protocols are valuable in allowing the researcher to see the treatment outcomes that are distinct from observations made prior to treatment (Rosenblum, 2010).

Comparative studies are of interest and value to the scholarly community investigating mindfulness. Davidson (2010) argues that "The measurement of mindfulness and the duration of its training, and the development of adequate comparison conditions against which to compare mindfulness training remain as important issues for further study" (p. 11). The control and treatment group design of this study was

important because it allowed for the determination of whether or not the treatment had an effect on the outcome.

The pretest and posttest design allowed for the measurement between and within control and treatment groups. The pretest, specifically, helped check whether groups were really similar. This was critical to affirm equivalency between groups and to make comparisons about the treatment. In discussing pretest and posttest control group design, Fraenkel et al. (2012) argue that its value lies in its ability to control specific threats to internal validity, which will be discussed below in the section on data collection. The posttest allows the researcher to measure the effect, if any, of the treatment after it has been executed.

In this experiment, the participating classrooms were randomly assigned to the treatment and control groups with the noted modification. In discussing the methodological challenges of studying mindfulness, Davidson (2010) affirms the importance of random assignment in research design for investigators attempting to measure the construct of mindfulness. For the context of this study, random assignment means that each classroom in the study had an equal chance of being in either the treatment or control group. This random assignment was intended to ensure that, to the greatest extent possible, extraneous variables did not influence the outcome of the study. Random assignment "allows the researcher to form groups that, right at the beginning of the study, are *equivalent* [emphasis in the original]—that is, they differ only by chance in any variables of interest" (Fraenkel et al., 2012, p. 267).

Three MIT Sloan instructors were available to facilitate the experiment in fall 2014 and each of these instructors taught two sections of the Communications for

Leaders course. This allowed for each instructor to facilitate one control group and one treatment group, thus avoiding possible instructor bias. The two sections were identical except that in the treatment classroom, a recorded meditation exercise was played at the start of 10 class sessions. In this research study, the treatment group did not receive any compensation.

Internal Validity of the Research Study

Research designs using control and treatment groups have strength in controlling subject characteristics threats, instrumentation threats, and maturation (Fraenkel et al., 2012). The subject characteristics threat, also known as selection bias, refers to the possibility that participants in the study differ in ways that may influence the outcomes of the study (Tuckman, 1978). In this study, random assignment to control and treatment groups minimized this threat. Furthermore, data analyses revealed that control and treatment groups were equivalent on demographic variables so the subject characteristics threat was further minimized.

Instrument threat, as it pertains to this study, refers to the change in the MAAS instrument itself as well as the data collection procedures over the course of the study (Tuckman, 1978). The MAAS did not change from pretest to posttest so that threat did not materialize. In addition, data collection was standardized across classrooms by using strict protocols that required faculty to follow a script when facilitating the experiment.

This standardized script also served to mitigate the testing threat, which could influence the internal validity of this study. The testing threat occurred with the use of a pretest that could signal to the treatment group that something is being studied, which then could influence how they receive the treatment (Fraenkel et al., 2012; Tuckman,

1978). An effort was made to neutralize this risk by the a section of the script referenced above that asked faculty to share a general explanation about the experiment, specifically: "*I am going to start each class by inviting you to participate in a very short exercise to help us focus our attention and awareness.*"

Maturation refers to participants' natural development over the course of a study (Tuckman, 1978). The risk of maturation influencing the results of a lengthy study can be mitigated by using a control group that will develop similarly to the treatment group so that the researcher can isolate any potential effects to the treatment as opposed to any changes in participants' natural development. Thus, the control and treatment group design of this study reduced this risk.

It is also important to be aware of demand characteristics that may (unknowingly) influence students' behavior in the experiment (Orne, 1962). Demand characteristics include all of the things about an experiment that may signal to the participants what is being studied (Orne, 1962). Participants may then be interested in reporting results that are in sync with they think is being studied. Orne (1962) discussing this phenomena states: "…if a test is given twice with some intervening treatment, even the dullest college student is aware that some change is expected, particularly if the test is in some obvious way related to the experiment" (p. 779). In this study, the MBA students were overheard claiming that the study was about "relaxation" and thus, following the logic of demand characteristics, those students may answer survey questions in a way that reflects that they have achieved heightened relaxation as a result of the treatment.

Location threat was a potential risk in this study. Location threat is the possibility that the intervention site may influence the study's outcomes. This was partly minimized

by holding the treatment in the same location each week. However, a fluorescent-lit classroom with uncomfortable seats was not an ideal location for mindfulness meditation and so in this way location may have reduced the possible impact of the treatment. The sites of the control group were the same as the treatment group.

Finally, there was the possibility of subject attitude threats to the internal validity of the experiment. The risk is that how a participant feels about the study will influence how they respond to it, as opposed to responding solely to the treatment itself. Fraenkel et al. (2012) suggest offering the control group a comparable treatment to minimize the threat due to subjects' attitudes but unfortunately this was not possible in this experiment because of the additional burden it would put on faculty involved in this study.

Data Collection Procedures

The requisite approval to conduct this study was first obtained by Boston College's Institutional Review Board (IRB). Subsequently, approval was obtained from MIT's Committee on the Use of Humans as Experimental Subjects (COEHUS). A meeting was then held to train the MIT Sloan faculty on the protocols for the experiment. A letter and implementation instructions were given to each faculty member at this meeting (see Appendices A, B, and C).

During the last week of August 2014 these faculty members read a "Statement to Prospective Participants" to six groups of first-year, first-semester MIT Sloan MBA students who were gathered in six separate classrooms for orientation; see Appendix D. This script invited prospective participants to open an email invitation (while seated in the classroom) inviting them to participate in this research study.

The email invitation (Appendix E) directed students to follow a link to an informed consent form in Qualtrics (see Appendix F). This method of data collection was used because of its efficiency and costs were compatible with the research goals (Wright, 2005). If students consented to participate, they were prompted to fill out the Pretest Participant Information Survey and the MAAS (Appendices G and H). The title of the MAAS was removed for both the pretest and the posttest so as to minimize response bias.

Because of technical issues or because they did not have their laptops, seven participants filled out a pencil-and-paper version of the questionnaire. At the end of the study, an email invitation (see Appendix I) was sent to participants asking them to fill out the final survey that would conclude their participation in the research study. The posttest surveys differed for the control and treatment groups in that the latter group was asked questions about their experience of the treatment. See Appendices J and K. This posttest data were collected during the first week of December 2014.

The on-line questionnaires were designed so that participants' information was anonymous. One way to ensure anonymity was by having participants create their own unique code at pretest and posttest that would allow their data to be matched without using any other identifying information. Participants answered five questions at the start of the pretest survey that created a unique five-character alphanumeric code. Participants answered the same five questions at the start of the posttest survey that should have created the same unique code. The matching process revealed that some participants appeared to have answered the same questions differently at pretest and posttest thus making it more difficult to match the five-character alphanumeric unique codes from

pretest to posttest. As a result, data were matched using the unique code and gender, race, age, and citizenship, if necessary. Thus there were nine possible criteria by which data could be matched and the majority of cases were matched on six out of nine criteria.

Intervention

As noted earlier, at the start of the first Communication for Leaders class, faculty read a script stating the general intent of experiment. Students were told that if they did not consent to be in the study, they did not have to participate in the meditation; they were allowed to sit quietly and wait until it was over. At the end of the recorded meditation, the instructors stated: "Let's bring this focus into our discussion today." No further discussion of the exercise occurred.

For classes #1 through #10, faculty played the five-minute guided meditation exercise for their treatment groups at the beginning of class. After class #10, all participants in the treatment and control groups were asked to complete the posttest questionnaire. Table 3 details the dates of survey administration and treatment.

Table 3.
Schedule of Data Collection and Intervention

Date	Treatment Group	Control Group	Duration
Orientation: 8/26-8/28	Informed Consent, Participant Information Survey, Pretest MAAS	Informed Consent, Participant Information Survey, Pretest MAAS	15 min
Class # 1: 9/2	Treatment		5 min
Class # 2: 9/9	Treatment		5 min
Class # 3: 9/16	Treatment		5 min
Class # 4: 9/23	Treatment		5 min
Class # 5: 9/30	Treatment		5 min
Class # 6: 10/7	Treatment		5 min
Class # 7: 10/14	Treatment		5 min
Class # 8: 10/28	Treatment		5 min
Class # 9: 11/4	Treatment		5 min
Class #10: 11/18	Treatment		5 min
Class # 11: 12/2	Posttest participant information survey and MAAS	Posttest participant information survey and MAAS	15 min

Duration of Treatment

Since mindfulness-based treatments can vary so greatly—from minutes to years—the duration of training is an important decision in the design of mindfulness research (Davidson, 2010). For this proposed study, the treatment was five minutes per class for 10 classes over the course of one academic semester. The duration of the treatment was chosen with respect to faculty members' perception of available time in the class session that could be devoted to the treatment. In this way, the research study mirrored the conditions under which mindfulness-training exercises might be incorporated into MBA curricula. It is important that the treatment is scalable and the brevity of this training facilitates scalability. As discussed in Chapter II, there is also empirical evidence supporting brief mindfulness-based interventions in participants' levels of mindfulness (Gregoire & Lachance, 2014; Ramsburg & Youmans, 2013; Zeidan et al., 2010).

Mindfulness Meditation Exercise

A recorded, guided mindfulness meditation (versus a live, guided meditation) was used in this study allowing for consistency in the treatment across classrooms. There were a wide variety of guided mindfulness meditations from which to choose for this study. These guided meditations vary in intent, style, and tone. Some focus on the breath, others on the body, and still others on a particular image or sound. Styles range from those that offer a lot of guidance in terms of how to sit, breathe, and approach the exercise, while others offer little guidance. The mindfulness meditation chosen for this treatment was recorded by Dr. Ronald Seigel (2013), a psychology professor at Harvard Medical School. It is titled "Breath Awareness Meditation" (see Appendix L) and offers sufficient guidance to make it accessible to non-meditators while allowing space and time

for silence within the meditation. It is also straightforward in its language using everyday terms that would be familiar to non-meditators. Seigel (2013) speaks in a calm and engaged tone. There is no background music or other sounds in this meditation nor are there any spiritual or religious references. Prior to the execution of this research study, the recording was shared with other MIT Sloan faculty to affirm its fit in the MBA classroom environment.

A digital recording of Siegel's (2013) mindfulness meditation was used consistently across classrooms and for the length of the experiment. The recording was copied on each faculty member's personal network server so they could access it from the classroom's computer each week. At the start of each of the 10 class sessions in the treatment classrooms, participants were instructed to listen to the recording.

Treatment Integrity

Treatment integrity checklists were given to each of the three faculty members to help ensure fidelity to the process of implementing the treatment (see Appendix M). The checklists included each step of the treatment. Potential issues that may have influenced the treatment were students arriving late to class. This was somewhat mitigated by the fact that points were deducted from students' daily participation score if they were late to class. This was a rule associated with the Communications for Leaders course, not this research study. This rule was effective in motivating students to get class on time.

An additional concern relates to the use of technology in the classroom that was used to execute the treatment. For example, a situation could arise in which the faculty member was unable to access the server and play the recorded meditation. To account for this, faculty members were also given a transcript of the guided meditation that they

could read to their treatment classrooms. The faculty members were able to play the recorded exercise from their server in every class session.

The Instrument: The Mindful Attention Awareness Scale

The instrument used to measure students' pretest and posttest mindfulness levels was the Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003). The MAAS is frequently used in research on mindfulness, in fact the "[MAAS] is one of the most popular measures of mindfulness, exhibiting promising psychometric properties and theoretically consistent relationships to brain activity, mindfulness-based intervention (MBI) outcomes, and mediation of MBI effects" (Van Dam, Earleywine, & Borders, 2010, p. 805).

Given the different emphases placed on the varied facets of mindfulness across instruments intended to measure mindfulness, it is important to clarify what exactly is being studied in research on mindfulness so as to avoid confusion and allow for comparison where possible (Baer et al., 2006; Davidson, 2010). The MAAS operationalizes mindfulness as awareness of and attention to the present moment experiences in daily life (MacKillop & Andersen, 2007). Whereas everyone is aware and pays attention—these capacities are part of basic functioning—the intensity of these capacities varies among individuals. These capacities can be dulled (consider the attentional fragmentation that occurs during multitasking) and they can be sharpened. The MAAS purports to measure this variation in people's levels of mindfulness.

The MAAS is a self-report questionnaire. Self-report questionnaires are of particular value when attempting to measure mindfulness because mindfulness is not a construct that is easily measured by direct observation or by non-self report tests (Baer,

2011). In addition to the obvious characteristics of convenience and efficiency, Baer (2011) says: "Questionnaires provide a means of asking systematically, in ways that are standardized to permit comparisons between individuals and within individuals over time" (p. 244). The use of self-report questionnaires to measure mindfulness is also affirmed by the finding that data from such questionnaires are in line with scholars' theories about mindfulness (Baer, 2011). However, there are some open questions about the validity of self-report measures that will be discussed below.

The MAAS has 15 items that are rated on a 6-point Likert scale. The scale, which yields one score, is determined by calculating the mean of the 15 items. A sample question is "It seems I am 'running on automatic' without much awareness of what I'm doing" (Brown & Ryan, 2003). The MAAS does not ask direct questions about mindfulness. As Baer (2003) states: "…it is not useful to ask people explicitly to rate how mindful they are, because they are likely to have idiosyncratic understandings (or no understanding) of what this term means" (p. 248). For this reason, the items are reversed-scored—people can more easily relate to "running on auto-pilot" because it is a common and much-discussed experience, whereas paying attention to present-moment experiences is not a common topic of discussion in most student environments. The reversed-scoring means that higher scores on the MAAS reflect more mindfulness. Carlson and Brown (2005) report that in a large, adult population the mean score on the MAAS was 4.6 with a standard deviation of 0.63.

The MAAS has been shown to be a valid instrument for use with university students and the general adult population (Brown & Ryan, 2003; MacKillop & Anderson, 2007). In terms of the scale's reliability, its internal consistency levels are sufficient—

Cronbach's alphas are reported between .80 and .90 (Brown, n.d.; Louks et al., 2014). The MAAS test-retest reliability is also high (Brown, n.d.; Louks et al, 2014). Brown (n.d.) lists these additional characteristics of the MAAS:

> The MAAS has demonstrated…discriminant and convergent validity, known-groups validity, and criterion validity. Correlational, quasi-experimental, and experimental studies have show that the trait MAAS taps a unique quality of consciousness that is related to, and predictive of, a variety of emotion regulation, behavior regulation, interpersonal, and well-being phenomena. (p. 2)

The robustness of these characteristics affirms the choice of the MAAS as a valid instrument to evaluate the effects of mindfulness exercise on MBA students' levels of mindfulness.

Scores on the MAAS are related to a number of constructs. There is evidence that female college students' mindfulness levels, as determined by MAAS scoring, increased as a result of meditation training (Silverstein, Brown, Roth, & Britton, 2011). It has also been shown that participant scores on the MAAS from pretest to posttest increased significantly after a 10-day mindfulness meditation retreat (Chambers et al., 2008). MAAS-scored levels of mindfulness were also related to better performance on a test measuring sustained attention, the Conners' Continuous Performance Test II (CPT-II, Conners, 2000) (Schmertz, Anderson, & Robins, 2008). There is also evidence that those reporting higher MAAS scores have also shown greater emotional self-regulation (Creswell, Way, Eisenberger, & Lieberman, 2007).

Scholars have found evidence that MAAS scores are negatively related to stress and mood disturbance (Brown & Ryan, 2003; Carlson & Brown, 2005), as well as the letting go of negatively-related thoughts (Frewen, Evans, Maraj, Dozois, & Partridge, 2007). In a study investigating mindfulness and measures of "psychological capital" of

business leaders, Roche, Haar, and Luthens (2014) found MAAS scores were negatively related to anxiety, depression, and bad feelings across three distinct levels of managers.

There are two limitations of the MAAS worth noting. MacKillop and Anderson (2007), seeking to further validate the psychometric properties of MAAS, did suggest that it was difficult to discern differences between non-meditators and novice meditators with this instrument. This is of particular relevance to this research study because according to self-reported responses on the posttest survey, all of the MBA students in this sample fell into one of those two categories, i.e. non-meditators or novice meditators.

Also, as the MAAS is a self-report questionnaire, there is an open question about identification, that is: how reliably can people report on their internal capacities (Baer, 2011; Davidson, 2010)? This is a particular concern for mindfulness because students are not accustomed to being aware of the functioning of their internal capacities (Baer, 2011). MBA students, in particular, are not trained to focus on the cultivation of either awareness or attention (Sadler-Smith & Shefy, 2007; Waddock & Lozano, 2012). As such it might be challenging for the students to articulate their observations about their own mindful states and the changes of those mindful states over time.

As a self-report questionnaire, there is also the question about misrepresentation. How truthfully do people rate themselves on self-report instruments? Misrepresentation can happen consciously or unconsciously and it is possible that respondents filling out a self-report questionnaire may rate themselves differently than they think, feel, or behave in reality (Baer, 2011). Baer (2011) suggests that incidents of dishonesty in self-report questionnaire responses are higher when the results of the instrument may be interpreted

to have consequences for the respondent, for example, work-related issues. Since there is little or nothing at stake in students' reporting their level of mindfulness, intentional misrepresentation was expected to be minimal. In addition, "[t]he mindfulness literature shows that are many participants are willing to provide data that are inconsistent with positive biases" (Baer, 2011, p. 252). That is, participants have reported only small changes in levels of mindfulness as the result of a mindfulness-based intervention, which Baer (2011) is interpreting to mean that they are being honest in their reporting.

Data Analysis

The hypothesis being tested in this study was whether classroom-based mindfulness exercises would influence participants' levels mindfulness as measured by MAAS scores; the use of control and treatment groups allowed for the necessary comparisons.

The pretest and posttest data were downloaded from Qualtrics into the Statistical Package for the Social Sciences (SPSS, Version 21 for Mac), which was used to conduct the necessary analyses. First, missing data were determined. Chi-square tests were conducted to determine the comparability of control and treatment groups. Mixed ANOVAs were conducted to assess the outcomes of the mindfulness training intervention. Mixed ANOVAs were also used to investigate relationships, if any, between demographic variables and participants' scores on the MAAS.

Summary

In summary, this chapter detailed the design of this research study as well as the methods used to determine the sample, collect, and analyze the data. A key aspect of this research study was to investigate the practical utility of embedding mindfulness-training

exercises in pre-existing MBA courses at MIT Sloan in addition to investigating the results of such exercises. Incorporating mindfulness training in the MBA curriculum could help MIT Sloan meet its espoused goals to develop leaders. The theoretical foundations of mindfulness suggest that "People need to be attentive to their inner states and behavior to pursue reflectively considered goals, and failing to bring sufficient attention to oneself tends foster habitual, overlearned, or automized reactions rather than responses that are self-endorsed and situationally appropriate" (Brown et al., 2007, p. 216). The cultivation of mindfulness through mindfulness meditation training could help MBA students know themselves better, allow for greater perspective-taking, and improve interpersonal skills. Chapters IV and V will present the results of this experiment and discuss the implication of the findings.

Chapter IV: Findings

Introduction

Chapter IV is dedicated to a discussion of the study's findings. The chapter begins with a review of the study site and its participants. It then details the initial analyses of missing data, comparability of control and treatment groups, and the psychometric properties of the MAAS as used in this study. The chapter then discusses the findings related to the research question posed in this study: do classroom-based mindfulness meditation exercises influence MBA students' levels of mindfulness? Chapter V discusses the implications of these findings, limitations of the study, and suggestions for future research.

Review of Study Site and Participants

This randomized control/treatment trial was conducted at the MIT Sloan School of Management in the fall of 2014. MIT Sloan is ranked as one of the top-ten graduate business schools in the world (Financial Times, 2014). MIT Sloan states that its mission is "to develop principled, innovative leaders who improve the world and to generate ideas that advance management practice" (MIT Sloan, 2014d). It is comparable to other high-ranking MBA programs in both duration and demographics: it is a two-year program with a white, male majority population though MIT Sloan does have a relatively high percentage of international students (45%) and women accounted for 40% of the Class of 2016—the highest percentage of women in MIT Sloan's history (Dhoul, 2014). MIT Sloan requires its students to take a core set of classes and work with a designated study team for the first semester.

The unit of analysis in this study was the individual first-year MBA Sloan student. MIT Sloan's class of 2016 had 406 students. Two hundred and four students from select class sessions, 50% of the Class of 2016, were invited to participate and 158 students completed this study. There were 76 students in the control group and 82 students in the treatment group resulting in response rates of 75% and 80%, respectively. Students in the treatment group listened to a five-minute recording of a mindfulness meditation exercise that was embedded in a nonelective, first-year MBA course, Communication for Leaders. The students listened to the recording for a total of 10 classes over the course of the fall semester for a total listening time of 50 minutes. Students in the control group participated in their Communications for Leaders course as normal.

Students in the control and treatment groups were surveyed in a pre/post manner: once at the start and once at the end of the fall semester. At pretest and posttest, students were sent an email to their MIT email address with a link to a Qualtrics-based survey in which the MAAS instrument was embedded. Chapter III detailed the psychometric properties of the MAAS. Copies of the pretest and posttest surveys may be found in the Appendix.

Analyses of Missing Data, Group Comparability, and the MAAS

Missing Data

The initial analysis began with an assessment of missing data. There were no missing data related to participants' demographic information in the control and treatment groups. There were also no missing data for the MAAS pretest in the control and treatment groups. There were missing data for the MAAS posttest: 3.5% of the

participants, 1% of the participants in the control group (one student) and 2.5% of the participants (two students) in the treatment group, did not complete any items on the MAAS posttest. These missing data were dealt with in SPSS by excluding cases pairwise such that the three participants were only excluded when analyzing MAAS scores. There were no other missing data for any other variables.

Comparability of Groups

Chi-square analyses were conducted to compare demographic characteristics between control and treatment group. Table 4 specifies the frequencies within the control and treatment groups. Overall, results indicate that control and treatment groups were comparable on demographic characteristics. A chi-square test for independence (with Yates Continuity Correction) indicated no significant association between gender and group membership: χ^2 $(1, n = 158) = .049$, p = .825. Control and treatment groups were also comparable on citizenship: a chi-square test for independence (with Yates Continuity Correction) found χ^2 $(1, n = 158) = .006$, p = .940. Control and treatment groups were also comparable on ethnicity: a chi-square test for independence (with Yates Continuity Correction) found χ^2 $(1, n = 158) = .163$, p = .686. A chi-square test for independence indicated no significant association between group membership and race: χ^2 $(2, n = 158) = .103$, p = .950. The chi-square test for independence for age categories also indicated no statistically significant differences between groups: χ^2 $(2, n = 158) = .205$, p = .902. The control and treatment groups were also comparable in terms of meditators in each group: a chi-square test for independence (with Yates Continuity Correction) indicated no significant association between meditator status and group membership: χ^2 $(1, n = 17) = .028$, p = .868.

Table 4.
Demographic Variables Across Control and Treatment Groups

Variable		Control (n = 76) Frequency n	Control (n = 76) Percent of group	Treatment (n = 82) Frequency n	Treatment (n = 82) Percent of group
Gender					
	Male	45	59.2	51	62.2
	Female	31	40.8	31	37.8
Age					
	20-24	5	6.6	5	6.1
	25-29	62	81.6	69	84.1
	30-39	9	11.8	8	9.8
Citizenship					
	US	44	57.9	49	59.8
	Non-US	32	42.1	33	40.2
Ethnicity					
	Hispanic or Latino	12	15.8	16	19.5
	Non-Hispanic or Latino	64	84.2	66	80.5
Race	Asian	17	22.4	20	24.4
	White	49	64.5	51	62.2
	Other	10	13.2	11	13.5
Meditation Practice					
	Yes	9	11.9	8	9.8
	No	67	88.2	74	90.2

An independent-samples t-test was conducted to explore the comparability of control and treatment groups on pretest MAAS scores. There was no significant difference in scores for control group (M = 4.082, SD = .677) and treatment group (M = 3.907, SD = .654); t (156) = 1.654, p = .100. As such, comparability of control and treatment groups was affirmed.

Psychometric Properties of the MAAS

The primary instrument in this study was the MAAS. Its properties were analyzed and the means, standard deviations, and alpha coefficients are noted in Table 5. According to Brown (n.d.), MacKillop and Anderson (2007), Louks et al. (2014), the MAAS scale has good internal consistency with Cronbach alpha coefficients reported between .80 and .90. A reliability analysis conducted on the use of the MAAS in this

study indicated a Cronbach alpha coefficient of .87 in the pretest MAAS and .89 in the posttest MAAS.

Table 5.
Means, Standard Deviations, and Alpha Coefficients for the MAAS Instrument at Pretest and Posttest

	n	Mean	SD	Alpha Coefficient
MAAS @ Pretest	15	59.86	10.028	.862
MAAS @ Posttest	15	56.99	11.129	.885

Treatment Integrity

The three facilitators noted that the treatment was executed consistently in their respective classrooms. Each faculty member played the recording at the appointed time in the 10 appointed class sessions over the course of the fall 2014 semester. The facilitators noted that there were occasional interruptions due to students arriving late to class. Facilitators also noted absences; however, due to the way excused absences are recorded in the Communications for Leaders course, they are indistinguishable from students who received a low participation score for each day. Thus, data related to students' absences are not available; however, treatment participants were asked to indicate the number of class sessions they participated in the treatment and this self-reported information is discussed later in this chapter. In general, the execution of the treatment was sound across the three classrooms.

Mindfulness Outcomes

The research question posed in this study investigated whether or not brief mindfulness meditation exercises would influence MBA students' levels of mindfulness as measured by the MAAS. A mixed between-within subjects ANOVA was conducted to assess the impact of meditation training on participants' scores on the MAAS across two time periods, pretest and posttest.

There was no significant interaction between control and treatment groups and time, Wilks'-Lambda = .991, F (1, 153) = 1.448, p = .231, partial eta squared = .01. This means that control and treatment groups did not differ significantly from each other at either pretest or posttest.

There was a substantial main effect for time, Wilks' Lambda = .905, F (1, 153) = 16.02, p < .001, partial eta squared = .10, with both groups showing a reduction in MAAS scores across the two time periods; however the effect size was moderate (partial eta squared = .10). See Table 6 for the descriptive statistics of MAAS scores. A follow-up, post-hoc power analysis was conducted for mixed ANOVA found that for an alpha-level of .05, sample size of 157, and effect size of .095, power of .8033 was achieved.

Table 6.
Descriptive Statistics for Control and Treatment Groups Pretest and Posttest MAAS Scores

	Control			Treatment		
Variable	n	M	SD	n	M	SD
Pretest MAAS Score	76	4.077	.681	82	3.905	.655
Posttest MAAS Score	75	3.829	.761	80	3.778	.727

Demographic Variables and MAAS Scores

Additional tests were conducted to further understand these results. Mixed ANOVAs were conducted to assess the impact of the treatment as measured by pretest and posttest MAAS scores and whether or not the impact differed for the following demographic groups: gender (Female, Male), citizenship (US, non-US), ethnicity (Hispanic/Latino, Non-Hispanic/Latino), and race (White, Asian, Other). There were no statistically significant interactions between these demographic groups and pretest and posttest MAAS scores. This means that the MAAS scores changed in the same way for these demographic groups over time. There were significant main effects with these

demographic groups showing a reduction in MAAS scores over time. There were not significant between-subjects effects, that is the MAAS scores were similar for the demographic groups at pretest and posttest. See Table 7 for results of the mixed ANOVA analyses. See Table 8 for the descriptive statistics related to these demographic groups and pretest/posttest MAAS scores.

There was one exception to these mixed ANOVA findings that relates to participants' age category. The mixed ANOVA analyses indicated that there was no significant interaction between age category and pretest/posttest scores nor was there a significant change in how scores changed from pretest to posttest for the age categories. There was, however, a significant difference between age categories and MAAS scores at pretest and posttest: Wilks' Lambda = 6.105, $F(2, 152) = 3.838$, $p = .024$, partial eta squared = .048. Post-hoc tests comparisons using the Tukey HSD test indicated that the mean score for the 20-24 group ($M = 3.387$, $SD = 0.728$) was significantly different than the mean score for the 25-29 age group ($M = 3.838$, $SD = .720$).

Thus, apart from age, it appears that the participants' demographic characteristics did not reveal any pattern of influence between pretest and posttest MAAS scores.

Table 7.

Mixed ANOVA Results Comparing Demographic Characteristics and MAAS Pretest and Posttest Scores

	Wilks-Lambda	DF	F statistic	P value	Partial eta squared
Gender & MAAS scores					
Interaction	.996	1, 153	.666	.416	.004
Within-subjects main	.904	1, 153	16.309	.000	.096
Between-subjects main	.767	1, 153	.929	.337	.006
Citizenship & MAAS scores					
Interaction	.999	1, 153	.095	.758	.001
Within-subjects main	.908	1, 153	15.572	.000	.092
Between-subjects main	.592	1, 153	.716	.399	.005
Ethnicity & MAAS scores					
Interaction	.993	1, 153	1.069	.303	.007
Within-subjects main	.966	1, 153	5.432	.021	.034
Between-subjects main	2.209	1, 153	2.709	.102	.017
Race & MAAS scores					
Interaction	.997	2, 152	.216	.806	.003
Within-subjects main	.936	1, 152	10.345	.002	.064
Between-subjects main	.581	2, 152	.349	.706	.005
Age category & MAAS scores					
Interaction	.983	2, 152	1.29	.279	.017
Within-subjects main	.977	1, 152	3.644	.058	.023
Between-subjects main	6.105	2, 152	3.838	.024	.048

Table 8.

Descriptive Statistics for Demographics and Pretest and Posttest MAAS Scores

Gender	Male		Female	
	M	SD	M	SD
Pretest MAAS Score	4.012	0.697	3.956	0.626
Posttest MAAS Score	3.855	0.764	3.714	0.704
Citizenship	US		Non-US	
	M	SD	M	SD
Pretest MAAS Score	4.022	0.618	3.946	0.738
Posttest MAAS Score	3.843	0.698	3.74	0.801
Ethnicity	Hispanic or Latino		Non-Hispanic or Latino	
	M	SD	M	SD
Pretest MAAS Score	4.093	0.863	3.969	0.621
Posttest MAAS Score	4.037	0.797	3.75	0.723

Race	White		Asian		Other	
	M	SD	M	SD	M	SD
Pretest MAAS Score	4.013	0.616	3.939	0.711	3.962	0.854
Posttest MAAS Score	3.833	0.734	3.699	0.678	3.822	0.895

Age Category	20-24		25-29		30-39	
	M	SD	M	SD	M	SD
Pretest MAAS Score	3.333	0.485	4.030	0.673	4.078	0.534
Posttest MAAS Score	3.387	0.728	3.838	0.720	3.753	0.872

Participation in the Treatment

Descriptive statistics were run to determine how many MBA students in the treatment group reported participating in the treatment. The treatment was executed in 10 classes and the range was from 0-10 classes, the mean was 6.09 classes with a standard deviation of 3.47 for 80 participants. A one-way ANOVA was conducted to explore the impact of participation in the treatment on posttest MAAS scores. Treatment participants were divided into groups based on the number of treatments they reported participating in and there were no statistically significant differences between class participation and posttest MAAS score for the treatment group: $F(10, 67) = .960$, $p = .486$. This indicates that repeated exposure to the treatment did not influence treatment participants' posttest MAAS scores.

Meditation Experience

The data were analyzed to determine relationships between participants' meditation practice and their MAAS scores. As noted earlier in this Chapter, 11% of all participants reported that they meditated on a regular basis—12% of control participants ($n = 9$) and 10% of treatment participants ($n = 8$). Descriptive statistics were run on the meditators and their MAAS scores; results are noted in Table 9. The mean difference (.028) indicates that meditators' scores decreased from pretest to posttest; however tests for significance were not run due to the low number of cases.

The relationship between meditation experience and level of mindfulness at posttest was also investigated using Pearson product-moment correlation coefficient. There was no significant correlation between the two variables, $r = -0.039$, $n = 155$, p

= .627. In addition, an independent samples t-test was conducted to compare scores of meditators (M = 3.88, SD = .805) and non-meditators (M = 3.79, SD =.736); t (153) = .486, p = .627 (two-tailed) and results indicated that there were no statistically significant differences between the two groups.

Table 9.
Descriptive Statistics for Meditators in Control and Treatment Groups

	Meditators n =17	
Variable	M	SD
Pretest MAAS Score	3.910	.598
Posttest MAAS Score	3.882	.805

Summary of Quantitative Findings

This chapter detailed the findings from this study that investigated whether and how classroom-based mindfulness meditation exercises would influence MBA students' levels of mindfulness. Data from 158 participants were analyzed in a number of ways to assess relationships within and between control and treatment groups as well as between variables. The primary analyses used mixed repeated measures ANOVAs, independent samples t-tests, and chi-square tests.

There were two main findings from these analyses. The first was that control and treatment groups were not statistically significantly different in terms of posttest MAAS scores. The second was that there was a statistically significant decrease in control and treatment groups' MAAS scores between pretest and posttest. It is also worth noting that demographic variables did not appear to influence any changes in the MAAS scores. The one exception to this finding was the very small group of the youngest students whose relatively low pretest MAAS scores increased slightly at posttest, bringing those students

closer to the older students' average posttest scores. Meditation experience was not found to be correlated with MAAS score at posttest.

The implications of these quantitative findings and the limitations of this experiment will be discussed Chapter V.

Exploratory Qualitative Findings

This study was not designed to collect or analyze qualitative data. However, participants and faculty made comments that add useful context to the quantitative findings. It is important to note that these comments, which were overheard in class, retold by faculty, or included in end-of-semester course evaluations for the Communications for Leaders course, are purely anecdotal.

One such comment, overheard in the researcher's own classroom, occurred in the class that followed the end of the treatment. Students were scheduled to give presentations worth 25% of their grade during this particular session and when they heard that class would no longer start with the mindfulness meditation recording there were audible gasps. And one student said loudly: "On this of all days we aren't going to listen to it?" implying that the exercise would be particularly valuable on a high-stress day. One of the faculty implementing this experiment had such a positive response to the treatment that he continued to start his classes with the mindfulness meditation recording after the study had ended.

Participants also provided written comments on the treatment in the Communication for Leaders course evaluations. See Table 10. These comments ranged from enthusiastic support for the treatment to indifference to disdain.

Table 10.
Anecdotal, Verbatim Written Comments from Participants Regarding the Treatment

Positive Comments
I loved it. I should do that everyday!
I thought it was extremely helpful.
One of the best moments in my week. I wish every class had started like this.
This should be incorporated in all classes.
Relaxing exercise that probably helped me be concentrated in class as soon as it started
Found it very useful, calming, and made me more attentive at the beginning of class.
Helps for concentrating later in class.
I liked it. Relaxing way to clear your mind and get ready for class.
I like the five minute excercise as it helps to start the class more focused.
I liked it! It calmed my mind and is a great idea to incorporate in classes! Shows students that college is more than just learning content. Keep it going!
I really enjoyed the start-of-class exercise, and would recommend it in other classes as well. I think the exercise helped to create a mindful tone of the students, and definitely helped me to be more present and engaged in class discussions.
I enjoyed it and wish that I did it more often. It truly helped me be more present and focused after a very hectic day.
I looked forward to the meditation at the start of each class. It was a wonderful exercise to ease into lecture and, for a few moments, leave behind the hectic buzz of Sloan.
I believe they were generally beneficial, it helped me to stay in the present despite stress and worries
I loved those 5 minutes. I have done some meditation and relaxation in the past and found no time for it all semester except at the beginning of comm class. Thank you for making it available to us.
An enjoyable break in the busy MBA life
Neutral Comments
No effect.
I do not think there was any effect for me. I think that's also because of the environment - it was not conducive for me to meditate.
I don't feel that the 5 minute exercise impacted me or my learning.
It was okay. I like it, but it seemed a little random. We should have gotten a bit more guidance as to the point of the exercise.
I don't know that the exercise affected me as a learner, but I found myself reacting both positively and negatively to it on various days. Sometimes I was grateful for the 5 minutes of quiet to just sit and breathe, other times I felt impatient wanting class to just start.
This practice reminded me how important the awareness is, but don't think it really helped me to focus. For better focus, I have to meditate at least once a day. Probably, will start doing that.
Negative Comments
Waste of time
I found it put me to sleep and made it harder for me to return to focus in class.
I would have preferred to have class time. For the amount of tuition we're paying, we should not have our class time reduced by being guinea pigs for someone else's research.
Didn't really understand the purpose, the exercise did not affect me as a learner other than taking a few minutes off the course - which was not necessarily a good thing (the comms class is already short, as students we are paying a lot for each class). Would have appreciated more explanation if this was going to be conducted

As noted, these qualitative comments are anecdotal and were not collected as part of the design of this study. They are included here to offer an additional perspective on students' experience of the treatment. There are some indications that at least for some people this was a positive experience while for others it was a neutral to negative one. The neutral and negative comments give some hints from student reactions and experiences about why the overall treatment did not result in positive changes on MAAS scores.

This next and final chapter will also address the areas of future research related to MBA student development and mindfulness.

Chapter V: Discussion

Introduction

There is an opportunity in graduate business schools to more fully develop MBA students' awareness of and attention to present moment experience. This is an important area of student development given the constant stream of academic, professional, and social information that dictates a fervent pace of doing, doing, and doing more while fragmenting the attention paid to any one task. Mindfulness, a concept with deep roots in Buddhist traditions though also practiced secularly in the West, is one such way to help students in this regard. Mindfulness has been shown to be related to a number of constructs including attention, working memory, stress, and well-being (Brown & Ryan, 2003; Kabat-Zinn, 1994; Keng et al., 2013; Jha et al., 2007; Mrazek et al., 2013). Mindfulness can be cultivated through meditation, a contemplative practice that emphasizes both concentration and insight (Olendzki, 2009).

The purpose of this research study was to determine if brief mindfulness meditation exercises would influence MBA students' levels of mindfulness as measured by the Mindful Attention Awareness Scale (Brown & Ryan, 2003). The mindfulness meditation exercises were embedded in an existing, nonelective MBA course to test the appropriateness of such exercises in an academic classroom and to assess their scalability. Data analysis revealed that participants' levels of mindfulness, as measured by MAAS scores, decreased significantly from pretest to posttest. The most likely reason for this outcome is a flaw in the research design, specifically that the treatment was too weak. It remains unknown whether increasing exposure would result in positive changes in

MAAS scores. MAAS scores appeared not to be influenced by gender, race, ethnicity, and citizenship suggesting that the negative treatment effects were independent of these demographic variables.

This final chapter interprets these findings in relation to the theoretical and experimental constructs covered in Chapters I and II. This chapter also details the limitations of this study, which are related to its design, data collection, and instrumentation. The implications of these findings for leaders of and instructors in MBA programs are also discussed. The chapter concludes with recommendations for future research.

Findings Based on Mindfulness Outcomes

The main finding in this research study was that the treatment failed to increase participants' mindfulness scores as measured by the MAAS. Participant scores in the control and treatment groups, which were deemed comparable at the start of the research study, actually decreased significantly from pretest to posttest. It is important to note that the decrease was less pronounced in the treatment group indicating that the treatment may have mitigated the decline. Mixed ANOVA was used to determine these results.

The participants' pretest scores in this study were comparable to what has been published in the relevant literature investigating MAAS-measured levels of mindfulness and undergraduate students and healthy adult populations. In this study, participants' average pretest MAAS score was 3.99 with a standard deviation of 0.669. MacKillop and Anderson (2007) reported an average MAAS score of 4.00 with a standard deviation of 0.85 upon entry to the study for over 700 hundred college freshmen and sophomores, the majority of whom were white females. Brown and Ryan (2003), using a much

smaller sample of 50 adults drawn from the community (mean age = 41), reported mean MAAS scores as 3.97, with a standard deviation of .0.64. Given the dearth of research on MBA students and MAAS-measured levels of mindfulness, there is not enough information to compare these participant scores with other MBA student scores on the MAAS.

The results of this experiment are likely due to a number of factors including the strength of the treatment, the graduate business school context, and the timing of the tests and will be discussed below.

Strength of the Treatment

In this research study, the guided meditation treatment was administered for five minutes at the start of 10 class session for a total exposure of 50 minutes over the course of a 14-week semester. This is a short amount of time. In the context of a first-semester, first-year MBA program which is often likened to "drinking from a fire hose" it is probable that the treatment was not robust enough to make an impact on participants given the additional academic, professional, and social demands for students' time.

The literature on mindfulness includes experiments with so-called "brief" treatments; however, mindfulness-based interventions have not been standardized into specific categories of duration and what constitutes brevity varies widely. It is possible that scholars define brevity in contrast to the hallmark Mindfulness-based Stress Reduction (MBSR) programs, which have 31 hours of instruction over the course of eight weeks (UMass, 2015). Three experiments in the literature that categorize their treatments as brief share some characteristics with the current study but also differ in critical ways.

Rambsburg and Youmans (2013) investigated the utility of a mindfulness-based intervention on undergraduate students' retention of information. In this experiment, the duration of the self-led meditation was six minutes after which students participated in a 50-minute class and then took a quiz on the class material. Rambsburg and Youmans (2013) found that meditation improved students' knowledge of the material covered in the class. The duration of Rambsburg and Youmans' (2014) treatment was similar to the duration of the treatment in the current study; however, testing of the effect was held 50-minutes after the treatment whereas the current study measured the effect weeks after the first treatment and the outcomes that were measured were different.

Zeidan (et al., 2010) used a brief treatment in the investigation of meditation training on cognition and mindfulness in undergraduate students. The treatment was four twenty-minute sessions for a total of 60 minutes over four days. The total exposure of this treatment was greater than the current study and it was executed in a more condensed period of time (four days versus 14 weeks). Like Rambsburg and Youmans (2014), the investigators did find that the treatment did improve participants' cognition. Zeidan et al. (2010) also found significant increases in students' levels of mindfulness as measured by the Freiburg Mindfulness Inventory.

In Gregoire and Lachance's (2014) study investigating how mindfulness meditation influences stress, anxiety, and negative emotions at work used a brief treatment duration: 15 minutes per day, separated into one 10-minute mindfulness recording in the morning and a five-minute mindfulness recording in the afternoon. However, the frequency of the treatment was much greater than the current study: it was repeated five days a week for five weeks for a total of six hours and fifteen minutes of

exposure versus the 50 minutes of exposure in the current study (Gregoire & Lachance, 2014). Gregoire and Lachance (2014) reported that the treatment significantly increased participants' levels of mindfulness as measured by the MAAS and reduced what they termed "psychological distress."

In this MBA experiment, both the duration and the frequency were brief. It is possible that increasing just one of these dimensions, either the duration or the frequency, would allow for more sufficient exposure to the treatment. Soler et al. (2014) in a study of 670 participants found that increased mindfulness was related to frequency but not duration or type of meditation. Carmody and Baer (2008) found that "practice time" which was calculated by total time spent meditating over 42 days to be significantly correlated with positive changes in mindfulness. The average in Carmody and Baer's (2008) study was 31-35 minutes of practice per day. The importance of strengthening the treatment in future studies is discussed later in this chapter.

MIT Sloan MBA Program Context

The MIT Sloan MBA environment is very much about excelling. As noted in the school's mission in Chapter III, MIT Sloan expects that their students will change the world (MIT Sloan, 2014b). Such change does not happen without relentless drive and accomplishment. Asking these students to shift their mindset for five minutes a week to participate in an exercise that is characterized by non-striving is a difficult task. And it may be asking something particularly challenging from the type of person who enrolls in a high-profile MBA program.

MIT students arrive at their MBA program socialized to work hard and fast, not to stop and contemplate. They are also socialized to prioritize hard skills over soft skills. If

it falls anywhere in an MBA curriculum, mindfulness would be considered a soft skill. Mintzberg's (2004) offers observations about the value soft skills in MBA programs: "The soft skills simply do not fit it. Most professors do not care about them or cannot teach them…and few of these skills are compatible with the rest of the program—they get lost amid all the hard analysis and technique" (p. 41). As noted earlier, MIT Sloan, like most typical MBA programs, emphasizes the acquisition of quantitative skill sets. For example, the first semester, first-year nonelective classes that the participants in this study were enrolled for the fall 2014 semester were: Data, Models and Decisions, Financial Accounting, Economic Analysis for Business Decision, Organizational Processes, and Communication for Leaders.

With the exception of the class that was the site of this research study, this core set of classes focuses on technical skills. In Communication for Leaders, students are required to complete self-assessments and participate in feedback sessions with their teammates. Such exercises are positioned as opportunities for leadership development and tend to be oriented to documenting how to improve the skills required to work effectively with others. While there is important value in this type of reflection, it is different from the cultivation of more inwardly-focused capacities such as mindfulness.

It is clear that this mindfulness meditation treatment was antithetical to the dominant culture at MIT Sloan and this may have been a factor in the results of this study. In no other area of the academic curriculum are Sloan MBA students encouraged or trained to pay attention to the moment with nonjudgmental awareness. Grossman and Van Dam (2011) note that the lack of value placed on introspection, in general, in

Western culture may also influence how mindfulness is experienced and measured in our society.

Given the hectic pace of MBA life, it may be that incorporating mindfulness meditation in the service of reducing stress, as opposed to increasing mindfulness *per se*, is a more appropriate fit for the context. As noted in Chapters I and II, there is evidence in the literature that mindfulness meditation has been shown to reduce stress in student populations (De Vibe et al., 2013; Weinstein, Brown, & Ryan, 2009) This idea will be discussed further in the recommendations for future research. Cultural forces of the MBA program are important to factor in when considering the results of this study and planning for future research.

Another possible interpretation for study findings relates to participants' attitudes toward the mindfulness meditation exercises that may have been influenced by their religious beliefs or their attitudes about what they might have perceived to be a spiritual practice. No data were collected about participants' religious preferences. In future studies on mindfulness and students, religious attitudes and spirituality would be interesting factors to consider.

Timing

The timing of the pretest and posttest may have also influenced the results of this study. Participants took the pretest during the last week of August 2014 during their orientation to MIT Sloan. This was a unique period of time for these participants as they had stopped paid employment but had yet to begin their first-semester classes. This transition from working professional to graduate student was a break of sorts. During this orientation, students are also highly attuned to what they are hearing from faculty and

administrators in their new school. Their attention is piqued. The combination of these circumstances—a relative break from pressures of work and school and the attention triggered by a new situation—may have contributed to participants' relatively higher scores on the MAAS pretest compared to their posttest scores.

The participants took the posttest in the first week of December 2014—the week before final exams. At this time of year, MIT Sloan MBA students are particularly stressed by the cumulative work of the semester, the looming pressure of final exams, and the summer internship recruiting process, which is in full swing. They are often frantic and scattered. It is not a time of year that lends itself to mindfulness. These events may have contributed to participants' relatively lower scores on the MAAS posttest.

Lack of Explanation

The research was designed so that participants knew as little as possible about what was being measured so as maintain the validity of the experiment. However, anecdotal qualitative comments indicated that the lack of explanation about the treatment was confusing to some participants. This confusion may have resulted in participants not electing to engage in the exercise. The data reveal that 30% of students in the treatment group reported participating in three or fewer exercises out of a total of 10 exercises. It is possible that a more thorough explanation of the research aims would have helped reduce confusion and increased engagement.

Findings Based on Demographic Characteristics

As reported in Chapter IV, posttest MAAS scores did not differ based on demographic characteristics recorded in this study. There were no differences across gender, race, ethnicity, or citizenship for control and treatment groups' posttest MAAS

scores. This indicates that the treatment's effects were not related to demographic characteristics. The literature offers little context in which to interpret these particular findings.

There is scant discussion about the effects of mindfulness and gender in the literature and the results that are reported are mixed. De Vibe et al. (2013) report that only two out of 31 randomized controlled experiments studying the effects of Mindfulness-based Stress Reduction (MBSR) investigated gender and both of those studies did not find significance related to gender. De Vibe et al.'s (2013) own study of the effects of MBSR on psychology and medical students did find significance in terms of gender: only women were found to have significantly positive outcomes related to mindfulness, well-being, and stress. The exclusion of gender in studies on mindfulness may be due to the relatively new stage of the field. However, it is a perplexing omission given that women have been shown to demonstrate (or admit to) higher levels of stress and so MBSR programs aimed at reducing stress would seemingly be interested in how gender mediates the treatment (De Vibe et al., 2013).

There is also little discussion about the relationship between age and mindfulness in the literature. There was one tentative observation about age and posttest MAAS scores worth noting in this study. The treatment participants in the youngest age category (ages 20-24) (n = 10) had the lowest mindfulness scores at pretest. This age category was also the only one to show a slight and insignificant (0.06 points) increase in posttest scores. This could be due to maturation of the treatment participants in this age category or it is possible that the treatment was responsible for this change; however, the number of participants affected was small so the observation remains tentative.

A second tentative observation is that in terms of ethnicity, there was an almost significant difference in Hispanic or Latino participants versus Non-Hispanic or Latino participants' posttest MAAS scores. The independent t-test indicated posttest MAAS scores for Hispanic or Latino participants ($M = 4.037$, $SD = .797$) and Non Hispanic or Latino participants ($M = 3.750$, $SD = .723$); $t(153) = 1.844$, $p = .067$ differed. Both age and ethnicity would be areas for further investigation in future research.

The literature has shown a positive relationship between meditation experience and mindfulness (Baer, 2008; Carmody & Baer, 2007; Soler et al., 2014). However, in this study, there were no significant differences between meditator status and pretest and posttest MAAS score. The duration and frequency of the participants' meditation experience offers a plausible interpretation to this finding. As mentioned, 17 participants self-identified as For the majority of these meditators, the frequency and duration of their meditation practice was minimal. Forty-seven percent of the meditators indicated that they meditated once per week or less. Forty-one percent of meditators indicated that when they meditated, they meditated for five minutes or less. meditators. These numbers offer a possible explanation for why participants' meditation experience did not have a significant effect on their pretest and posttest MAAS score.

Limitations of the Study

Limitations are inherent to the execution of experiments (Mertens, 1998). There are limitation to this study that relate to the sample, data collection and measurement, and the intervention itself. Each of these limitations will be discussed in this section.

Sample

There are also limitations to this study related to its non-probabilistic sample. This study used a sample of convenience, which is not the preferred strategy for robust experimental designs though it is often used (Mertens, 1998). Part of the allure of convenience sampling is the ready access to participants and the relatively lower cost of reaching those participants. Because the population was not chosen at random and may include under- or over-representation of particular groups, it is not generalizable to all MBA students. In particular, the sample was drawn from an elite MBA program, which further reduces its generalizability to non-elite MBA programs.

The validity of the sample for this study is somewhat increased because first-year, first-semester MIT Sloan students, from which this sample was drawn, had been separated into separate classrooms to ensure homogeneity between those classrooms—a policy of the MIT Sloan MBA Program office independent of this study. As such, the results can be generalized to first-year MIT Sloan MBA students.

Measurement of Mindfulness

One limitation of this study relates to the documented difficulty of measuring mindfulness (Baer et al., 2006; Baer, 2011; Davidson, 2010). A self-report questionnaire that is widely used and has valid psychometric properties, The Mindful Attention Awareness Scale (Brown & Ryan, 2003) was used to measure participants' levels of mindfulness in this research study. Scholars have expressed concern that self-report questionnaires are subject to response bias and that different groups of people, for example meditators and non-meditators, may interpret and answer questions differently (Baer, 2011; Grossman & Van Dam, 2011; Van Dam, Earlywine, & Borders, 2010). These factors could dilute the outcomes of this research study.

It is possible that the operationalization and measurement of mindfulness in this research study missed an important understanding or experience of the construct. As noted in Chapter III, the MAAS is an indirect measure of mindfulness. The MAAS asks questions related to people's mindlessness because of the difficulty people have in answering questions about their mindfulness. Critics of the MAAS suggest that the MAAS narrowly measures people's perceived lapses of attention and that the inverse is not an equivalent measure of mindfulness (Grossman & Van Dam, 2011; Van Dam, Earlywine, & Borders, 2010). Grossman and Van Dam (2011) also suggest that the MAAS (and other conventionally accepted instruments measuring mindfulness) do not consider the contextual factors that are inherent in the Buddhist conception of mindfulness. Additional instruments and ways of measuring mindfulness should be considered in future research on the topic.

Data Collection

There are limitations in regard to data collection and measurement used in this research study. In terms of data collection, some participants could not access the on-line pretest or posttest either because of they reported not receiving the pretest or posttest link at their MIT email address or because they did not bring their laptops to the classroom at the pretest or posttest. On these occasions, participants were offered a paper version of the survey, which they filled out and submitted to the facilitator. Data from these paper surveys were manually entered into SPSS. Additionally, participants accessed the pretest and posttest surveys in the classroom. In this setting, participants may have been interested in finishing the surveys as quickly as possible. Participants may not have trusted that the survey was anonymous and could have withheld information that would

be valuable to the study, even though a self-created unique ID and survey anonymization ensured that participants' information would be kept confidential and anonymous.

There was also one execution error at pretest and one at posttest. At pretest, one faculty member dismissed her group of prospective participants without inviting them to join the research study. As such, the researcher had to follow up in person with the group of prospective participants to invite them to join the study; however, the students were not given time in class to read the email invitation to the study and respond. As such, fewer prospective group participants may have joined the study than if they were given the requisite time to read and consent to the study while in a classroom setting. However, the response rate of the prospective participants was robust: 90% of invited students agreed to be part of the study at pretest.

At posttest, a different faculty member did not grant enough time for a group of participants in the control group to fill out the posttest in the classroom, which was the protocol for the experiment. As a result, faculty had to follow up by email to ask a portion of the participants to fill out the posttest survey. This lapse in protocol may have resulted in fewer participants in the control group filling out the posttest. Seventy-eight percent of participants did complete the posttest.

This drop of participants from pretest to posttest may also be attributable to another flaw in the data collection. As noted in Chapter III, participants were asked to create a unique code that they would use to enter the pretest and posttest survey. This unique code was created by answering five questions and was designed to ensure anonymity. However, it became clear while trying to match cases between pretest and

posttest that some participants either changed their answers or did not enter the same unique code at posttest that they had at pretest. Eighty-seven percent of possible cases were matched: 12 control cases and 11 treatment matches could not be matched and were dropped from the study. It appears that the unique code may have been too complex or students did not pay attention or remember how they answered the ID questions to answer them consistently at pretest and posttest.

Implications of the Research Study

The implications of this research study extend to leaders of graduate business schools who shape the mission and curriculum of their MBA programs and to faculty interested in incorporating mindfulness training into their MBA classrooms. While this research study did not find that mindfulness training increased students' levels of mindfulness, it is not a signal that further research on this subject should abate. As noted, there is sizable evidence across disciplines that indicate that mindfulness training increases mindfulness and novel ways of approaching this relationship in the business school context should be explored before it can be concluded that it neither effective or appropriate.

Implications for MBA Leadership

The results of this study imply that a context in which an experiment is conducted may influence the outcomes of that experiment. In this study, mindfulness meditation training was attempted in an environment not conducive to contemplative practices. MBA students may more readily accept mindfulness training in graduate business programs if accompanied by explicit signals by MBA program leadership that there is value in developing such internal capacities. MBA leadership can show a greater

commitment to developing a broader range of students' abilities, not just their quantitative and technical skills. Such a commitment might be best made in the context of leadership development recognizing that cultivating awareness of and attention to present moment experience may be beneficial to the students as they prepare for their future roles as leaders. Scholars of management education have argued that a student aware of his or her own thoughts, feelings, and actions is better able to self-regulate, is able to make more informed decisions, and is more deeply attuned to others (De Dea Roglio & Light, 2009; Hunter & Chaskalson, 2013; Waddock & Lozano, 2013).

In advocating for contemplative higher education, the Center for Contemplative Mind in Society (CMind) (2013) argues: "A contemplative perspective supports students' academic engagement and the development of their healthy inner life. Contemplative practices strengthen and sustain attention, deepen understanding of course material, support and increase connection to others, and inspire inquiry and insight" (p. 6). This perspective has gained some traction in some areas of higher education in recent years where instructors integrate contemplative practices with the study of traditional academic disciplines (Barbezat & Bush, 2014). However, there are only a handful of graduate business programs that have offered courses that broach the subject of mindfulness and those courses tend to be offered to executive education students (Gardiner, 2012).

The contextual importance of site selection for mindfulness training argues for finding a site more open to experimental methods of teaching and learning. As indicated above, executive education programs within graduate business schools may be more likely to experiment with novel ways to foster student development because they are not as constrained by the necessity to teach foundational concepts and skills in business that

typical MBA programs must teach. Students in executive development programs tend to be older than typical MBA students, have more work experience, and have seen that it takes more than quantitative skills and technical ability to succeed in business. Hunter (2013), Mirvis (2008), and De Dea Roglio and Light (2009) offer examples of successfully teaching executive students mindfulness, consciousness-raising, and reflection, respectively.

If full-time MBA programs were to consider incorporating mindfulness training in their curricula, one obstacle may be finding the appropriate academic department in which to teach mindfulness training. The AASCB (2002) cited the functional silos of business schools as impediments to curricular changes necessary to keep up with the rapid pace of change in business practices. In this research study, the mindfulness meditation exercises were embedded in a soft-skills course: management communication. However, there is precedence for contemplative practices to be integrated with more technical disciplines like economics in an undergraduate program (Barzebat & Bush, 2014).

While there is scant evidence that business schools will embrace contemplative practices such as mindfulness training, what does that mean for their future? Business schools may be encouraged by the growth in the rigorous research in the neuroscience, psychology, and educational fields attesting the potential benefits of mindfulness to explore its inclusion in their curriculum.

It is also possible that MBA educators are correct that the cultivation of internal capacities, such as awareness and attention, does not have a place in graduate business education. Perhaps doing so would stretch the academic mission in a way that was not

compatible with the mission of MBA programs. It is also possible that MBA educators may value the development of these capacities but feel that mindfulness training is not the appropriate pedagogical way to pursue such ends.

For MBA Classrooms

This research study reveals numerous implications for instructors about how mindfulness training can be approached in the MBA classroom. These implications include important decisions about type of course offering, course content, and frequency and duration of mindfulness meditation practice.

Mindfulness training in MBA programs should be delivered in elective courses. This study suggests that students should be able to opt into a course that teaches mindfulness; it is not a subject students should be obligated to study. This position comes from the understanding that mindfulness is not a practice to be forced onto people (Gunaratana, 1991). There is also a pedagogical imperative for elective participation as implied by Maex (2011):

> Teaching mindfulness, as in the teaching of any skill, is seen as an interaction between the skill in itself, the skilfulness of the teacher and the skillfulness of the student. The teaching must be skilfully tailored to the abilities of the student. The student him or herself is an equally defining element in the relationship as the teacher. (p. 172)

It would be important to have willing students enrolled in such a course. While the current study was embedded in a nonelective course, students were able to opt into the exercises.

A second implication for teaching mindfulness in an MBA programs regards the content of what should be taught. As noted, the literature is replete with nuanced definitions of mindfulness (Bhodi, 2011; Grossman & Van Dam, 2011; Shapiro et al.,

2004). Instructors are advised to be very clear about how they define mindfulness and be explicit about what will and will not be covered in the discussion of mindfulness. This includes to what degree mindfulness will taught with fidelity to Buddhist traditions. There is a debate in the literature about how Western practice of mindfulness has become distanced from its Buddhist roots with some scholars accepting contemporary and secular modifications to the practice and others decrying them (Grossman & Van Dam, 2011; Williams & Kabat-Zinn, 2011). There is valuable substance to both sides of the debate; what is important is being clear about what is being taught and why.

Whatever the approach with respect to Buddhist traditions, it is advisable that instructors teaching MBA students about mindfulness include the scientific and medical literatures offering empirical evidence regarding the potential effects of mindfulness. Such traditional scientific evidence would be a way to counterbalance the impression of mindfulness and meditation as lacking substance and gravitas that may negatively bias MBA students against the practice.

Lastly, an important implication from the current research study is that instructors are advised to make the actual practice of mindfulness meditation training a robust part of the course. Given that typical MBA electives are held once or twice per week, course design should include the practice of mindfulness meditation both in the classroom and at home. The Center for Contemplative Mind in Society offers guidance for teaching contemplative practices in higher education, including sample syllabi that members can consult for reference (though there are no syllabi, yet, for business or management). The most appropriate model for teaching mindfulness in an MBA program may not come from the field of higher education but from the corporate sector.

In 2007, Google created a course for its employees called Search Inside Yourself (SIY). The goal of this course is to teach mindfulness and emotional intelligence by exploring the scientific literature on mindfulness and practicing mindfulness exercises, including meditation (Boyce, 2011). The SIY curriculum focuses on developing employee's internal capacities: "The skills to work with our minds, our emotions, and other people are essential–but rarely developed" (Search Inside Yourself Leadership Institute, 2015). Google's program is tailored to meet the skepticism of its empirically-minded employee base of engineers and thus serves as an potentially helpful model to reach MIT Sloan's MBA students, the highest proportion of which come from engineering backgrounds (MIT Sloan, 2015). In addition, the format of the SIY course at Google is elective and delivered in a fairly short-time frame, which suggests it could be successfully integrated into a course in a typical MBA semester.

Recommendations for Future Research

This study yields numerous ideas for future research relating to mindfulness and MBA students. To start, future research should extend the exposure to the treatment to assess if and how such exposure influences MBA students' levels of mindfulness. In particular, increasing the frequency of the exposure is recommended. To facilitate such an increase, in addition to the treatment being facilitated in class, students could be asked to self-direct the treatment in the context of daily homework assignment outside of class. A follow-up test can be added to see if effects, should any be found, hold over time.

In addition, future research can be conducted at multiple sites to assess whether there are differences in students' experience of the treatment between MBA programs. Expanding the research to include more participants would also be important to see if and

how effects of the treatment extend with a larger sample size.

Future research should be conducted using mixed-methods to gain both a quantitative and qualitative understanding of the treatment. This would be important given the documented difficulty of measuring mindfulness (Baer, 2011; Brown & Ryan, 2004; Davidson, 2010). For example, a mixed-methods design might include a pretest/posttest design with a control group using a validated instrument to measure mindfulness as well as journal writing and interviews to understand students' experience of the treatment in their own words.

Future research could add a teaching component to the research design that instructs participants about the theory and practice of mindfulness so that they have a context for the treatment. Steps would need to be taken to ensure that teacher effects and testing threat do not compromise the internal validity of such a research design.

Lastly, future research on mindfulness and MBA students can be conducted to answer a different question that may have more relevance in the graduate business school context, that is: What are the effects of mindfulness meditation on MBA students' levels of stress? While stress reduction was not the focus on this current study, it is clear that graduate business students feel stress related to their academic and professional pursuits and the literature shows that mindfulness meditation reduces stress (Kabat-Zinn, Lipworth, & Burney, 1985). Boyatzis, Smith, and Blaize (2006) discuss the stress related to the leaders:

> Because individuals in leadership roles have to influence others upon whom they are dependent so that they might do their jobs, and since they may feel responsible for the collective effort and desired progress of the organization, they are frequently, if not daily, in situations that invoke stress. That is, they are personally working on things that are important to them, somewhat uncertain, and

> that often involve others watching or critiquing. Each condition may invoke stress. This suggests that leaders are under a steady flow of stress related to the exercise of power and its responsibility. This could be labeled chronic stress…" (p. 9)

While the measured goal may be different, this research question will still help management educators assess mindfulness meditation as a potentially useful tool for graduate student development.

Finally, future research can exclude mindfulness meditation training and focus on other ways of cultivating MBA students' internal capacities that may be more appropriate to the MBA context. Such research might center around experiential learning, role playing, case discussions, writing, and/or concentration activities to cultivate awareness and attention.

Concluding Statement

In summary, this research study sought to investigate the effects of a brief mindfulness meditation on MBA students' levels of mindfulness. While there is a robust and growing interdisciplinary literature on mindfulness, it does not extend to the graduate business school context. As the potential benefits of mindfulness have been well documented, it stands to reason that research is conducted to assess how it may foster MBA student development.

This was a randomized control/treatment trial with a non-probabilistic sample. One hundred and fifty eight first-year, first-semester MBA students participated in this study where the intervention for the treatment group was five minutes of mindfulness meditation at the start of 10 class sessions over the course of the fall semester 2014. The control group participated in their class as normal. An analysis of the pretest and posttest

data revealed that mindfulness scores as measured by the Mindful Attention Awareness Scale (Brown & Ryan, 2003) decreased from pretest to posttest indicating that the treatment negatively influenced participants' levels of mindfulness. The weakness of the treatment, the MIT Sloan MBA program context that does not foster contemplative practices, and the timing of the posttest help explain this outcome. This research study contributes to the literature by providing useful information about the research design and execution related to the study of mindfulness in graduate business schools. In particular, this study adds to the conversation surrounding the duration and frequency of mindfulness-based interventions needed to positively influence the effects associated mindfulness practices. It also contributes to the higher education literature by assessing the effectiveness and scalability of embedding mindfulness training in existing courses. Lastly, this research study offers guidance for future research in the study of mindfulness and MBA students.

If a one-semester, five-minute exercise in an elite, pressure-filled MBA program helped overachieving students be more mindful, it would certainly be great news for advocates of contemplative practices in higher education. This treatment, implemented as it was in this research study, wasn't the answer, but it is important to keep trying other approaches and other MBA contexts, for the goal of mindfulness but also for perhaps the more-easily attainable purposes of stress reduction or more focused learning.

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Appendix

A. Cover Letter to Faculty

B. Faculty's Implementation Instructions for Control Group

C. Faculty's Implementation Instructions for Treatment Group

D. Statement to Prospective Participants

E. Email Invitation to Prospective Participants

F. Student Informed Consent Form

G. Pretest Participant Information Qualtrics Survey, Control and Treatment Groups

H. Mindful Attention Awareness Scale (MAAS)

I. Email Invitation to Participants for Posttest

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K. Posttest Participant Information Qualtrics Survey, Treatment Group

L. Dr. Siegel's Breath Awareness Mindfulness Meditation Transcript

M. Treatment Checklist for Faculty? Treatment Group

Appendix A

Cover Letter to Faculty

Dear Faculty:

Thank you for agreeing to help facilitate the treatment in this research study. Your role is essential to data collection and the successful completion of the research. We will meet as a group on Monday, August 25, 2014 to review the procedures for the treatment. In the meantime, I'm sharing information related to the procedures for you so that you may be prepared for our meeting.

Attached to this letter you will find "Implementation Instructions" that outline the steps to follow in facilitating this experiment for your control group and your treatment group. Please do not elaborate about the study with any of the participants. If participants are aware that this study is investigating their levels of mindfulness, it may affect their responses to the survey. It is certainly appropriate to indicate that the study is intended to examine learning techniques.

Please let me know if you have any questions. I am very grateful for your help with this project and look forward to sharing the results with you in the near future. Thank you.

Sincerely,

Kara Blackburn

Appendix B

Faculty's Implementation Instructions for Control Group

1. Tuesday, August 26, 2014, Wednesday, August, 27, 2014, Thursday, August 28, 2014: At the appointed time during Orientation, read the Statement to Prospective Participants. Then allow students to access their email so they may read the email invitation to the study and click on the embedded link that takes them to a Qualtrics' survey that will collect their informed consent, participant information, and the Mindful Attention Awareness Scale (MAAS) pretest data.

2. Tuesday, Dec. 2, 2014: Allow students to access their email so they may read the conclusion to the study and click on the embedded link that takes them to a Qualtrics' survey to collect post-participant information form and the Mindful Attention Awareness Scale (MAAS) posttest data.

If you have any questions about these instructions, please do not hesitate to contact me at 617-253-7479 or kfb@mit.edu.

Thank you,

Kara Blackburn

Appendix C

Faculty's Implementation Instructions for Treatment Group

The following information is provided to ensure that the method under investigation is implemented in a consistent way in all participating classrooms.

1. Tuesday, August 26, 2014, Wednesday, August, 27, 2014, Thursday, August 28, 2014: At the appointed time during Orientation, read the Statement to Prospective Participants. Then allow students to access their email so they may read the email invitation to the study and click on the embedded link that takes them to a Qualtrics' survey that will collect their informed consent, participant information, and the Mindful Attention Awareness Scale (MAAS) pretest data.

2. Tuesday, Sept. 2, 2014: Class #1. You will need to inform your Group B students that you'll be starting each class with an exercise as part of a research study. Please tell them:

I am going to start each class by inviting you to participate in a very short exercise to help us focus our attention and awareness. Please listen carefully to the recording and follow the instructions. Students who choose not to participate in the exercise may sit quietly until exercise has ended; no use of electronic devices are allowed as per stated norms in the MIT Sloan core courses.

Please do *not* tell your students the nature of this research study; this may influence survey responses.

3. Please play the 5-minute recording that has been loaded onto your server at the beginning of each class throughout the semester.

4. Please participate in the exercise with your students.

5. After the recording finishes, please tell the class: "Let us take this focus into our discussion today."

6. Tuesday, Dec. 2, 2014: Allow students to access their email so they may read the conclusion to the study and click on the embedded link that takes them to a Qualtrics' survey to collect post-participant information form and the Mindful Attention Awareness Scale (MAAS) posttest data.

If you have any questions about these instructions, please do not hesitate to contact me at 617-253-7479 or kfb@mit.edu.

Thank you,
Kara

Appendix D

Statement to Prospective Participants

The following statement will be read aloud to the prospective participants during Orientation before they access the email invitation to the study. The email invitation will include an embedded link that takes them to a Qualtrics' survey that will collect their informed consent, participant information, and the Mindful Attention Awareness Scale (MAAS) pretest data.

You are being invited to take part in a research study about student experiences related to awareness and attention. You are being invited to participate in this research study because you are enrolled as a first-year MBA student at MIT Sloan. If you take part in this study, you will be one of about 200 people to do so.

Your participation is completely voluntary. Your decision whether or not to participate will have no effect on your grades or academic standing at MIT Sloan. You may withdraw from the study at any time without any penalty. If you consent to participate after reading and signing the Informed Consent form, you will be asked to fill out a 15-minute survey at the start and end of the semester. A random group of you will also be invited to participate in a five-minute exercise at the start of 10 class sessions.

Appendix E

Email Invitation to Prospective Participants

August, 2014

Hello, MIT Sloan MBA,

As a result of random selection, you are being invited to take part in a research study conducted by MIT Sloan faculty about student experiences related to awareness and attention. You are invited to participate in this research study because you are enrolled as a first-year MBA student at MIT Sloan. If you take part in this study, you will be one of about 200 people to do so. Your participation is completely voluntary. Your decision whether or not to participate will have no effect on your grades or academic standing at MIT Sloan. This survey will take 5 minutes to complete.

Thank you,

Kara Blackburn, Senior Lecturer MIT Sloan; JoAnne Yates, Sloan Distinguished Professor of Management

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}
Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix F

Student Informed Consent Form

Participant Informed Consent Form
Boston College: Lynch School of Education
Title of Study: Classroom experiences of MBA students.
Researchers: JoAnne Yates, Kara Blackburn
Type of Consent: Adult Consent Form

Introduction

You are being invited to take part in a research study about awareness and attention in the classroom. You are being invited to participate in this research study because you are enrolled as a first-year MBA student at MIT Sloan. If you take part in this study, you will be one of about 200 people to do so.

Voluntary participation and withdrawal

Your participation is completely voluntary. Your decision whether or not to participate will have no effect on your grades or academic standing at MIT Sloan. You may withdraw from the study at any time without any penalty. The researchers can withdraw a participant when it is in the subject's best interest or when a participant does not comply with the study requirements.

Description of the study

The people doing this study are JoAnne Yates, Sloan Distinguished Professor of Management, and Kara Blackburn, through her affiliation with MIT Sloan School of Management and Boston College. Dr. Karen Arnold at Boston College is overseeing the study. By doing this study we hope to learn more about students' experiences in the classroom.

The study will involve two groups of participants, Group A and Group B. If you decide to volunteer for this study, you will be randomly assigned to one of the two groups. Both groups will be asked twice, once at the beginning and again at the end of the fall semester, to complete a 15- minute on-line survey during class time. Group B will also listen to a five-minute recorded exercise at the start of ten class sessions of 15.280, Communication for Leaders. The total amount of time you will be asked to volunteer for this study is at most 80 minutes over the course of the fall semester.

Risks and discomforts of being in the study

The study has the following risk: you may not be interested in the recorded exercise. If this occurs, you need not participate. Other than the matter of your opinion about the exercise, there are no reasonable foreseeable risks. There may be unknown risks.

Benefits of being in the study

There potential benefit to you is that you may enjoy the recorded exercise and that you may feel gratified knowing that you helped further the scholarly work in this research area. There are no costs to you associated with your participation. You will not be compensated for the time you take to participate nor will you be given course credit.

Alternatives

The recorded exercise shared with Group B will be available to Group A participants at the end of this study, if they wish.

New information

If, during the three months that you are involved in this research study, additional information becomes available that might affect your decision to participate in this research, we will tell you about the information.

Confidentiality

Your responses will be anonymous and be kept confidential. Your responses will not be linked to your student record in any way whatsoever. Coded data, that is data that has been stripped of any identifying information, will be stored in password protection location accessible only to the principal investigator. Please note that regulatory agencies, the Boston College Institutional Review Board, and Boston College internal auditors may review research records if necessary.

Contacts and questions

If you have questions or concerns concerning this research you may contact the principal investigator JoAnne Yates at jyates@mit.edu or Kara Blackburn, kfb@mit.edu. If you have questions about your rights as a research participant, you may contact the Office for Research Protections, Boston College, at 617-552-4778 or irb@bc.edu.

Statement of consent

I have read (or have had read to me) the contents of this consent form. I understand the possible risks and benefits of this study. I know that my participation is entirely voluntary and I have been encouraged to ask questions. I may save or print a copy of this form.

If you agree to the statements above and agree to participate in this study, please press the "Consent Given" button below.

Appendix G

Pretest Participant Information Qualtrics Survey, Control & Treatment Groups

Please answer the following questions. All information is confidential.

1. Please answer the following questions that will produce a unique ID for you that will help make the survey results anonymous.

1a. What is the first letter of your last name? (provide A-Z drop down menu)
1b. Please enter the day of your birth. (provide 1-31 drop down menu)
1c. What is the first letter of the city or town in which you were born? (provide A-Z drop down menu)
1d. How many siblings do you have? (provide 00, 01, 02, 03....,10 drop down menu)
1e. What is the first letter of your mother's first name? (provide A-Z drop down menu)

2. How do you self-identify your gender? _____

3. How old are you? _____

4. Describe any present circumstances that might be placing you under additional stress (e.g., recent loss of a loved one, significant health concern, fasting)._____

5. How do you identify yourself in terms of race/ethnicity? Please check the box that applies and fill in the blank as needed.

African American/Black

Asian American/Pacific Islander

Caucasian/White

Latino/Chicano/Hispanic

Native American/Alaskan Native

International/Foreign National

Biracial _____

Multiracial_____

Other _____

6. Are you a US citizen? ____ Yes
____ No

Appendix H

Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003)

PsycTESTS®

doi: 10.1037/t12318-000

Mindful Attention and Awareness Scale
MAAS

Items

1. I could be experiencing some emotion and not be conscious of it until sometime later.
2. I break or spill things because of carelessness, not paying attention, or thinking of something else.
3. I find it difficult to stay focused on what's happening in the present.
4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.
5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.
6. I forget a person's name almost as soon as I've been told it for the first time.
7. It seems I am "running on automatic" without much awareness of what I'm doing.
8. I rush through activities without being really attentive to them.
9. I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there.
10. I do jobs or tasks automatically, without being aware of what I'm doing.
11. I find myself listening to someone with one ear, doing something else at the same time.
12. I drive places on "automatic pilot" and then wonder why I went there.
13. I find myself preoccupied with the future or the past.
14. I find myself doing things without paying attention.
15. I snack without being aware that I'm eating.

Note . Items were introduced by the following: "Below is a collection of statements about your everyday experience. Using the 1–6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be." The accompanying 6-point scale is 1 = *almost always,* 2 = *very frequently,* 3 = *somewhat frequently,* 4 = *somewhat infrequently,* 5 = *very infrequently,* and 6 = *almost never.*

Appendix I

Email Invitation to Participants for Posttest

December 2, 2014

Dear student,

Please click on the link below to complete the 15.280 Research Study that you consented to at the beginning of this semester. As you know, all responses are both anonymous, confidential, and have no bearing on your grade in 15.280. Thank you very much for your contribution to the research process so fundamental to the production of knowledge.

Kara Blackburn and JoAnne Yates

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}
Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix J

Posttest Participant Information Qualtrics Survey, Control Group

Your responses to the surveys in this research study are anonymous. This anonymity is ensured, in part, by a unique code you created when you filled out the survey during Orientation. In order for your responses to be valid, it is vital that the code you enter now is the same code you entered during Orientation. The questions were chosen to ensure that the responses are unforgettable and unchanging. Please answer the following questions to re-enter your unique code.

1. Please log-in with the unique student ID you created earlier this semester:
1a. What is the first letter of your last name? (provide A-Z drop down menu)
1b. What number corresponds to the month you were born? (provide 01, 02, 03....12 drop down menu)
1c. What is the first letter of the city of town in which you were born? (provide A-Z drop down menu)
1d. How many siblings do you have? (provide 00, 01, 02, 03....,10 drop down menu)

2. How do you self-identify your gender? _____

3. How old are you? _____

4. How do you identify yourself in terms of ethnicity?

Hispanic or Latino
Non-Hispanic or Latino

5. How do you identify yourself in terms of race? (Participants can only select one option)

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White
- Other

6. Do you regularly meditate? (Do not include tai chi, chi gong, or yoga in your consideration.) *If you do **not** meditate regularly, go to Question x.*
___ No
___Yes

6a. How often do you meditate?
Less then once per week

Once per week
Twice per week
Three times per week
Four times per week
More then four times per week
Every day

6b. When you meditate, on average how long do you meditate?

5 minutes or fewer
10 minutes or fewer
20 minutes or fewer
30 minutes or fewer
30-60 minutes
More than 60 minutes

Appendix K

Posttest Participant Information Qualtrics Survey, Treatment Group

Your responses to the surveys in this research study are anonymous. This anonymity is ensured, in part, by a unique code you created when you filled out the survey during Orientation. In order for your responses to be valid, it is vital that the code you enter now is the same code you entered during Orientation. The questions were chosen to ensure that the responses are unforgettable and unchanging. Please answer the following questions to re-enter your unique code.

1. Please log-in with the unique student ID you created earlier this semester:
1a. What is the first letter of your last name? (provide A-Z drop down menu)
1b. What number corresponds to the month you were born? (provide 01, 02, 03....12 drop down menu)
1c. What is the first letter of the city of town in which you were born? (provide A-Z drop down menu)
1d. How many siblings do you have? (provide 00, 01, 02, 03....,10 drop down menu)

2. How do you self-identify your gender? _____

3. How old are you? _____

4. How do you identify yourself in terms of ethnicity?

Hispanic or Latino
Non-Hispanic or Latino

5. How do you identify yourself in terms of race? (Participants can only select one option)

American Indian or Alaska Native
Asian
Black or African American
Native Hawaiian or Other Pacific Islander
White
Other

6. This semester, you listened to taped recordings at the beginning of 10 classes. How many of the classes did you follow the instructions in the recording? Estimate as closely as you can.

__ 10 classes
__ 9 classes
__ 8 classes
__ 7 classes

__ 6 classes
__ 5 classes
__ 4 classes
__ 3 classes
__ 2 classes
__ 1 class
__ No classes

7. Do you regularly meditate? (Do not include tai chi, chi gong, or yoga in your consideration.) *If you do **not** meditate regularly, go to Question x.*
___ No
___Yes

7a. How often do you meditate?
Less then once per week
Once per week
Twice per week
Three times per week
Four times per week
More then four times per week
Every day

7b. When you meditate, on average how long do you meditate?
5 minutes or fewer
10 minutes or fewer
20 minutes or fewer
30 minutes or fewer
30-60 minutes
More than 60 minutes

Appendix L

Siegel's (2013) Breath Awareness Mindfulness Meditation Transcript

For the next 5 minutes or so, we'll do some breath awareness practice. So find a comfortable posture whether sitting in a chair or on meditation cushions or using a bench. And begin to notice that if all is going well, you are already breathing.

[pause]

Allow your spine to be more or less erect and alert, and feel the sensations of breath in the body. There are a number of different ways that this can be done, but for this exercise right now, just notice the breath in the belly. Notice as you breathe in the belly rises a little bit and as you breathe out it falls a little bit.

[pause]

There is no need to control the breath, simply allow it to come in and out naturally. It doesn't matter whether the breaths are short and shallow or long and deep; this isn't a breathing exercise rather an opportunity to bring the attention back to the present, to be aware of what is happening in the moment, and embrace it with acceptance. 3:29

[:30 second pause]

See if you can continue some continuity of awareness by following the breath in entire cycles from the beginning of an inhalation to the point where the lungs are relatively full, back down to the point where the lungs are relatively empty and another cycle begins.

[one-minute pause]

Before long you'll probably notice that thoughts enter the mind, these are perfectly fine. As soon as you notice that the mind has become hijacked into a chain of narrative thought, just gently bring it back to the sensations of the breath. [End]

Appendix M

Treatment Checklist for Faculty/Treatment Group

Date	Did I	Yes	No	Comments
Aug. 28	Share Qualtrics link to collect informed consent, participation information and MAAS pretest survey data			
Sept. 2	Tell them: *"I am going to start each class by inviting you to participate in a very short exercise to help us focus our attention and awareness. Please listen carefully to the recording and follow the instructions.*			
	Start class with and play the entire recording?			
	Participate in the meditation with students?			
	After the recording finished, tell them: *"Let's take this focus into our discussion today."*			
Sept. 9	Start class with and play the entire recording?			
	Participate in the meditation with students?			
	After the recording finished, tell them: *"Let's take this focus into our discussion today."*			
Sept. 16	Start class with and play the entire recording?			
	Participate in the meditation with students?			
	After the recording finished, tell them: *"Let's take this focus into our discussion today."*			
Sept. 23	Start class with and play the entire recording?			
	Participate in the meditation with students?			
	After the recording finished, tell them: *"Let's take this focus into our discussion today."*			
Sept. 30	Start class with and play the entire recording?			
	Participate in the meditation with students?			
	After the recording finished, tell them: *"Let's take this focus into our discussion today."*			
Oct. 7	Start class with and play the entire recording?			
	Participate in the meditation with students?			
	After the recording finished, tell them: *"Let's take this focus into our discussion today."*			
Oct. 14	Start class with and play the entire recording?			
	Participate in the meditation with students?			
	After the recording finished, tell them: *"Let's take this focus into our discussion today."*			
Oct. 28	Start class with and play the entire recording?			
	Participate in the meditation with students?			

	After the recording finished, tell them: "*Let's take this focus into our discussion today*."			
Nov. 4	Start class with and play the entire recording?			
	Participate in the meditation with students?			
	After the recording finished, tell them: "*Let's take this focus into our discussion today*."			
Nov. 18	Start class with and play the entire recording?			
	Participate in the meditation with students?			
	After the recording finished, tell them: "*Let's take this focus into our discussion today*."			
Dec. 2	Share Qualtrics link to collect participant information and MAAS posttest			