Meditation and Cognitive, Affective and Behavioral Change inside and out of the Classroom

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ABSTRACT

This paper examines the impact that a daily meditation practice has on the cognitive, affective and behavioral traits of participating subjects. An examination of the historical evidence revealed that the practice of meditation has been associated with both religious and secular attempts to gain mastery over the mind by avoiding the automatic processing of incoming sensations, data and experiences according to past experiences with similar salient features. A critical review of the literature revealed several distinct areas of research focus. Several studies found that the practice of meditation causes distinct changes in brain physiology associated with attention, working memory, emotional self-regulation and the acceptance of painful or dissonant emotional events. Several studies presented evidence that the practice of mindfulness not only attenuates negative affective states but also results in greater academic achievement. Several studies evaluated the effectiveness of "mindfulness" to positively impact maladaptive behavior patterns in both youthful and adult populations that are at risk of permanent involvement with the criminal justice system. Conclusions from the studies reviewed generally supported the argument that meditation supports affective, cognitive and behavioral traits in students that are conducive to academic engagement and achievement in the classroom. Suggestions are given to guide future research on the effect of meditation on students' ability to concentrate on, comprehend, and remember academic material and remain calm in adverse and challenging situations.

TABLE OF CONTENTS

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CHAPTER ONE: INTRODUCTION

Students come to the classroom with a variety of strengths and weakness. There are many labels and theories used to understand and address both the specific needs of the child and the system of education as a whole, but whatever the strengths or weaknesses, hardships or privileges, skills or deficits of each individual or system, meditation can be used as a tool that not only illuminates the issues but also develops a calm and balanced mind to deal with them.

Rationale

It is generally accepted that students learn more from classroom experiences set in emotionally conducive environments rather than from academic experiences set in stressful anxiety-producing classrooms. Students experience stress in the classroom for a variety of reasons, and whenever this happens the amygdala is activated, circumventing extensive processing of information by the cerebral cortex, that is most often associated with higher cognitive processing and function. Many students experience chronic stress and alienation in the classroom. Some are constantly being reprimanded because their behavior is disruptive, off-task or inattentive. Students are ignored because they are seen as unmotivated or they suffer from low-self esteem, experience mild to moderate symptoms of mental illness, have aversive relationships with peers or teachers, and/or have anxiety related to academic or social performance. Students often are not able to meet academic standards, feel isolated from their peers and exhibit antisocial behavior in the classroom that is not conducive to favorable learning outcomes. For some, impairments in working memory and ability to attend to instructions make it extremely

difficult to process the incoming information sufficiently to know what the sequence of steps they must follow to successfully complete a task. For far too many learning challenged students, a teacher's voice is like a radio going on in the background, where the students knows the teacher is talking but can't derive sufficient meaning from what is being said to render it useful. Hart (2007) worked with students who had math anxiety and found that their challenges had little to do with their ability but rather had everything to do with the state of their mind as they approached the problem (p.5).

In what ways does meditation reduce the effects of anxiety and subsequent behavior problems on academic performance? How do students become calmer, more focused better able to comprehend as a result of practicing meditation and does this positively impact the quality of engagement, academic and social outcomes in the classroom?

Given the level of disruptive, antisocial and even violent behavior exhibited in the classroom, how can meditation train the mind to not react to distracting, disturbing or impulsive thoughts and provide students an opportunity to interrupt actions predicated on these maladaptive thoughts and impulses? Kickbush, Winters & Luttrell (1997) of the U.S. Department of Education identified the scope of behavioral issues evident in American schools when they cited that "nearly 3 million crimes take place in or near schools annually -one every 6 seconds of the school day" (Dhammika, 2004, p.5). The public has historically searched for ways to provide a comprehensive education to children and youth that will not only elevate the social and emotional well- being of the child and alleviate some of the tensions that contribute to student alienation but also

provides them with the skills that will promote academic and future success.

Evidence suggests that there are many instances where students experience an inability to focus on classroom activities and therefore cannot benefit from the experience or the instruction provided in the classroom. Individuals whose ability to concentrate and focus lies at the outer end of the spectrum are often well aware of how it can negatively impact their ability to get things done, stay organized and even maintain intimate relationship. Many individuals who exhibit even minor deficits in attention or whose attention span lies within the average range may greatly appreciate the cultivation of greater focus, attention and concentration in their daily lives. Most individuals recognize the value of improving their memory and their ability to stay on task. This paper examines how meditation affects the ability to concentrate, attenuate negative or maladaptive thought patterns and behavior. This paper asks if there is sufficient evidence to address how students who practice meditation daily become better learners, and the classroom environment becomes a better place to learn.

Definition of Terms

Considering the diversity of meditation techniques, there is no simple answer to the question "What is meditation?" During self–guided meditation, concentration is typically focused on a specific object (e.g., a word, a mantra, an image, a prayer, sensations, or one's own natural breath) while the meditator tries to disregard but not suppress distracting events, thoughts, feelings and memories (Hozel, Ott, Hempel, Hackl, Wolf, Stark, Vaitl, 2007). Meditation often involves training the mind to cultivate mindfulness in every moment, experience and reaction to stimuli encountered.

What are the critical attributes of meditation? Must deliberate observation of and concentration on the natural breath, sensations within the body, a biblical passage, a mantra or image be the focus during meditation or can simply enjoying a solitary walk in the forest that promotes inner reflection and quiet be considered meditation if there is no purposeful effort applied in this direction? Meditation is both a popular term used to convey non-specific behavior as well as an ancient term that has a precise contextual meaning that defines only certain specific behaviors as meditation. This paper will use meditation to refer to intentional, directed, mental activity that leads to the cultivation of a calm, quiet, attentive mind.

During many forms of meditation students may recognize thoughts as distracting events that are not to be intentionally suppressed but are not the focus of the concentration exercise and should not be given great significance and attention during it. Usually attention is directed to a specific object or activity during meditation like observation of the natural breath. Although the practitioner's goal is to remain concentrated on a specific task, they may simultaneously become aware of the intrusive nature of unrelated thoughts and memories that disturb their ability to concentrate. Other meditation techniques deliberately encourage the mediator to attend to their thoughts by mentally noting the quality and content of them.

There are various techniques for concentrating the mind. "Anapana-sati, awareness of respiration (literally, awareness of the incoming breath and the outgoing breath), consists of observation of the natural breath in the area around the nostrils (Hart, 1982, p.72). "Respiration is the object of attention that is readily available to everyone,

because we all breathe from the time of birth until the time of death. It is a universally accessible, universally acceptable object of meditation. Anapana meditation is not a breathing exercise; it is an exercise of awareness that has the breath as the object of attention. The meditator in this tradition doesn't apply effort to control the breath but rather observes it, as it naturally occurs: long or short, heavy or light, rough or subtle. For as long as possible one fixes the attention on the breath, without allowing any distractions to break the chain of awareness " (Hart, 1982).

Since this paper will examine how the practice of meditation may affect cognitive skills and behaviors associated with better learning outcomes it is necessary to define how some of these terms with be used in the paper. Cognition refers to at least one of the following domains, attention, working memory, information processing, critical thinking and creative problem solving skills. Academic achievement here will refer to the acquisition of knowledge and skills, the ability to understand, evaluate, analyze and critique information, instruction and experiences set within the classroom. Social-emotional domains refers to an outcome of a greater sense of individual well-being that effects all levels of the system due to the reduction of dysfunctional moods and behaviors within it. Motivation here will refer to student and teacher investment and engagement in what is being taught and the learning opportunities provided in the classroom. Motivated students take an active interest in what they are learning and are not simply passive recipients of the teacher's instructions. Emotional and behavioral self-regulation refers to an individual's ability to reconcile and regulate challenging emotions so it isn't reflected in disruptive or confrontational behavior in the classroom.

Limitations

It is the author's bias that the improved ability to concentrate, stay on task, regulate emotions, stay calm, accept responsibility for one's own behavior, avoid dysfunctional coping strategies leads to greater academic achievement and social emotional well-being in and out of the classroom. The paper relies on research conducted adult and student populations to suggest links that haven't been investigated in this paper. For example, greater emotional well-being and ability to stay on-task has an impact on the quality of learning that happens in the classroom. Although, this paper examines how meditation effects a subject's ability to concentrate, manage their emotions and behavior, alleviate or attenuate the experience of stress, anxiety, mental illness, off-task and anti-social behavior, this paper does not examine if there is sufficient evidence to link these outcomes to improved academic performance and a more conducive learning environment.

Since the introduction of meditation into academic environments is still in its nascent stage, evidence of the impact on school age populations are often extremely limited in the U.S. Therefore, studies done on less restricted populations that provide evidence of the effect of meditation on adult populations, must be considered in light of the current absence of data available on children and youth.

Prison officials and psychologists who are in a position to introduce strategies, programs and techniques that alleviate the mental suffering of their client populations and reduce addictive or dysfunctional behavior have found meditation instrumental in affecting positive affective and behavioral change within these target populations.

Incarcerated individuals may exhibit behavioral, affective and cognitive responses that interfere with their ability to function within society. Since these populations are not subject to the same degree of scrutiny as interventions implemented in public schools in the United States, there are far more studies that target this population. Therefore, given the relative paucity of research studies available on meditation in public schools in the U.S. at this time, studies done on analogous populations must be included in the review of the literature. Nonetheless, the reader should be aware that interventions conducted on more mature subjects might affect the cognitive, behavioral and emotional outcomes in ways not applicable to younger student populations.

In addition, some forms of mindfulness training have been incorporated into cognitive behavioral therapy, which may be effective in treating various social and emotional disorders in youth and adults. Mindfulness practices included within these psycho-therapeutic techniques essentially train subjects to non-judgmentally observe their maladaptive thought patterns without reacting to the content has shown some promise in treating adult anxiety, depression and obsessive compulsive disorders**.** Since these techniques have also been used to successfully to treat children and youth with a variety of mental, emotional and behavioral problems, it will be included in the present discussion that researches the value of including meditation as part of classroom activity. Although these forms of mindfulness differ significantly from more traditional definitions of meditation and incorporate a variety of other therapeutic elements, they may help attenuate mood disorders and antisocial behaviors in a ways that benefit those who practice it, therefore they will be included in this review especially given the paucity of

available research on the effects of traditional meditation on school age children.

Statement of Purpose

It is widely recognized that children are subject to increased amounts of stress within the classroom of today because of the academic and social demands on them. Matheny, Aycock and McCarthy (1993) documented three distinct classifications of stress related symptoms in elementary school age students that impact students lives and prevent them from participating in the learning opportunities presented within the classroom. The first category included disruptive off-task behavior, including conflict with peers and teachers and cognitive processes such as blame, where the locus of control for their behavior is externalized to avoid direct responsibility for their actions. Teachers must then divert their attention away from instructional support and guidance and attempt to ameliorate the impact of off-task or disruptive behavior on the quality of instruction and the climate of the classroom. The second category included the lack of motivation to learn, mismanagement of time and energy, and attentional difficulties that prevent students from completing and handing in their assignments on time. The third category included dysfunctional social-emotional-cognitive habits that contribute to problems such as oversensitivity, low self-esteem and the lack of friendships with classmates, depression, and fear.

Researchers found that since long-term physiological effects of stress on the body occur over time children are less likely to present with degenerative diseases but rather suffer from a compromised immune system that makes students more susceptible to common colds and flu. Other obvious symptoms of stress include depression, agitation,

irritability, fear, attention deficits, impulsive behaviors, regression to immature behavior, and social isolation and withdrawal. The symptoms of stress in children may not only prevent children from attending to and participating in classroom activity, resulting in alienation and isolation but problem behavior also diverts the teachers attention away from providing needed instructional support and guidance. Therefore, this paper examines the effect of meditation as an intervention to enhance cognitive, emotional and behavioral traits that support academic engagement and rigor, cooperation and respect within the classroom.

Summary

The intent of this paper is to review the literature to determine if there is sufficient evidence to indicate the effect that a regular meditation practice has on cognitive, affective and behavioral traits of students. It examines how meditation improves concentration, memory and comprehension of what is being read, said and explored within the classroom. It looks at ways meditation, can be used by students, as a tool to face adverse or challenging experiences in a way that promotes greater positive outcomes in and outside of the classroom. It examines in what ways can individuals who have trouble with impulse control, intense emotional reactions, mental illness and attention deficits can effectively use meditation as a tool to self-manage these dysfunctional states, thereby reducing conflict and promoting greater on-task activity within the classroom. Ultimately this paper seeks to answer the question of whether the practice of meditation within the classroom will likely benefit students and teachers?

CHAPTER TWO: HISTORICAL BACKGROUND

Introduction

Meditation has been practiced for thousands of years by many cultures both in the East and West as a practice used to develop awareness and insight. Meditation can be defined in many ways depending on the role and function of meditation in an individual's life. Even within specific religious traditions the function of meditation lies across a spectrum of purposes with distinct goals and outcomes. Livete (2001) defines it as something essential to the human spirit, but which is not necessarily dependent on race, history, geography or religion. The context and intent of a variety of different meditation techniques will be explored within this chapter to acquaint the reader with both the historical and contemporary role of meditation as well as to educate the reader about some of the specific techniques used in the contemporary studies under investigation.

Van der Lans (1987) described Christian meditation as the desire to see and know God through the recitation of the Psalms or the Gospel. He invoked Sunden role theory as a schema to help understand how the meditation exercise is intended to bring about a change in a subjects' perceptual processing. He further explained that meditation would not induce a religious experience for every subject practicing it, even if they had a religious frame of reference that supported such an experience. He pointed out that meditation results in a change in the way incoming information is processed by an individual. Meditation is an interruption of the ordinary way the brain processes incoming sensations and information. Individuals usually make an automatic selection from the incoming stimuli according to what we learned as most effective for survival.

Under special conditions this pragmatic system of automatic selection is set aside or breaks down in favor of alternate modes of consciousness whose stimulus processing may be less efficient from a biological point of view, but may permit awareness of an aspect of the experience that had been previously excluded or ignored.

King (2002) examined how the Jesus Prayer of Orthodox Christianity includes repetitive prayer, sitting posture, controlled breathing in order to reach a state of deep inner peace free from all images and discursive thought, that allows a mystical union and a vision of divine light which in this life can be seen with the bodily eyes (p.107) She formalized a distinction between prayer and meditation because prayer focuses attention outward to the great "Other," while meditation is connected with deep inner concentration and outer withdrawal(p.110). The daily recitation of the rosary in the catholic tradition is not unlike the repetition of a phrase that focuses and quiets the mind used in some types of meditation.

The historical figure of Siddartha Guatama is most often associated with the rediscovery of the practical aspects of meditation. Siddartha (563-483 B.C.E.) a young prince was born in Lumbini, India near the present day border of Nepal and India. Although his father tried to protect him from seeing the suffering that existed in the world by sheltering him in a very protective princely environment, he eventually saw life's harsh realties of sickness, old age and death. The realization that everyone experiences suffering despite their worldly status, led him to become an ascetic at the age of 29 in search of the truth about the nature of suffering and a way to end it (Austin, 2006, p.4).

Although the meditation technique rediscovered by the historical Buddha

originally was and still is practiced as a non-sectarian technique to calm and quiet the mind and gain experiential wisdom, meditation also became associated with distinct regional and cultural beliefs associated with Buddhism. Mahayana Buddhism absorbed the strong cultural beliefs of Taoism and Confucianism before it traveled to Japan and developed into the distinct form of Zen Buddhism. Theravada Buddhism, centered around South East Asia, consolidated itself in several major councils, the first at Rajgriha immediately after the first mahaparinibbana or the physical death of the historical buddha, and the second 60-100 years later at Vaishali (Omvedt, 2003, p101). Under classical Buddhist theory, meditation is a necessary but insufficient condition to purify the mind and come out of suffering. Other essential features outlined in the Eightfold Path Leading to the Cessation of Sorrow included Sila or guidelines for leading a righteous life, Samadhi or meditation and Panna or intellectual insight and understanding. Sila included the following guidelines for householders, no killing, no stealing, no lying, no sexual misconduct and no taking of any kind of intoxicants.

The historical Buddha realized that physical reality is constantly changing from moment to moment and by examining himself he penetrated deeply into his own nature and experienced the continuously arising and passing away of the entire material structure (Hart, 1982,p.32). The cause of suffering is the reaction the mind has to the evaluation of an experience. This reaction of the mind sets in motion the wheel of suffering that symbolizes human and non-human existence (Hart, 1982, p.37). The brief unconscious reactions of the mind are repeated and intensified moment after moment, growing into powerful attractions and repulsions depending on how our mind has

previously reacted to the incoming sensations (Hart, 1982, p.47&48).

Suffering is caused by preferential attachment to certain types of experience based on how the mind has evaluated those experiences previously. Therefore to end suffering one must not crave or have aversions to certain experiences but remain equanimous to all experiences, regardless of the sensations they produce in the body. Although one might believe that this precludes action and fosters passivity, this is not the case, it advocates for strong action or force if that is what is necessary to curb an aggressors' conduct. The difference behind the behavior is attention is paid to the quality of ones own mind in the interaction; balance, awareness and equanimity is the ideal basis of action. This awareness of one's own mental state can interrupt behavior predicated on projections, stereotypes and negative moods. An individual is less likely to act out of anger but rather compassion for those who unnecessarily suffer unjust situations.

Meditation and Learning Theory

Historically meditation has had no place in the discussion about its role or function within either the progressive or traditional educational systems. Meditation can be considered a type of experiential learning because it allows students to gain knowledge by direct experience rather than being imposed by an outside authority, while the meditator simultaneously trains her/his mind to focus, concentrate and become aware of a particular object or experience.

Although education reformers like John Dewey (Spring, 2005), advocated that schools be a place "to bring people with a variety of different ideas and beliefs together, in a way as with lesson frictions and instability, and introduce deeper sympathy and wider

understanding" (p.214) and Johann Pestalozzia (Spring, 2005,p. 281) advocated learning through the senses neither of them could be considered an advocate of meditation despite their support for some critical attributes of the experience. Dewey's advocacy of experiential learning most closely reflects the basic tenets of some forms of meditation, that wisdom is only gained through direct experience through the senses and that the introduction of abstract concepts should be avoided at least until students have laid the experimental groundwork to make the concept meaningful for them.

Many parents, teachers and administrators of schools today would agree with Dewey (Spring, 2005) that industrialization and more recently the related stress of the current world system has "destroyed a form of household and community life that has given the child experience and "training in the habits of industry, and the idea of the responsibility, of obligation to do something, to produce something for the greater good" (p. 283). Despite the disagreement about the particular causes that have given rise to this state of affairs, the pressures, stresses and strains experienced by children as well as adults is everywhere evident reflected in the ever increasing numbers of individuals that are medicated for either cognitive or affective disorders.

Although, the meditator may experience greater social-emotional well-being and become motivated to work for the well-being of others which aligns it with advocates of progressive education, it can also be aligned with advocates of traditional forms of education as a specific type of cognitive training that results in measurable improvement in a student's ability to concentrate on, comprehend and master new academic material. It is this attribute of meditation that identifies it as a mechanism to enhance cognitive

functions necessary for academic achievement that follows the recommendations of Edward Thorndike, a pioneer in the field of educational psychology whose seminal work *Educational Psychology* published in 1913 influenced the structure of education for decades to come. Meditation can be considered a specific type of stimulus –response training that results in measurable academic improvement. Meditators train themselves to redirect their attention to their breath or another object of meditation every time they become aware of the shift of their focus to distracting inner or outer experiences. Eventually these intrusive thoughts, feelings and memories only get momentary attention because the meditator through repeated practice has trained herself to remain focused on a specific task (p.287). Thorndike's (Spring, 2005) Law of Exercise expressed the idea that other things being equal, that the practice of a particular response to a given situation makes it more likely to occur in the future, supports the introduction of a mental exercise or meditation in the classroom that trains students to concentrate on a specific task, directly effecting the quality of student engagement in experiences and instruction presented within the classroom (p.287).

How the Brain Learns

In order to fully understand the potential impact that meditation may have on cognitive, emotional and behavioral outcomes in the classroom, it is necessary to understand how the mind evaluates, perceives and reacts to incoming sensory data. It is in the context of recent research about the brain's structure and function that outlines the potential of meditation to impact variables related to academic achievement and success.

Jensen (2005) outlined the brain's capacity to change the way it evaluates

experiences by interrupting the automatic processing of events based on past patterns or conditioned responses to stimuli. The first step in acquiring an experience is to receive input from the senses directly related to the experience or by thinking about, imagining or recalling an experience from memory. The sensory data is then routed simultaneously to the thalamus and the appropriate cortical structures used to process that type of sensory input, for example the parietal lobe processes experiences that mainly involve hearing. The brain then forms a rough sensory impression of the experience based on how similar information was processed in the past (p.10).

The thalamus is a key sensory relay station. If the experience on a sensory level is determined to be threatening it is sent immediately to the amygdala that will in turn activate the sympathetic nervous system so it can deal with the emergency. Ordinarily mundane experiences and information are not considered threatening and will be stored only temporarily in the frontal lobes before it is dismissed from memory entirely because it is not compelling enough to remember. If the experience or information is more significant then it is routed to the hippocampus to be organized and indexed before being sent to the same lobe in the cortex that originally processed it for later retrieval (Jensen, 2004, p.15/16). In contrast, information that is deemed threatening gets routed from the thalamus to the amygdala for preferential treatment that effect more of the brain's circuits, consequently, individuals recall stressful or threatening emotional events longer. In addition, gluccocorticoids like cortisol, and amines like nor-adrenaline are released by various brain structures under stressful events; with high levels of cortisols, ordinary memory is impaired and enhanced memory for material with an emotional salience

occurs. So experiences with a negative emotional content not only get processed first, but the brain becomes hyper-alert and hyper-reactive to the subtlest cues for similar messages.

The brain evaluates sensations based on past experiences that have had a similar sensations or input. If the sensations are determined to be threatening the brain reacts immediately, perhaps misinterpreting incoming stimuli because all information has yet to arrive (Jensen, 2005 p.58). People who have a storehouse of experiences that involve negative and abusive experiences could be triggering the brain's survival mode every time they encounter a similar unpleasant experience because they haven't developed the ability to wait and see if the experience is truly threatening or simply something viewed as unpleasant. These negative memories serve as a conditioning in which to process future incoming data. The cycle of perceiving things as threatening and reacting to them is strengthened.

Studies conducted on adults with significant anxiety symptomology have confirmed the well established idea that these adults will give attentional preference to threatening stimuli in their environment or perceive stimuli in a more threatening way than a population of adults who do not present with anxiety symptoms (Ehrenreich, Gross, 2001) Furthermore after perceiving a situation as threatening these adults ability to perform a subsequent task is impaired to the extent that they can't select or enact the appropriate response immediately after exposure to the threatening event or stimuli. The attentional process available for a subsequent task performance has been reduced to the extent that cognitive performance is compromised by the interference of anxious thoughts

(Sarason, 1988).

Easterbrook (1959) found that higher levels of arousal to a primary stimuli facilitated performance on the primary task at the expense of a secondary task. The selective attentional vigilance of children, who have been subjected to abusive conditions or relationships, interferes with their ability to give primary attentional focus to non-threatening stimuli or relationships. They are continually engaged in a process of detecting, processing and responding to threatening conditions in their environment. Little concentration and energy is available for complex cognitive tasks that involve critical thinking skills and problem solving activity demanded in high achieving academic environments.

Children with elevated trait anxiety levels exhibited a greater tendency to select the more threatening interpretations of emotionally neutral social cues than their non-anxious peers (Bell-Dolan and Wessler, 1994). The tendency of anxious children to evaluate environmental stimuli as threatening established a biased attentional and information processing style that is not conducive to social and academic performance. Since anxious children tend to focus their attention on perceiving threatening stimuli, evaluating stimuli as negative and reacting to the perceived negative stimuli a significant amount of attention is diverted into non-academic tasks and socially maladaptive behavior; so poor academic and social performance can be expected in the classroom. Meditation can be considered a specific type of stimulus-response training that alters the way individuals evaluate and react to incoming data.

In conclusion, if past neural impressions of an academic experiences and

learning are associated with feelings of failure, anxiety or stress then students may avoid experiences that are likely to trigger these feelings and sensations. Common "threat-linked" experiences that students may encounter at school include bullying, learning disabilities that make regular classroom assignment inaccessible, social stigma associated with being from a non-dominant culture, serious deadlines and high stakes testing. Recent studies suggest that the threat of violence in the learning environment, whether real or perceived caused students to perform significantly lower on standardized exams of reading and writing compared to students who did not have a exposure to such violence. If students experience fear, hopelessness, anxiety, and disappointment during learning, the association is made that learning is a stressful or threatening event. (Jenson, 2004, p.74-75).

This section described how the brain creates and maintains neural networks and stimulates physiological responses that may prevent students from successfully engaging, participating and learning in the classroom. It identified how repetitive negative thought cycling can interfere with a student's ability to attend to academic experiences and instruction and therefore may limit a student's success in the classroom. The outline of how the brain responds to established preferences may illuminate the pathway which meditation impacts concentration, comprehension and learning within the classroom and outside.

Summary

The historical analysis of meditation's changing role and function within education is a difficult if not impossible exercise because not only has it been absent from

the educational debate in this country but also because it can neatly fit into both the progressive and more traditional views on education. Meditation fits into Dewey's understanding of the critical importance of experience in providing the basis of knowledge while it also can be viewed in ways consistent with ideas presented by Thorndike as a specific form of cognitive training that promotes attention and concentration by restructuring the way an individual responds to distracting and intrusive thoughts and experiences that pulls their attention away from the primary instruction and academic tasks happening in the classroom. The recent research on how the brain works is included to illuminate the how the brain reacts and adapts to incoming sensory and cognitive data.

In addition a variety of different meditation techniques practiced throughout the world have also been outlined in Chapter 2 to give a basic historical overview of the practice of meditation throughout the world.

CHAPTER THREE: CRITICAL REVIEW OF THE LITERATURE

Introduction

Chapter one discussed the idea that on-going meditation practices incorporated into daily classroom routine may promote cognitive, emotional and affective change within the practicing student. How a student manages the cognitive interference that distracts and interrupts active learning and pulls attention away from on-task behavior, may have a profound effect on the classroom climate and also individual student accomplishment and success. This paper will investigate how the practice of meditation affects those who practice it. Can meditation attenuate distraction, attention deficits or "cognitive interference" associated with maladaptive coping styles that are characterized by repetitive negative or compulsive thought patterns, which often compromise a students' ability to fully participate in classroom activity? Can teachers use meditation to become more aware of their filters, biases, judgments and reactive habits patterns that negatively influence interaction with students and their families? Teachers may have established biases towards different ethnic, religious, socioeconomic communities that can be discovered if they become aware of the quality of their thoughts and how these thoughts can negatively impact their expectations, attitude and even behavior towards different communities or groups. The quality of teacher's participation and interaction influences the degree to which the learning environment is responsive to the academic and social needs of the students.

Chapter two explained the historical development of meditation as an attempt to gain insight through the heightened awareness of a particular experience that interrupts a

more automatic processing of the event or cognitive input. It examined the development and evolution of particular schools of meditation throughout the world over the past two thousand five hundred years. It touched on the historical differences among different meditation traditions and techniques that are now practiced in and outside the U.S. It also outlined current understanding of how the brain processes incoming stimuli and events.

Chapter 3 reviews the research about meditation and its effect on the cognitive, emotional and behavioral characteristics of individuals who practice meditation over time and its potential impact on students and the academic environments. The research used in this chapter is organized into the following sections: its effect on brain physiology and the body; its effect on attention and academic achievement; its effect on stress, anxiety levels and maladaptive coping styles in students; its effect on mood and affective disorders; and its effect on biased or maladaptive thought patterns like racism, homophobia, prejudice and addiction that may lead to acts of harm. Each of these studies are summarized, analyzed and critiqued to determine whether evidence suggests that the practice of meditation impacts emotional well-being, academic achievement and social functioning of students, teachers and others who practice meditation.

Meditations Effect on Cognition and Physiological Function

The four out of five studies of this section document how on-going practice of mindfulness techniques produce changes in brain physiology in the research subject that are correlated with greater cognitive skills. Newberg, Alavi, Baime, Pourdehand, Santana, and d'Aquili (2001) gathered quantitative evidence on the changes in regional cerebral blood flow (CBF) during the complex neurocognitive task of meditation. Hotzel, Ott,

Hempel, Hackl, Wolf, Star and Vaitl (2007) documented increased activity in the anterior cingular cortex associated with greater emotional processing of conflict during meditation. Pegoni and Cekic (2007) documented that meditation prevents nuerological and cognitive decline associated with ageing. While data collected by Lutz, Greischer, Rawlings, Ricard and Davidson (2004) revealed that long-term meditators have higher ratios of high amplitude gamma synchrony patterns associated with greater cognitive skills in the area of attention, working memory and learning.

Newberg, Alavi, Baime, Pourdehand, Santana, and d'Aquili (2001) collected data on eight subjects (age 38-52, M = 45) who practiced Tibetan Buddhist meditation for at least 1hour, 5 days a week for the last 15 years and compared outcomes to a control group of subjects with no previous meditation experience nor any clinical evidence of medical, neuropsychological, or drug use that could have impacted CBF outcomes.

The meditation technique practiced in this study required participants to focus their attention and maintain awareness of a visualized image for the entire trial period of one hour. Single photon emission computed tomography (SPECT) imaging technique measured no significant difference at baseline, except in the thalami laterally index. Post meditation scans revealed increased blood flow to specific regions of the brain, including the cingulated gyrus ($p = 0.0001$), the inferior ($p = 0.0025$) and orbital frontal cortex ($p = 0.0075$), the dorsolateral prefrontal cortex ($p = 0.0154$) and thalamus ($p = 0.0114$) for the eight adept meditators. The significance threshold for increased activity was set at $p < 0.01$ and decreased activity at $p < 0.001$ when comparing the observed pixels above threshold. The SPECT scans documented mildly increased blood flow in the prefrontal

regions of the brain and associated this with heightened attention experienced by long-term meditators consistent to findings documented by Herzog (1990) and Lazar (2000).

A meditation technique that primarily focuses on the visualization of a specific object, in this case an image may have significant impact on attentional outcomes because the practioner maintains their focus until they reach a state of awareness associated with clarity of thought and the loss of space and time perception (Newberg, Blaime, Pourdehnad, Santanna, and d'Aquilli, 2001, Hart, 2007). Different meditation techniques train the mind in different ways, and although the intention of the visualization practice may have not been to enhance attentional skills of the practioners, it none-the-less had a positive impact on this variable.

Increased blood flow to specific regions of the brain responsible for attention and higher cognitive function may be a result of the nature of the complex neuro-cognitive task itself, or may be due to pre-existing characteristics of individuals drawn to long-term meditation. It is necessary therefore to document changes in structures related to cognitive function in novice meditators over several years or even decades. It is difficult to isolate the impact of different experimental variables especially since meditators read meditation books for the first 30 minutes, used incense and closed their eyes for the last 30 minutes at which time the adept meditators reached a an "intense meditation stage." The study provided evidence that through the on-going practice of meditation, functional changes occur within the brain. The study points in the direction that meditation changes how the brain works in a direction that supports learning in the classroom.

A quantitative study conducted by Hotzel, Ott, Hempel, Hackl, Wolf, Stark and

Vaitl (2007) documented increased activity within the rostral anterior cingular cortex and the dorsal medial prefrontal cortex bilaterally in 15 experienced meditators who maintained a regular meditation practice of two hours daily for at least two years and participated in a minimum of four 10-day meditation courses in the tradition of S.N. Goenka (mean age = 33.8 +_4.6 years) compared to 15 non-meditator controls matched for socioeconomic characteristics (mean age = 33.4+_5.6 years).

The anterior cingular cortex (ACC), lies next to the midline just above the corpus callosum and is the component of the brain that is activated when an individual evaluates a situation as negative due to the presence of physical or emotional pain and suffering or when conflicts emerges because "incompatible information processing." The dorsal anterior cingular cortex has greater activity when subjects are able to adjust to conflict with faster reaction times. It responds not only to physical but also emotional pain associated with social rejection. The ACC becomes activated in the process of reconciling conflict. (Austin, 2006, p.83) The rostal ACC is also engaged when individuals experience greater well-being where conflict doesn't dominant the evaluation of the experience.

Researchers compared the activation of the ACC in 15 adept meditators and 15 non-meditators using the findings of 481 MRI's taken during the following meditation and control activities; 1) Observation of the natural breath (Anapana-sati) and sensations experienced below the nostrils and above the upper lip while breathing. If the participant became aware of being distracted from the observation of their breath, they then attempted to bring their attention again to the observation of sensations in the same area.

2) Addition of 10 numbers between 0 and 29 successively appearing on a screen, then pressing a button to give the correct answer from amongst three choices given to them. 3) Pressing a button every time the participants experienced a sensation while inhaling. To counteract the serial effect the order of the above conditions alternated between the mindfulness condition and arithmetic, and the button condition and arithmetic condition.

Meditators displayed an improved ability to sustain attention and concentration during meditation by the greater activation of the dorsal medial prefrontal cortex (DMPC) during mathematical computation exercises and mindfulness exercise. Meditators who practiced redirecting attention to a specific primary object of attention, in this case the natural breath, are trained to sustain attention on particular task and continually reinforce the behavior that attention needs to be redirected to the primary activity whenever distracting external or internal events occur. Findings highlighted the significant group difference in the percentage of time meditators concentrated during mindfulness ($t=3.6$, $p = 0.001$) and experienced boredom ($t = - 4.62$, $p<0.001$). Evidence suggested that meditators have developed skill at attentional self-regulation and emotional processing as a result of their practice.

The study provided evidence that increased activation of the rostral ACC in Vipassana meditators engaged in meditation indicated greater emotional awareness and processing of distracting and/or disturbing emotional memories or thoughts during meditation. The different degree of activation of the rostral ACC between adept meditators and non-meditators indicated that meditators are engaged to a greater degree in resolving the tension associated with incompatible emotional information. This study

suggested that consistent practice of meditation promotes greater emotional self-regulation and enhanced internal conflict resolution skills compared to non-meditator controls.

It identified conflict-generating events as anything that distracted their attention form the observation of sensations that they were instructed to attend to while meditating, but the content of the thoughts and memories themselves could have generated conflict (for example disturbing or provocative contents) These distracting events caused conflict for the meditators and the processing of conflict activated rostral ACC while the attentional component of meditation activated the DMPC. In addition findings in this study contradicted earlier studies that have found greater activation of ACC in controls rather than meditators suggesting heightened conflict associated with the inability to continuously keep their attention focused on a particular objects. It therefore remained unclear whether the ACC is engaged at moments of heightened emotional conflict or the processing of emotional conflict or both. The study acknowledged the somewhat contradictory results of different experiments.

What remained unclear within the study is the mechanism by which meditators gain ability to process emotions and reconcile internal conflict generated by the quality and content of their thought patterns. Aspects of the particular meditation technique may allow for the development of this skill to reconcile conflict and regulate emotions, although the mechanism by which it happens remains vague and the evidence contradictory. Since meditation techniques involve practices that substantially differ from one another, it is important to illuminate and identify potential causal links between the

mechanism and the outcome to add clarity to the results. Moreover committed meditators may have adopted certain lifestyle habits and values that influence the variables measured but have not been controlled for within the study. Similar to many other meditation studies that simply compare and contrast differences between experienced meditators and non-meditators, a longitudinal study of the changes experienced by novice meditators over time needs to be conducted to add insight into the mechanism of that change over time.

Interestingly in a non-meditation related research study, Chui, Widjaja, Bates, Voelbel, Padina, Marble J., Blank J., Day J., Brule N., and Hendren R. (2007) found that the left Anterior Cingulate Gyrus, (ACG) volume was significantly smaller in a group of children diagnosed with pediatric bipolar disorder compared to an autism spectrum disorder group and a group of children with no psychiatric disorder. No significant differences were found in the right ACG volume. These differences in volume of the ACG did not appear to be attributed to either medication or IQ but rather added clarity to the role that the left ACG plays in cognitive control the one of many processes important to sustain attention and ignore distracting stimuli. Smaller ACG size may thus characterize individuals who have a compromised ability to ignore distracting stimuli in the form of depressing or exciting sensations or thoughts and therefore more intensively experience and react to them, then individuals with larger or more active ACG involvement who can ignore cognitive input that may signal depression or mania. This research evidence adds support to the previous one that documented the link between increased activation of ACG during meditation and its role in the mediating and

processing of emotions

Pegnoni and Cekic (2007) examined the age related decline and attentional performance of 13 Zen meditators with more than three years of daily practice experience compared with to 13 control subjects matched for age and gender with no prior experience and found that the grey matter volume showed a marginally significant negative correlation with age in the control group (r =- 0.54, p =0.056) that was not obvious in meditators (r = 0.0006, p = 0.83). The ANCOVA highlighted an Age x Group interaction for the total gray matter volume at a trend significance level (t (9) = 1.82, p = 0.08) with an estimated rate of change of -4.7ml/year for the control group and +1.8ml/yr for the meditator group. The capacity of sustained attention including target sensitivity and quickness to respond to the target using group-wise Pearson's correlation analysis revealed a significant decrease with age in control subjects while indexes remained virtually constant for the meditators.

Zen meditators sat in the "lotus" or "half lotus" position, tried to maintain a straight posture, did not regulate their breath and recognized distractions and mind wandering when they occurred while meditating. Later all subjects performed a task from CANTAB battery that required the continuous observation of fast moving digits in the center of a computer screen to detect the occurrence of three specific target sequences. Researchers assessed attentional performance by calculating the reaction time needed to detect the target sequence and then rating the performance.

Zen meditators didn't experience a decrease of grey matter volume or lower attentional performance level with an increase in age, and displayed physiological

differences in the Putamen. The basal ganglia's corpus striatum, which includes the putamen is a predominately dopaminergic structure which plays a role in motor control, learning, cognitive flexibility and attention. This study again links the practice of meditation to cognitive changes that support learning and attention. The study provides strong evidence that the long-term practice of meditation may prevent neurological and cognitive ageing as wall as present other cognitive benefits. The research study failed to acknowledge that the meditators could have differed in regards to some less obvious characteristics like diet, alcohol or recreational drug consumption, values, etc. that may account for the differences in their attentional performance or grey matter volume. Likewise, the researchers did not clearly define what effects if any the volume of grey matter has on cognitive ability and attention.

Lutz, Greischar, Rawlings, Ricard, and Davidson, (2004) examined the quantitative difference in self-induced high-amplitude gamma synchrony patterns before and during meditation between a group of eight long-term Buddhist meditation practitioners and a control group of 10 healthy student volunteers subjects new to the practice of meditation and found patterns in the experimental subjects that suggested greater attention, working memory and cognitive skills among meditators**.** It should be noted that meditation and control subjects differed in many respects, including age, culture of origin, and first language, and they likely differed in many more undocumented respects, including diet and sleep. The long-term meditators practiced meditation within the Tibetan Nyingmapa and Kagyupa traditions for 10,000 to 50,000 hours over a range of 15 to 40 years. Controls subjects had no previous meditative experience but had

declared an interest in learning meditation.

The control group learned and practiced one hour of "unconditional loving kindness and compassion" meditation for a week prior to the collection of data. This meditation practice unlike others didn't rely on observation of particular objects, vocalization or image but focused on generating loving-kindness and compassion initially towards particular persons or groups of people and later to all sentient beings without thinking of anyone in particular.

The long-term meditators generated three meditative states during their meditation sessions, but this study described the effects of only the last "loving kindness" meditation on both controls and Tibetan Buddhist practitioners. Researchers collected data during each meditative session, where meditators relaxed for a 30-second block of neutral resting activity time and then meditated for a 60-second block of time four times sequentially. During the EEG data collection period both controls and long-term meditators were asked to generate an indiscriminate state of loving kindness and compassion towards all sentient beings. The results found that long-term Buddhist practitioners self-induced sustained electroencephalographic high-amplitude gamma oscillations and phase-synchrony during meditation differed from controls, in particular over the lateral frontoparietal electrodes. The study found high amplitude gamma oscillations in the EEG's of long term-practitioners that were not present in their initial baseline.

In addition, long-term practitioners had higher ratios of gamma band activity (25-42 Hz) to slow rhythms compared to controls even at baseline before meditation practice

onset. Gamma band frequencies in the 25-70Hz suggested greater cognitive skils in the area of attention, working memory and learning. This group difference increased sharply during meditation, remained higher in the post-meditation baseline and continued in the post-meditation resting blocks over most of the scalp electrodes for long-term meditators. Long-term meditation promoted changes within brain activity in the form of high-amplitude gamma activity that was sustained beyond the period of meditation practice.

Synchronization of oscillatory neural charges in the fast frequencies are associated with a higher degree of neural precision, thought to play a role in the constitution of transient networks that integrate distributed neural processes into highly ordered cognitive and affective functions, inducing synaptic changes associated with enhanced attention, working memory and cognition. This time the research linked on-going practice of meditation with synaptic changes associated with enhanced attention and working memory. Furthermore in addition to the meditation-induced effects, the study found a difference in the normative EEG patterns between the two populations during the resting state prior to meditation. These results are consistent with the goal of meditation practice to transform the automatic processing of daily events into experiences of heightened perception and insight.

The researchers failed to control for, define and measure the many variables that differed significantly between the participants within the experimental and control groups such as distinct personality traits of long-term meditators or monks, culture, values and the long-term experience and practice of several different meditation techniques included within different Tibetan Buddhist Traditions. The study only evaluated mental states for

the practice of the loving-kindness meditation although long-term practitioners practiced several other techniques designed to change their baseline states of awareness and cognition. In addition it is extremely difficult to control for all the variables that influenced the study since many if not all of the long-term meditators may have been monks originating from Asia who in many regards did not resemble members of the control group. Despite these shortcoming the study again revealed distinct cognitive advantages for long-term meditators.

The previous section provided clear quantitative evidence that meditation affected brain structures and function in ways that support better cognitive and emotional outcomes for those individuals who practice meditation over time. These articles supplied the main body of recent quantitative research linking meditation to improved attention, working memory, cognitive flexibility and the prevention of neural degeneration associated with aging for subjects who practiced meditation over time. The studies revealed that the structure and the function of the brain changed as a result of on-going meditation in ways that might support achievement and success in the classroom.

Meditation and Physiological, Academic and Behavioral Outcomes in Students

This subsection examined the impact of meditation on physiological, emotional and academic outcomes of practicing students. Barnes, Tieber, and Davis (2001) linked TM to lower blood pressure outcomes for African-American students at risk for hypertension. Hall (1999) found that meditators and controls grade point average (GPA) did not differ significanlty at baseline but by the end of the quarter students who practiced meditation had significantly better grades than controls. Rosaen and Benn (2006)

presented evidence that students who practiced mediation displayed greater levels of self-control, self-awareness, flexibility and presented better academic work than their peers who did not maintain a meditation practice. So and Orme-Johnson (2000) conducted three quantitative studies in Tawain which linked meditation to faster cognitive processing speeds, better comprehension, academic achievement and reduced anxiety levels in students who practiced meditation as part of a daily routine. Manjurath and Telles (2003) found that students who participated in a Yoga camp that included both yoga and meditation resulted in improved spatial memory performance of participants. Finally a study conducted in Bhuj, India revealed that children with autism who practiced meditation made improvements especially in the areas of sociability and health.
These studies provide the bulk of the evidence on the effect of meditation onstudent populations.

Barnes, Trieber and Davis (2001) examined the impact of Transcendental Meditation Program on cardiovascular (CV) reactivity in 34 African American, lower income adolescents, who did not participate in a formal sports program or take any prescribed medication for high resting systolic blood pressure (BP) in the 85^{th}-95^{th} percentile for their age and gender and determined that TM appeared to have a positive impact on CV functioning at rest and during acute laboratory stress tests for adolescents at risk for hypertension. African Americans from late childhood on exhibit higher casual blood pressure, which puts them at a significant risk for developing later hypertension.

The researchers randomly assigned the students with similar socio-demographic and anthropometric variables into a TM group (n = 17) or a health education control

group (n = 18). The TM group meditated twice a day for a period of two months to achieve a "wakeful but restful state". Researchers administered a car driving simulation stressor and a social stressor interview to simulate stressful events that normally increase cardiovascular arousal in participants at pre-and post-intervention phases of the research and illuminated lower levels of response for the TM group compared to the control group.

A MANOVA analysis of the car driving simulation stressor revealed significant phase effect for all cardiovascular parameters ($p < 0.04$) while the social stressor MANOVA revealed significance ($p < 0.04$) for all measures except for cardiac output ($p < 0.10$) indicating significant CV response for all participants pre-intervention. The TM group experienced less reactivity or difference between pre-stressor and post-stressor response to the driving stressor exercise than the control group that exhibited a slight increase in reactivity. The TM group experienced markedly less reactivity to the social stressor exercise than the control group, which also experienced less reactivity post-intervention. The TM group exhibited a 4.8-mmHg greater decrease in Systolic Blood Pressure (SBP) compared to a 2.6-mmHg increase in the control subjects after simulation of the stressful event.

Although the study revealed a positive impact of TM on blood pressure and cardiovascular response of subjects who practiced TM meditation on a regular basis, it did not analyze the impact that the health education class influenced choices and moderated variables like diet, sodium intake, exercise, and environmental stress that significantly effects blood pressure outcomes. In addition the researchers acknowledged the TM group participants had greater contact with intervention providers than their peers

assigned to the health education group which could have had a significant impact on engagement levels and stress experienced by the participants. Since it is widely recognized that stress negatively impacts educational outcomes as well as BP measures in subjects, the influence that relationships have on mitigating environmental stressors needs to be explicitly controlled for in experiments that measure the reduction of stress.

Hall (1999) investigated the impact that TM had on the academic performance of 56 undergraduate college students enrolled in a introductory psychology course. Researchers randomly assigned students to either a meditation or no meditation control group and found that although a significant difference did not exist at base line between the different groups GPA's by the end of the spring semester a significant difference did exist between the two groups. The students assigned to the meditation group practiced repeating and concentrating on a mantra at least twice a week, for 10 minutes before and after a one-hour study session. The control group also met for an hour study session but it did not include practice of TM. A one-factor analysis of variance revealed that a significant difference did not exist between GPA's (meditation mean GPA's=2.77, and control mean GPA's=2.64, $F = .811$, $p < 0.318$) but by the end of the Spring semester a one-factor analysis of variance revealed a significant difference between the groups GPA's (meditation group mean GPA= 2.85, control mean=2.55 F=4.25, $p < 0.041$).

Although the participants of both groups were asked not to discuss details of the study session, if discussion occurred it likely became evident that the meditation group was being taught an additional technique that the other group failed to receive, this in turn could have lead to higher result expectations in the experimental subjects. An

experimental design that controlled for this variable would minimize the impact of higher expectations among the TM group. It might also explain why the control group GPA's actually declined during the intervention period compared to the previous semester.

In 2006, Rosaen and Benn collected data on ten randomly selected 7th grade African American students ranging in age from 12 to 14 years from a charter school in Detroit, Michigan after they maintained a 12 month, TM meditation practice characterized by two 10 minute meditation periods, one at the beginning and one at the end of the school day and found that the students displayed greater self-control, self–awareness, self-reflection, flexibility to situational demands, and improvement in their academic work. Immediately following the morning meditation, participants either completed an art project, writing exercise, written questionnaire, or responded to a nine-question interview exploring their perception of the effect of meditation on their lives. The first researcher then transcribed and analyzed the conceptual content of the interviews for emergent themes using Atlas-ti, a Scientific Software Development package form Berlin, Germany. More than half the students described being better able to control themselves in annoying situations where they previously would have expressed their anger towards others. The majority of the students also gave specific examples of how meditation improved their and other students academic performance. Students described being more relaxed and able to concentrate as a result of the meditation program.

The limitations of this study include students desire to make a favorable impression on the interviewer not blind to the research objectives. The researchers, who

desired to shed light on less destructive ways of navigating adolescence conducted the interviews, this bias may have influenced how students responded to the questions. In addition the lack of a control group, demographic characteristics and small sample size affected the validity of the results. Students' ability to control their impulses or to act in less destructive ways may have been due to the increasing maturity of youth over time rather than the effects of a meditation program.

So and Orme-Johnson (2000), linked the practice of Transcendental Meditation to wakeful hypo-metabolic states or states of restful alertness characterized by decreased metabolism, heart rate, and respiration to improved cognitive function and academic performance in 56 first year senior high school students in Taiwan. The experimental group consisted of 56 randomly assigned students who learned and practiced TM 15-20 minutes, twice a day for 6 to 12 months. Another group consisted of 58 students who learned TM 6 month later, but served as a control group in this research study, these students took naps on the same schedule of meditation instead of practicing TM. Students not interested in learning TM, made up a third group of 40 students. Three schoolteachers administered the pre and post-tests including the Culture Fair Intelligence Test (CFIT) that measured the ability to successfully reason in novel situations, Inspection Time (IT) that assessed the speed of information processing when information is encoded or transferred into short term memory from a sensory register, it positively correlates with IQ variance, Constructive Thinking Inventory (CTI) measured "practical intelligence" that predicts success in work, social and emotional relationships, Group Embedded Figures Test (GEFT) evaluated field independence and predicts academic achievement,

Test for Creative Thinking-Drawing Production (TCT-DP) measured "whole brain creativity" which required a balanced use of cognitive, emotional and volitional domains and reflected comprehension, analysis, curiosity, unconventionality, synthesis and risk/avoidance traits.

The researchers performed a Repeated Measure Analysis of Covariance (ANCOVA) to determine whether students who practiced of TM, and those who did not had significantly different levels of performance on the pre and post-test scores. It analyzed the covariance of post-test scores using pretest scores as the covariate. The TM group showed significant improvement ($p < 0.003$) on six of the seven tests, ($F = 8.89$ - 29.43) compared to the napping group, the results of the CFIT was the only test not indicating a significant difference in regards to the TM intervention. The TM group showed significant improvement on all seven tests compared to the "no interest group" while the napping group and "no interest group" did not differ from each other significantly on any of the test measures.

This strength of this study lies in the establishment of several different control groups to compare pre and post-test results, which showed significant improvement on most pos-test results for the TM group compared to control. The largely lower test scores for the napping control group, and "no interest control" group compared to the "TM group" suggested that the effects of TM are not due to periods of unstructured rest but due to specific qualities developed by this particular meditation practice.

So and Orme-Johnson (2000) conducted a second study with a similar design to the previous one, except that in place of a napping control group, students practiced a

form of contemplation meditation following the same schedule as the TM group. The researchers conducted the study on a younger student population of 118 female junior high school students, with a mean age of 14.6 years (*SD*), taking a regular curriculum at Yang- Ming National School in Taipei Taiwan and assigned them to a TM meditation group (*N*=37), a contemplation meditation control group (*N*=41) and a no interest control group (*N*=40) and compared results on the following measures CFIT, IT, CTI, GEFT, TCT-DP, Trait Anxiety and State Anxiety. The only difference between this and the previous one is that the subjects were younger females only and instead of the napping group their was a contemplation meditation group which, according to the researchers, allowed students to think about the meaning of something which kept the mind on the surface level of thinking while TM didn't require students to make meaning of anything and therefore allowed the practitioner to enter a hypo-metabolic state characterized by restful alertness.

Again researchers used the univariate ANCOVA to determine if the difference in test performance levels between the groups are considered statistically significant and identify causal links between specific interventions and accompanying results. Statistical Analysis for Experiment 2 was identical to the statistics derived from Experiment 1. The most significant correlations (for all groups and all subjects) were between the CFIT and IT and STAI ($p < .01 - p < .001$). In addition, the GEFT was also correlated with the CFIT (post-test, $r = .37$, $p = 0.007$) and with TCT- (pre-test , $r = .37$, $p = 0.007$, post-test, $r = .33$, $p = 0.040$). STAI with the CTI (pre-test, $r = -.34$, $p = 0.026$; post-test, $r = -.36$, $p = 0.015$) while the contemplation group showed improvement over the no

treatment group on the GEFT and IT.

Since different teachers taught each technique, the quality of meditation instruction could have impacted the students' ability to practice the different forms of meditation. Rather than outcomes being a result of the meditation technique itself, they could be due to the quality of instruction the students were given to follow. In addition it is difficult to gauge the extent to which a participant is engaged in meditation without some formal measurement of specific brain function.

The results suggested that all meditation techniques do not produce the same results, the discrepancy may have resulted from the meditation experience and instructional quality of the particular meditation instructor rather than being intrinsic to the technique itself or conversely the results could be the results of the requirements of the specific technique. Regardless both meditation groups demonstrated improved performance on at least some of the test measures given to students at pre and post-intervention.

The inclusion of the contemplation meditation group in this study controlled for expectation fostering features because instructors for both groups felt that the meditation technique they taught students would foster positive cognitive and affective results in the student population practicing them. This study indicated that TM improved performance on all variables and reduced trait and state anxiety compared to the contemplation meditation control group and "no interest control group". This study illuminated the differential impact of several meditation techniques. Contemplation meditation included a " meaning making" activity that TM did not. This study suggested that "meaning

making" mental activity kept the mind at the surface level of experience and prevented the practitioners from reaching a state of hypo-metabolic state of restful alertness. Interestingly, the many different forms of cognitive therapy included in this paper introduce "mindfulness" as a meaning making activity used to change behavioral responses to specific internal and external stimuli. The current study suggested that the "meaning making" activity of the brain needed to be interrupted to reach a hyper-metabolic state conducive to academic achievement. Further studies need to compare and contrast different meditation techniques to determine the usefulness and applicability of each technique in the classroom.

Experiment three conducted by So and Orme-Johnson (2000) consisted of an experimental group (N = 51) and a no treatment control group (N = 48) of male vocational students with a mean age of 17.8 years (SD = .07) majoring in technical drawing at Nan-Ying Commerce and Industry Training School in Tainin, southern Taiwan. Researchers used the same variables as in the previous two studies, but they administered the post-test after 12 months and the principal paid the course fee for the students. The statistical analysis consistently matched the previous studies while the results again revealed significant improvement due to TM practice on all variables measured. The TM practitioners demonstrated highly significant improvement on most variables relative to randomized controls with p values falling between the 0.001 and f.05 range. As with experiment 1 and 2, the strongest correlations (for all subjects in all groups) were between CFIT and IT and STAI. In addition GEFT was correlated with CFIT (r = .48, p < 0.001) and with the TCT – DP (r = .28, p < 0.009). At post-test, the

only significant correlation was between the GEFT and the CFIT ($r = .44, p < 0.001$) with no other change scores correlations reached significance. There were no significant negative correlations between change in anxiety and change in the cognitive variables for the TM group and a single correlation of -0.38 between state anxiety and the TCT-DP for the control group. The findings provide results consistent to experiment 1 and , that students who practiced TM showed significant improvement on all variables.

The strength of these studies lies in the fact, that the procedures and methods are clearly outlined, the randomly selected experimental and control group/s provided a standard for comparison, the length of the studies ranged from six to twelve month and the participants were all students at the time of the study. It is important to mention that the according to the author of the study Chinese culture values techniques that improve health, intelligence and moral behavior, since these aspects of their culture may impact the results in ways that are difficult to control for, the results may not be directly transferable to cultures that do not hold the same high regard for these qualities in an individual.

Manjurath and Telles (2003) analyzed the impact of yoga and yoga breathing exercises on verbal and spatial performance scores of female subjects ranging in age from 11-16 who attended a yoga camp or fine arts summer camp ($N = 30$) in Bangalore, India and concluded that the participants of the yoga summer camp achieved an increase in their spatial memory performance scores compared to the group of youths who attended a fine arts camp for the same length of time, although verbal memory scores remained the same for all groups over time. The researchers established a control group who did not

participate in either the yoga or fine arts camp ($N = 30$) to determine if test-retest activity had any effect on score outcomes. Researchers administered the tests on day 1 of the study and after the intervention period on day 10 of the study. The verbal test material consisted of the projection of 10 non-sense syllables on a screen, the spatial test material consisted of the projection of 10 simple line drawings, while the projection of a mathematical problem on the screen after the presentation of the 10 test items served as a brief interruption, after which the subjects attempted to recall and write or draw the 10 test items initially presented on the screen for either the verbal or spatial test.

The multivariate analysis between subjects showed a significant difference for the Yoga group ($F(3,116) = 5.569$, p=0.001).While the fine arts camp participants ($F(3,116) = 2.230, p = 0.088$) and the control group ($F(3,116) = 0.727, p = 0.538$) did not display any significance regarding intervention.

While the present study supports the conclusion that participation in the yoga camp resulted in improved spatial memory performance of participants compared to other activities, it remains unclear which variable within the intervention effected outcomes since the yoga camp included several distinct training exercises like yoga asanas (90 min), regulation of the breath (pranayama, 60min) internal cleansing techniques (kriyas, 30 min), meditation and devotional practice (90 min), guided relaxations (30 min), using meaningful stories (60 min) to foster specific values and feelings of responsibility considered essential to the practice of yoga and games (120 min). In addition children willing to participate in these types of exercises activities for 8 hours a day may possess several distinct character traits and cultural predispositions not readily transferred to a

population of similarly age students in the United States. They likely had on-going prior exposure to some of these techniques prior to the start of the camp to be able to sustain interest in the activities for such a long duration. The study did not sufficiently control for most of these distinct variables to provide clear evidence that yoga, yogic breathing and meditation contributed to the improvement of spatial right hemispheric improvement.

A qualitative pre-test, post-test experimental study at the Dhavantri School in Bhuj, Gujrat analyzed the outcome for five autistic students ranging in age from 5-13, who maintained a daily 10-minute meditation practice that consisted of observation of the natural breath. They found improved behavior patterns for participants evaluated against the Autism Treatment Evaluation Checklist (ATEC) items and DSM-IV guidelines. All the five children experienced delays in motor, speech, social maturity levels, ability to participate in spontaneous make-believe play, social conversation, and displayed behavior abnormalities like rocking, spinning, clapping and self-hitting behaviors. Almost all the children had language abnormalities like repetition of sounds or syllables, abnormal sensory motor functioning, tactile processing issues, poor posture and bodily alignment, difficulty maintaining eye contact, low levels of visual alertness and problems with vestibular processing and modulation.

Parents completed an Autism Treatment Evaluation Checklist (ATEC) at the beginning and end of the12 month intervention period that showed lower ATEC scores and indicated improvement in the areas of speech and sensory/cognitive awareness with the most marked improvement in areas of sociability and physical/health behavior.

The mean rating of parent's perceptions on the ATEC are as follows:

Area	Before	After
Speech	25	22
Sociability	30.4	16.2
Sensory	27.8	25
Health	33.4	16.8

Although the study suffered from some significant methodological flaws; parents rather than a neutral third party blind to the experimental results and objectives evaluated behavioral outcomes, the study didn't control for the Hawthorne affect, the small number of participants, an experimental control group didn't exist, it none-the-less illuminated areas in which parents reported significant improvement in their children's behavior. Since children who present with symptoms associated with autism spectrum disorder often challenge and significantly impact family relationships, the perceptions of the parents whether accurate or not deserve attention because they signal a reduction of stress within that relationship.

These studies reveal that on-going practice of meditation for even 10-15 minutes a day had an impact on cognitive, and behavioral variables considered important in academic environments. Of the above studies, So and Orme-Johnson provided the most extensive quantitative evidence that meditation effects students ability to process and interpret information in the classroom and reduces the experience of stress in academic environments.

Meditation's Effect on Maladaptive Psychological Coping Styles in Children and Youth

Broderick and Korteland (2004) found that rumination as a coping mechanism

correlated with the subsequent development of depression in student populations. In another study Broderick (2005) found that mindfulness proved more useful in attenuating dysphoric moods than rumination or distraction. Sibinga, Stewart, Magyari, Welsh, Hutton and Ellen (2008) ascertained the positive impact of Mindfulness Based Stress Reduction (MBSR) on HIV+ youth. While Beauchemin, Hutchins, Patterson (2008) determined that mindfulness meditation correlated with better affective, cognitive and behavioral outcomes in students identified as having a learning disability in a specialized instructional environment targeting this special needs population. Semple, Reid, Miller (2005) documented students' perceptions toward the mindfulness program students participated in at their school.

Broderick and Korteland (2004) reviewed the effect of long-term rumination on the later development of depression (p.384). Rumination is defined as a maladaptive coping style for depressive disorders; individuals repetitively focus on depressive thoughts and negative events in their life to an almost obsessive degree. These repetitive negative thought patterns or ruminations not only interfere with an individual's ability to enjoy life but also have a profound effect on a students' ability to attend to, participate in and benefit from academic and social experiences provided in the classroom. Research found that rumination as a mental habit pattern in children interfered with attention and concentration, impeded the ability to solve problems, exacerbated the perceived severity of the problem, contributed to poor academic performance, alienated mentors and was associated with negative affectivity in adults.

Forty-eight girls and 31 boys from a charter school in a large metropolitan area of

northeastern United States participated in the study. Ninety-eight percent of the participants were Caucasian from lower to middle class socioeconomic environments. The principal estimated that 15%-20% of the student population had special academic needs due to ADHD or mild learning disabilities that compromised their academic achievement. The participants included 4th, 5th, and 6th graders and the average age of the participant at the time of the administration of the first test was 10.1 years of age. Researchers collected data about the students in May 2000, May 2001 and May 2002. Students completed a 13 page, approximately, 45-minute questionnaire giving their opinion to the various questions. Students used a lickert scale from 1 (almost never) to 4 (almost always) on the Nolen-Hoeksema's Response Style Questionnaire (RSQ) to measure their tendency to either use rumination or distraction to cope with their problems. Reliability and internal consistency being $r = 0.80$, $a = 0.89$ respectively, for the questionnaire. For this study, the rewording of the original questionnaire reflected the youthful characteristic of the subjects, whenever "people" appeared, the researcher changed it to " kids" to facilitate comprehension among students.

Researchers administered the complete Children's Depression inventory (CDI), a 27-item measure of cognitive, affective, and behavioral signs of depression and The Children's Sex Role Test, a 24-item test to measure gender role identification. Out of the following variables, rumination score, grade and gender, only ruminations significantly predicted later depression (beta= 0.31, $p < .000$), accounting for significant variance in CDI scores.

Broderick and Korteland (2004) identified a causal link between rumination and

subsequent affective disorders in adulthood. In a subsequent study Broderick identified the usefulness of "mindfulness meditation", that allowed individuals to meta-cognitively stand back and examine the nature and content of their thoughts in a non-judgmental way, thus promoting the psychological de-centering or distancing necessary to objectively view the quality of their mind. Teasdale, Moore, Hayhurst, Pope, Williams and Segal (2002) established mindfulness as a key feature of many different types of cognitive therapy because of its ability to interrupt repetitive negative thought cycling characteristic of rumination and depression.

Although this study examined the relationship between rumination as a coping style during pre-adolescence and later affective disorders in adulthood and offered "mindfulness" as an intervention to interrupt the maladaptive coping mechanism, it did not itself report the efficacy of this treatment approach in the subjects under consideration.

In addition the study stipulated that only rumination predicted later depression but elsewhere stated that rumination may not be distinct from depression, since they both include repeated re-experiencing of negative feelings and thoughts, perhaps the difference lies in the extent to which negative thoughts interfere with the subjects ability to enjoy life. Researchers acknowledged that students may have had difficulty understanding and identifying a relatively abstract concept like rumination, which would interfere with their self-reporting of it. Clearly some students may find the process of identification and awareness of the quality of their thoughts difficult to monitor and maintain without some kind of previous training.

The authors clearly established the link between the habituation of rumination in pre-adolescence and the continuation of these negative thought patterns into adulthood with the presentation of depressive symptoms. They acknowledged that cognitive therapy is often the treatment of first choice to change distorted cognitions and proposed further studies that included "mindfulness" as a key feature of cognitive therapy to prevent or interrupt this ruminative cycle from continuing into adulthood. The student population they chose to study was a non-randomly selected homogeneous cross section of the population that is non-representative of the general population and therefore may be inaccurately generalized to the general population. Given the low-middle socioeconomic status, high stress, lower income urban environment and high incidence of special needs the tendency of this population to develop low self-efficacy thought patterns may be more pronounced then in the general population and needs to be controlled for in future research studies.

In another study conducted by Broderick (2005), examined "mindfulness meditation" as an intervention to reduce dysphoric moods, in contrast to rumination and distraction, the two primary coping styles used to deal with unwanted mental states or life events. Nolen-Hocksema (1991) defined rumination as the repetitive focusing of attention on negative feelings and thoughts in response to a negative mood. Rumination has a cognitive component that is expressed as repetitive self-focused mental activity, an affective component that is expressed in increased emotional sensitivity and a behavioral component expressed in impairment of high-efficacy behavior. Students engaged in rumination are less likely to attend to classroom activity because the repetitive thoughts

demand their primary attention, while distractive behaviors interfere with the students', classmates' and teacher's ability to attend to the academic instruction and tasks occurring in the classroom. Distraction here is defined as doing or experiencing something you enjoy, like talking to friends, getting the attention of the teacher or thrill seeking activity to distract the subject from experiencing their current dysphoric mood.

Although distraction may be more effective in attenuating dysphoric moods than rumination since it does not necessarily focus on negative thoughts and events, both coping mechanisms interfere with classroom instruction and learning activities since they occupy the attention of the student, while distraction in addition may disrupt or disturb the rest of the class depending on its expression.

In this qualitative study Broderick recruited 139 female undergraduates and 38 male undergraduates from an Educational Psychology course at a university in Pennsylvania. The students mean age was 20.9, 91% were Caucasian, 4% were African American, 2% were Hispanic, 2% were Asian American and 1% Other. The initial demographic questionnaire disqualified any students with prior meditation experience. The first part of this study created a negative mood in the 177 participants. The participants repeated progressively more negative statements about how they thought and felt about themselves, concentrated on events in their lives that made them feel depressed and imagined their sad feelings becoming stronger while Barber's Adalgio for Strings played in the background. After researchers delivered a standardized set of initial instructions, students listened to subsequent directions on audiotape. Students in the rumination group (N = 55) then either concentrated on self-focused phrases like "why I

react the way I do", while students in the distraction group ($N = 61$) concentrated on non-self focused cognitions like a "freshly painted door" and the students in the meditation group ($N = 61$) listened to a meditation audiotape with occasional prompts that reminded them to focus their attention on self-acceptance and the awareness of their breath.

The students completed the Positive and Negative Affect Schedule (PANAS) questionnaire three times, once prior to mood induction, once immediately after mood induction and once after the experimental condition. The PANAS used to evaluate moods and changes in moods had a high reliability and excellent discriminative validity for positive and negative mood fluctuations. After the experimental intervention all students listed their thoughts and then two raters blind to the experimental condition evaluated these thoughts as positive, negative or neutral based on their content with a inter-rater reliability of .81, .82, and .76 respectively. Participants in the distraction condition observed significant less negative moods compared to the rumination condition ($p < .001$), while participants in the meditation condition reported significantly less negative mood compared to participants in the rumination condition ($p < 0.001$) as well as less negative moods compared to the distraction condition ($p< 0.032$). The results of the study confirmed the hypothesis that "mindfulness meditation" proved significantly more effective than either distraction or rumination for alleviating the dysphoric mood induced by amplifying both the memory and the experience of sad and depressing thoughts.

The limitations of this study included the use of different modalities of instruction for different experimental conditions. The rumination and distraction group

used written phrases to direct their thought processes while the "Mindfulness Group" listened to an audiotape to direct their thought processes. In addition there is no way to measure the degree to which the participants engaged in the self-directed cognitive tasks. The students in the rumination group reflected on negative thoughts, which prolonged and is the same as the negative mood that they sought to measure at the end of the experiment. Also an intervention that is effective on a sample population of non-randomly selected college students where dysphoric moods are induced may not accurately be generalized to a more heterogeneous population of depressed youth whose affective states are not artificially induced but rather reflect a physiological predisposition or environmental factors.

Sibinga, Stewart, Magyari, Welsh, Hutton and Ellen (2008) conducted qualitative interviews to ascertain the impact of Mindfulness Based Stress Reduction (MBSR) on the reduction of stress, negative moods, maladaptive behavior responses and the improvement of immunologic function in a group of 5 HIV+ infected urban African-American youth ranging in age from 13-21. The five subjects described several emergent themes characteristic of their experience in the program including improved attitude, decreased reactivity, improved behavior, improved self-care and the importance of the group in their lives. The participants' response averaged 9.6 out of 10 when rating the importance of the program in their lives while they all reported learning something valuable from the class.

Although the positive perception of this program among participants alone supports inclusion of this type of intervention for those suffering from a terminal illness,

the study none-the-less suffered from several major methodological weaknesses including the small size sample of non-randomly chosen participants, the lack of a control group, the high attrition rate amongst participants, the inclusion of other treatment modalities such as yoga, the relationship aspects created by the intervention process supported " a feeling of togetherness and safeness in the group" that had little to do with the technique itself but likely impacted outcomes. Cognitive therapies, that include elements of "mindfulness", as the key attribute of meditation, are not a form of meditation in the classical sense, but rather provide opportunities for self-reflection and meta-cognitive distancing that can impact subsequent behavior.

Beauchemin, Hutchins, Patterson (2008) conducted research on a population of students who were identified as learning disabled. Students with learning disabilities often suffer from elevated levels of stress due to perceptions of low self–efficacy in regards to academic performance, higher levels of anxiety and greater social skill deficits than typically associated with adolescents. The researchers acknowledged that the study used the "cognitive-interference model" to explain poor academic performance in anxious individuals who due to perceptions of low self-efficacy, competence and greater preoccupation with negative thoughts and experiences suffer lapses in their attention that impact their academic performance. In contrast the "deficient in study skills" approach identifies anxiety as a by-product of deficient preparation and knowledge to perform the academic task.

The researchers recruited students from four high school classes ranging in size from 8 to 12 students who attended a Vermont school which primarily served students

diagnosed with a learning disabilities. The study included 34 students, 29% female and 71% male, ranged in age from 13 to 18 years old, the median being 16.61 years and two of their teachers, one female and one male. An anonymous questionnaire indicated that 53% of students had some experience with meditation. Out of the 44 students invited to participate in the study, only 34 students returned the signed permission slip indicating parental approval for their participation. The "mindfulness meditation" instruction consisted of two 45-minute sessions conducted by a primary investigator and the regular classroom teacher who had undergone a special training that familiarized them with meditation instruction. The students meditated for 5 to 10 minutes at the beginning of each class during the five-week program.

A comparison of the pre and post-test results, of the well-validated and widely used State-Trait Anxiety Inventory (STAI), identified anxiety levels that were significantly higher at pre-test time before intervention was administered to the students. Each comparison employed an alpha of .05. Trait anxiety scores were ($M = 42.56$) at pre-test and only ($M = 39.68$) at post-test, ($t\ (33) = 4.88$, $p < 0.05$). While state anxiety scores also indicated significantly greater anxiety levels at pre-test time ($M = 38.21$) compared to post-test ($M = 32.59$), ($t\ (33) = 4.88$, $p < 0.05$).

. A comparison of the pre and post-test of the Social Skills Rating System (SSRS) revealed that students experienced significant improvement in their perceived social skills performance at post-test. Pre-test data include ($M = 95.68$; percentile rank = 31) to post-test ($M = 100.06$; percentile rank 43.5), $t\ (33) = 3.11$, $p < 0.05$. The most significant improvement occurred in the teachers perception of student's social skill performance

where the data revealed a pre-test score of $M = 86.65$; percentile rank = 18.5 that reached a post-test result of $M = 94.41$;percentile rank = 55.5,t (33) = 3.35,$p < 0.05$. Teachers also gave ratings of students' problem behaviors which decreased after the introduction of "mindfulness meditation" from a pre-test score of $M = 116.06$;percentile rank = 85.5 to post-test score of $M = 105.74$;percentile rank = 66, $t(33) = 4.95$,$p < 0.05$. Lastly the teachers rated students on their academic achievement, which again showed significant improvement after the introduction of mindfulness meditation in the classroom. Pre-test showed $M = 87.56$;percentile rank = 28.6 while post-test scores revealed $M = 92.68$; percentile rank = 33.6, $t(33) = 4.48$, $p < 0.05$.

The pre-test post-test experimental study suffered from several methodological limitations including the failure of researchers to establish a control group, to use researchers blind to the experimental objective to rate students' behavior, and to collect socioeconomic data, the study none-the-less reported that all of the students who responded to the open-ended question about what they liked about the meditation program reported positive feelings including feeling calm, quiet, relaxed and peaceful, while teachers as well as students reported significant improvement in academic and social outcomes.

Semple, Reid, Miller (2005) researched the effects of "Mindfulness Meditation" on the self-management of attention in children with trait anxiety. They focused their study on what he considered the primary aspect of mindfulness to redirect the attention to the awareness of the breath every time the meditator became aware that they no longer observed their breath. They explained mindfulness as a practice that emphasized the

observation of internal experiences without distortions from affective, cognitive or physiological reactivity to the experience of internal thought and emotions.

Three boys and two girls between the ages of seven and eight presenting anxiety symptoms and attending an elementary school in Harlem, New York participated in the study. The 6-week program consisted of one 45-minute weekly group school based intervention and some weekly homework practice. Semple et al (2005) collected pre-treatment data, four days prior to the initial intervention. Students practiced focusing their attention on the bodily sensations, and perceptions they experienced while performing simple sensory, breathing, visual, auditory, olfactory, and tactile exercises. The study included the use of the following items: snacks, music CD's, scents, herbs, and a variety of household objects in the above activity. The researchers emphasized the experiential rather than theoretical nature of meditation. Students practiced the technique at school and at home. The researchers instructed student to describe and label an experience rather than evaluate it by making a judgment. A three-minute breath awareness meditation began and ended each session, which also included writing your most pressing daily worry and symbolically throwing it away in wastepaper basket. Other exercises included becoming aware of sensations associated with everyday experiences like eating, walking, yoga etc. Students could opt out of any of the activities at any time.

After six weeks, four out of the five children expressed enthusiasm for the meditation program and wanted it to continue. Teachers reported improvement in academic achievement and a reduction in clinical manifestation of maladaptive externalizing and internalizing behaviors that interfere with classroom activity. The

researchers acknowledged several significant limitations of their study including the fact that teachers, who rated students' behavior and academic performance knew the expected outcome of the study and researchers did not administer rigorous academic and social performance assessments to measure these variables. In addition the small sample size and the lack of a control group also compromised the validity of generalizing the positive impact that meditation had on cognitive, affective and behavioral domains to larger student populations. In addition the facilitators of this program likely developed a positive relationship with the students given the small sample size, which impacted the subjective states of the subjects.

The studies in this section largely documented the impact of that specific forms of mindfulness had on a variety of children and youth. Most of the studies provided evidence that mindfulness improved affective outcomes and promoted behaviors conducive to greater engagement in subsequent activities. The research studies in this section identified mindfulness as a mechanism to interrupt the continuous repetition of counterproductive cognitive habits that promote affective and behavioral states in ways that promote engagement and participation in and outside of the classroom.

Cognitive Therapy, Mindfulness and Behavioral Outcomes in Children and Youth

What distinguishes the studies in this section from the others is that mindfulness here is embedded in a therapeutic structure that is facilitated by a trained therapist or mental health worker and includes therapeutic techniques that are distinct form traditional forms of meditations. Research on the impact that the practice of therapeutic listening, mindfulness and self–reflection had on educational outcomes, although limited in scope,

provides insight into possible ways behavioral change can occur in schools age children and youth. Apshce, Siv and Matteson (2005) documented that Mode Deactivation Therapy (MDT) that included "mindfulness' successfully reduced the acts of physical aggression in a 13-year old boy diagnosed with several severe psychological dysfunctions. Boozin and Stevens (2005) conducted a study on the effects of Mindfulness Based Stress Reduction (MBSR) therapy on sleep patterns, alcohol abuse patterns and relapse patterns after treatment and found no consistent patterns of improvement or amelioration in any of the outcomes. Birnbaum's (2005) identified a therapeutic model that included elements of meditation that allowed the subject to gain insight into the motivation behind certain patterns of interaction but fails to provide any evidence that supports its guiding question of whether mindfulness reduced acts of aggression in her client. Leoni (2006) also described a model of therapeutic intervention that included elements of mindfulness but failed to describe less any concrete outcomes for any of the subjects of her study Trupin, Stewart, Beach, and Boesky (2002) described the positive effects of DBT on incarcerated youth who suffered from mental illness. While Apsche and Bass (2005) compared three different therapeutic models and found that Mode Deactivation Therapy that included elements of mindfulness had the greatest impact on the reducing acts of physical and sexual aggression in youth incarcerated for these crimes and diagnosed with Axis I or II disorders. The study done by Nee and Farman (2007) revealed that DBT reduced the frequency and severity of incidents of self-harm in an incarcerated client with a history of emotional, physical and sexual abuse.

Apsche, Siv and Matteson (2005) case study observations' described improved

behavioral outcomes for a 13-year old adolescent who engaged in severe aggressive, self-injurious and impulsive behaviors. William experienced increased levels of self-control after participation in Mode Deactivation Therapy (MDT) compared to involvement in Dialectical Behavior Therapy (DBT). William diagnosed with Post-Traumatic Stress Disorder, Impulse Control Disorder, Reactive Attachment Disorder, Obsessive Compulsive Disorder and Personality Trait Disorder presented the following negative behavior patterns including: lying, social phobias, hoarding, aggressive and threatening behavior, property destruction, academic performance problems, school behavior problems, difficulties with peers, enuresis with purposeful urination on furniture and clothing, and sexually inappropriate behaviors. William received individual and group DBT therapy for 13 months in a residential treatment program but it did not effectively address problematic behaviors, build skills and enhance self-esteem. Therapists used MDT to identify and understand William's underlying fear and the subsequent development of avoidance behaviors and coping strategies.

MDT did not label the client's maladaptive modes but provided a methodology that collaboratively allowed the client and therapist to identify, address and validate the unbalanced dichotomous emotional beliefs or schemas that activate his negative behavior. Initially, he did not become aware of the physiological sensations associated with an anxiety producing events until it was too late to activate "cognitive controls" to prevent a dysfunctional reaction. The distinct element of mindfulness incorporated in this therapeutic model is the training of the client to become aware of how he feels from moment to moment including moments of heightened anxiety and emotional stress.

When William participated in DBT for 13 months he averaged 9.38 incidents of physical aggression compared to after 6 month in MDT when his acts of physical aggression averaged 1.67. While data suggested that incidents of physical aggression and self-harm decreased as a result of MDT, it remained unclear whether other variables influenced outcomes. The researchers collected DBT data for over a year, including Nov., Dec., and Jan., when self-harming behavior increased noticeable but data isn't available for analogous time period for MDT intervention. It is a common phenomenon that students coming from homes where physical neglect or emotional dysfunction is a constant often present more maladaptive behavior near school holidays. The different periods of data collection does not account for the influence of the holiday season on the clients' behavior. In addition William received 19 months of therapy in total and there could have been a delayed serial affect or natural maturity that wasn't sufficiently controlled for in the study. The absence of a control group, the variety of parts to each treatment model, the serial effect all serve to obscure the impact that mindfulness had on treatment outcomes and the relationship between and the effectiveness of different elements of the treatments. In addition the study stated that William did not become aware of the physiological sensations associated with an anxiety producing events until it was too late to activate "cognitive controls" to prevent a dysfunctional reaction, since the study does not define nor explain what "cognitive control" means it is difficult to determine if it is consistent with different definitions of meditation or whether the mindfulness aspect only includes the observation of physiological sensations.

Boozin and Stevens (2005) conducted a study on the effects of Mindfulness

Based Stress Reduction (MBSR) therapy on sleep patterns, alcohol abuse patterns and relapse patterns after treatment. The researchers recruited 55 mostly Caucasian male adolescents who complained of either daytime sleepiness or sleep disturbance and had recently completed outpatient substance abuse treatment programs. Drug and alcohol abuse can be seen as a means to self-medicate for moods disorders or dysfunctional sleeping patterns. Approximately 42% (n = 23) of the original participants (n = 55) completed the program by attending at least four of the six therapy sessions that included elements of cognitive restructuring where participants identified misconceptions, unrealistic expectations, diminished sense of self-control, and erroneous beliefs about sleep and sleep promotion practices. In addition, MBSR helped reduce the incidence of stress related disorders such as worrying or rumination. The treatment program included components like stimulus-control instruction (SCI) that reduced cues associated with arousal and sleep, it used bright light to change circadian rhythms, and it promoted habits associated with successful sleep routines and environments.

The adolescents kept daily sleep journals, wore acti-watches to measure body movements, completed the GAINS substance abuse checklist, the Penn State Worry Questionnaire (Worry), the Epwoth Sleepiness Scale (ESS) at baseline and periods throughout the 12 month study while researchers assessed them for dim light melatonin onset that provides biological measures of sleep phase activity (DLMO).

Although researchers recruited participants near the end of their substance abuse treatment program, completers had a significantly higher substance problem index (SPI, $p < 0.02$, a score of 4.0 indicated substance dependence) and more days of drug use ($p <$

0.10) than non-completers. Completers did not exhibit significant differences in test scores, their General Mental Health Distress Index (GMHI) at baseline averaged 11.5 which indicated acute mental distress, Worry scores indicated moderate levels of worry and ESS scores suggested moderate levels of daytime sleepiness wile 27.3% of participants exhibited excessive levels of sleepiness during the daytime. Interestingly completers slept almost an hour less then non-completers but both groups experienced long delays in sleep onset, frequent periodic brief sleep awakenings and poor sleep efficiency defined as the percentage of time the participants slept while they were in bed. The study revealed significant improvement for all participants including non-completers in sleep efficiency ($p < 0.001$), sleep onset latency ($p < 0.01$), number of awakenings ($p < 0.001$), total sleep time ($p < 0.05$), self-ratings on the quality of sleep ($p < 0.001$) and soundness of sleep ($p < 0.01$). Significant improvement ($p < 0.05$) occurred in terms of reduction of daytime sleepiness, worry, and mental health distress but did not improve significantly compared to non-completers. Completers reported twice the number of days of drug use during the 30-day intervention program than non-completers. In addition drug use increased for both completers and non-completers during the treatment interventions but at the 12 month follow up SPI scores of completers seem to suggest a decrease of their drug abuse problem at this time.

The study suffered from a lack of randomized control group but interestingly enough the study did not report improvement of completers compared to non-completers on almost all variables except for preliminary findings that their drug abuse may decrease in the 12-month follow-up period. The study suffered from several major weakness,

researchers manipulated many variables unrelated to meditation conditions, included cognitive therapy that influenced affective states and subsequent behavior of the completers. The researchers need to control for confounding variables so it is possible to assess the link between mindfulness and substance abuse patterns. The researchers linked the treatment program to better sleep outcomes, which improved for all participants overtime, non-completers included, and then linked better sleep outcomes to the decreased use of drug abuse. In addition the researchers did not adequately define the structure or content of the MBSR program but rather described the results expected, like a reduction in stress related disorders. The researchers encountered significant problems in regards to motivation, commitment and compliance of the participant population so the numbers of non-completers are unacceptably high and render unreliable results especially since non-completers improved to the same extent as completers in most domains.

Birnbaum's (2005) case study documented the effect of practicing "mindfulness meditation" which in this case referred to the constant non-judgmental noting of one's bodily sensations as well as any thoughts and feelings (p. 483). Julia initially learned the meditation technique within a group mindfulness meditation workshop but due to her strong emotional reaction in the first session, the facilitator later provided private instruction. Julia revealed that she had strong feelings of resentment and anger toward her mother who had abandoned her, her depressed father and younger brother, when she was 13 to emigrate to the U.S. with her lover. Julia paid close attention to her 'inner voice' while meditating and reported out her revelations to the facilitator after each session. As part of the intervention, she used affirmations, practiced meditation daily, wrote a daily

letter to her mother in her journal expressing her true thoughts and feelings and participated in a dialogue with the facilitator/therapist at the beginning and end of each session. She set goals before each meditation sessions and discussed the revelations she had during the session afterwards with the therapist. Julia observed the feelings, thoughts and the sensations she experienced while meditating and attached some kind of meaning to these observations.

During her 5th and final session she said, “I became aware of how I used to explain difficulties in my life in terms of my relationship with my mother, she realized that she now had to explain success and failure in terms of “herself”(p.485). The therapeutic model that included “mindfulness” taught her to seek meaning and relevance from the thoughts emerging during each session. She identified the significance behind every mental, emotional and physical occurrence rather than simply accepting things at face value. According to Birnbaum (2005) after the patient accepted the contents of the thoughts, feelings and sensations as valid, the therapist asked questions designed to illicit the meaning behind them (p.485) The therapist told her “that significant encounters with people are not accidental but hold meaning, purpose, and potential lessons at a given time in life for the individual involved- what would your lesson be?” The different thoughts, feelings and sensations are then linked to relevant key therapeutic issues and are used to help clients express conflicts or attach meaning to them (Birnbaum, 2005, p. 485).

She postulated that an individual with a low level of self-autonomy, may use external or internal forms of aggression to differentiate from overprotective or controlling parents as a way to fulfill emotional needs and gain autonomy. Rosen (1994) found that

some adolescents responded to emotional situations by slamming doors, throwing things, and becoming enraged (1994, p.222-236). Violence may serve as a distance regulating mechanism, creating a "safe' distance and a temporary sense of individuality (Rosen, 1994, p.222-236). Studies conducted on school age children demonstrated a close relationship between low levels of differentiation with parental figures and violent and destructive behaviors including out of control behavior, alcohol and drug dependence, lower academic achievement and higher rates of truancy [16,17,18].

Meditation coupled with a distinct awareness of the messages of an 'inner voice' fostered awareness of the meditator's needs for individuality. Birnbaum (2005) argued that the insights gained through these facilitated therapeutic/ meditative sessions expanded the way in which participants view themselves (p. 486).

Unfortunately this study fails to support its guiding framework that "Mindfulness Meditation" will reduce aggression in adolescents because it fosters differentiation and individuation of the self. The study does not document the age of Susan but she is at least 20 and is no longer an adolescent. In addition other then saying that she had a strong emotional reaction after the first intervention, it did not describe it nor identify if she is aggressive and how that behavior changed as a result of intervention. Curiously, the study identified violent and reactive behaviors as and attempt to create autonomy within symbiotic relationships with "mother' figures, but the mother of Susan abandoned her at the age of thirteen and the study does not identify her as having had such a symbiotic relationship.

At one point in the study the participant non-judgmentally observed the thoughts

and sensations she experienced during the session but later allowed her inner voice to attach a particular therapeutic meaning to what she thought or experienced in the session. The former technique is consistent with meditation while the later is consistent with some forms of therapeutic intervention but compromised the initial non-judgmental observation of her experience. The intervention initially included standard elements of meditations but later it encouraged a meaning-making element that contradicts many forms of meditation. The change that occurred in the participant's self-concept may not be a result of the meditation practice but rather the therapeutic relationship and intervention. Future studies can explore whether meditation alone can promote individuation in participants who find it difficult to differentiate from others. Although the findings that meditation may promote changes in self-perception are believable because it interrupts the automatic processing of events and experiences, the study relies more on therapeutic intervention than meditation to meet these objectives.

The model of intervention used in this study is not well suited for a classroom because it involves significant attention by an experienced facilitator. While "Mindfulness Meditation" can be applied in a classroom setting if students non-judgmentally observe the arising of their thoughts, feelings and bodily sensations.

In the case study documented by Leoni (2006) in ' Communicating Quietly: Supporting Personal Growth with Meditation and Listening in Schools'. Leoni used meditation in a number of ways. Firstly, she used it herself before the interviews, group projects and lessons to become aware of the quality of her own thoughts, feelings and sensations. Leoni (2006) used meditation to interrupt biased thoughts and reflections

from dominating her expectations of and reactions to her students. She was able to admit to herself, her emotions were her responsibility. For example “rather than thinking he made me angry’, I would be able to own that ‘I feel angry’. Meditation allowed Leoni (2006) to separate her feelings from her need to act on them. When painful or dissonant thoughts or feelings arose she noticed them but let them pass and returned to the observation of her breath (Leoni, 2006,p.123).

Leoni (2006) used active listening skills and Carl Rogers’ three core conditions while conducting her interviews with clients. She had Unconditional Positive Regard’ (UPR) for her patients, defined as ‘acceptance and caring for an individual as a separate person with permission to have his or her own feelings and experiences’ (Rogers,1961,p.283). She tried to accept the person just as they are; even if she disliked their behavior or an attitude they held. The second core condition is the ability to be ‘empathetic’ or to put oneself in another’s shoes (Rogers, 1961) She modeled, used and encouraged active listening techniques in the individual and group check session to formalize a patterns that allowed students to share while others listened attentively and raised their hand to offer comments, questions and suggestions.

Leoni (2006) worked with adolescents that all had been suspended from school for inappropriate behavior. At one time in their life, they all had experienced a loss, or threat of loss of some of their basic needs for safety, belonging or identity. (Maslow, 1954) The subjects past experience of neglect and/or abuse created emotional dysregulation and activation of a dysfunctional orienting schema based on the perception of threat associated with past abuse. The dysfunctional “mode” is associated with a

particular conglomerate of beliefs, emotions, motivation, and behavioral pattern that is activated in situations perceived as stressful. (Apsche, 2004). The activation of these modes are typically characterized by high levels of anxiety, fear, irrational thoughts and feelings, and anti-social or dysfunctional behaviors used to adapt, counter and survive the perceived threat or danger.

Leoni (2006) interviewed suspended students (n = 95) in grades 7-11, 70% (n = 67) agreed to be interviewed for the first phase, 21% (n = 14) of those interviewed were girls, 1.5% (n = 1) of those interviewed were either of mixed race or 1.5% (n = 1) Asian, 9% (n = 6) of the students received special educational support services. Eight of the boys attended an anger management group led by a trained psychotherapist.

Mindfulness offered pupils a break from dealing with external information and demands and gave them the time to observe and reflect on their inner affective state while therapeutic listening gave students a structure to listen to the thoughts, feelings and experiences of others. Students found meditation to be a calming and useful technique for diffusing intense emotional experiences

Leoni (2006) described how she benefited from the practice of mindfulness, as teacher and researcher in the following ways. “I was able to reduce and manage my stress, to gain awareness of my own emotions and physical needs and to address them so as not to project or transfer them onto the students. This meant that I was more able to listen and accept the young people’s behavior without judgment and could work toward s problem solving and resolution rather than conflict”.

Students commented that the meditation and therapeutic listening sessions

provided them with skills and an opportunity to share their thoughts and feelings, get to know others, make connections with others based on their sharing of experiences, learn how to listen to the hurt of others, understand how another person is feeling, get things of their chest, all of which contributed to their understanding of themselves and others.

She documented the experience of Kirk who had been suspended for letting the air out of a teacher's tires after he found out he hadn't been accepted to participate in the school's talent show. As a small child Kirk had witnessed violence between his parents, he later opted to live with his father who was wrongly convicted and imprisoned for the assault. He had never spoken about these events before but frequently felt consumed by anger. On one occasion when the students visualized the in-coming breath as blue and calming and the outgoing breath as red, tense and angry, Kirk imagined "the devil coming out of him with the out-breath and felt cleaner and more hopeful with the in breath." Other students' similar "brutal" experiences during meditation surprised but reassured him. He shared how scared and angry he had been at the time of the stabbing of his father. By participating in the group, he realized that other people lived through intense suffering too, he learned ways to calm himself down and felt that he got angry less often.

Although therapeutic listening and meditation as described by Leoni seemed to beneficially affect her students, the study itself suffers from some major weaknesses. limiting its usefulness as a guideline for intervention. The commingling of meditation and therapeutic techniques blur the causal relationships to such an extent that further research needs to clearly identify dependent and independent variables and provide control groups to measure differential rates of performance. She initially described meditation as the

observation of the breath, thoughts and sensations but by the end of her report, she described students visualizing the in-coming breath as blue and calm while the out going breath is visualized as red, angry and tense. Identification of the meditation principles used can help clarify the variables involved in her research and how they affected outcomes. Although her research suggested that students became calmer as a result of the group intervention she didn't answer the question of whether it affected underachievement and suspension rates of students who participated in it. Again the quality of reporting is imprecise, vague and limited to only a few examples that can't easily be generalized to other populations for which different variables are also evident. She also failed to present any data to support her claims, so the research results reflected the design of a single case study, where the instrument of observation, the therapist is biased towards a specific outcome. Despite the shortcomings in the research itself a technique that encourages self-reflection, empathy and respect for all participants is likely to support positive results in the client population.

Trupin, Stewart, Beach and Boesksy (2002) researched the behavioral effects of Dialectical Behavior Therapy (DBT) on a demographically similar population of incarcerated female adolescent offenders in at a Juvenile Rehabilitation facility in the state if Washington. Researchers used DBT with subjects from the Mental Health Cottage (MHC, $N = 22$), the General Population Cottage ($N = 23$) and a control group from the General Population ($N = 15$). Researchers determined the DSM-IV psychiatric diagnosis and levels of functional impairment of the subjects using the Diagnostic Interview Schedule for Children and the Child and Adolescent Functional Assessment Scale

(CAFAS). In addition a daily log, which reported behavioral incidents like school suspension, aggressive behavior, suicide attempts, and inappropriate classroom behavior highlighted the on-going behavior of the subjects. Records of the subjects confined to the mental health unit revealed that these subjects suffered greater mood disturbances ($\chi 2$ = 7.78, p = 0.007),self-harmful actions and ideations ($\chi 2$ = 3.80,p = 0.05) and thought disturbances ($\chi 2$ = 5,72,p = 0.017) than subjects in the general population, but subjects from the general population had a greater propensity toward Anxiety Disorders and Substance Use Disorders than their peers. Adolescent in the MHC exhibited significant reduction in behavior problems during the 10 month study ($R2$ = .55, p = 0.01) while youth on the GPCD did not demonstrate a significant reduction in behavior problems ($R2$ = .02, p = 0.77). Although rates of behavioral problems during the DBT study and the analogous period the previous year did not differ significantly (β = 0.03, T = 1.13, p = 0.27), the staff significantly reduced the use of punitive actions against youth in the MHC during the DBT study, compared to the same 10 month period the previous year (β =-0.03, T =- 2.222, p = 0.27).

Participants from the MHC experienced a significant reduction in behavioral problems and affective disorders during the time of the DBT study compared to the other cottages because they start with higher rates of severe behavior, mood and thought disorders than the general population who transfer to the MHC if they exhibit similar tendencies. However, evidence suggested that a reduction in these problems in the MHC did not occur compared to the same 10-month period the previous year. The researchers suggested that the constant influx of youth diagnosed with mood and behavioral problems

accounts for this statistical piece. The researchers failed to establish a control group of inmates presenting similar affective and behavioral characteristics to the MHC participants, so the impact of the treatment could not be adequately assessed and evaluated by the researchers. Interestingly the DBT therapy did not affect moods and behavior outcomes for offenders who did not present severe emotional and behavioral dysfunction, although it could be argued that adolescents sentenced to incarceration have necessarily exhibited severe maladaptive behaviors to be involved with the criminal justice system.

The noteworthy statistical piece is that staff trained to be "mindful" significantly reduced the use of punitive action for inappropriate behavior consistent with previous research. Although the study did not account for the change in the staff's behavior in any way, the previous study revealed that Leoni (2006) used meditation to increase her level of awareness of her own biased thought patterns, expectations and behaviors and interrupt behavior predicated on those actions. What effect the reduction of punitive actions has on incarcerated individuals would be worthwhile noting since it most likely would single a reduction of stress for those individuals and may impact subsequent outcomes.

Apsche and Bass (2005) investigated the comparative advantage of three different therapeutic treatment models on behavioral outcomes of demographically similar male adolescents (N = 60, Average age ranging from 14.5-16.5) diagnosed with conduct disorders and/or personality dysfunctions, currently involved in the criminal justice system because of the commitment of crimes involving aggression and sexual violence

and determined that Mode Deactivation Therapy (MDT), an advanced form of cognitive behavior therapy, that unlike Cognitive Behavior Therapy (CBT) doesn't directly challenge the irrationality of an individuals orienting schema but validates the unique "truth" of the youth, resulted in significant reduction of sexual aggression for these youths in the course of a year long treatment program.

Due to the prevalence of conduct disorder, in the general adolescent male population (6% to 16%), and among incarcerated adolescents (81%-91%), characterized by the display of aggression, bullying, violence, intimidation, delinquency, rule violation, recklessness, property destruction, disregard and lack of empathy for others, substance abuse, sexual abuse and other antisocial behaviors (Kazdin and Weisz, 2003), teachers often face significant challenges the classroom. The researchers defined two types of conduct disorder: 1) Reactive aggression where individuals show extremely strong emotional responses to perceived threats and react excessively and 2) Proactive aggressive where youth initiate violence to accomplish an objective or goal.

Researchers assigned the aggressive or sexually aggressive incarcerated adolescents diagnosed with one of the following Axis I or II disorders; Conduct Disorder, Oppositional Defiant Disorder, Post Traumatic Stress Disorder, Major Depressive Disorder, Mixed Personality Disorder, Borderline Personality Disorder, Narcissistic or Avoidant Personality Traits, Dependent Personality into one of the following three treatment conditions, I) Cognitive Behavior Therapy (CBT, $N = 19$) directed youth to observe negative thought patterns, sexual offense patterns and beliefs, aggressive response patterns and beliefs while taking responsibility for their mental health

maintenance including substance abuse issues. 2) Mode Deactivation Therapy (MDT, *N*=21) and 3) Social Skills Training (SST, *N*=20) which promoted identification, practice, role-playing and reinforcement of appropriate behaviors.

The MDT condition incorporated "mindfulness exercises" specifically designed to promote awareness or self-monitoring of feelings and emotions in the adolescent observer which parallels some "Mindfulness Meditation" techniques that actively encourage the notation of thoughts, feelings and memories but which contradicts more traditional meditation techniques that do not draw attention to the content of the thoughts but encourage practitioners to regard them as distractions to the observation of a particular object of attention like the natural breath or the repetition of a phrase. MDT included the unconditional validation of an individual's core beliefs as legitimate expression of their life's experience regardless of how irrational they may be, while CBT explicitly labeled and challenged these dysfunctional beliefs and schemas.

Documentation of acts of physical and sexual aggression at baseline and post-intervention consisted of reports in the Daily Behavior Report and Behavior Incident Report for the first 60 days following admission while post-treatment measures included incident rates for the 60 days prior to discharge, these measures had an inter-rater reliability at the 98% level. The Child Behavior Checklist (CBCL) measured three categories of behaviors: 1) internalizing behaviors like withdrawn behaviors, somatic complaints, anxiety and depression, 2) externalizing behavior like delinquent and aggressive behavior and 3) both internalizing and externalizing behaviors in 11 to 16 year olds. Researchers detected lower scores on all measures for participants in the MDT

condition (one standard deviation below CBT). While the Devereux Scales of Mental Disorders (DSMD) describe functional levels in comparison to a normal group and MDT again exhibited better scores on all measures compared to CBT.

The study revealed that although all treatment programs had a positive effect on reducing physical and sexual aggression, the evidence confirmed that a significant difference existed between the effectiveness of different modalities. An ANCOVA conducted at post-treatment revealed that physical ($F(2,56) = 8.32, p < 0.01$) and sexual aggression($F(2,56) = 10.02, p < 0.01$) were significantly affected by the type of treatment modality used. MDT reduced rates by 80.7%, CBT by 72.6% and SST by 68.8%. Only MDT (T=2.21, $df = 39, p = 0.01$) exhibited statistical significance in reducing sexual aggression post-treatment compared to CBT and SST, which were not statistically significant from each other.

Although it seemed that MDT was better suited to treat sexually aggressive individuals than CBT, these results may only be experienced in intensive long-term residential treatment program with severely dysfunctional adolescents that have been institutionalized for their crimes. The usefulness of including this therapeutic model in a classroom setting despite the presence of adolescents in the classroom presenting behaviors consistent with conduct disorder is limited and compromised by the time and experience needed to adequately train and implement this therapeutic model. Even within the study it was difficult to control the competence levels of participating therapists and their adherence to the model applied in each condition. In addition MDT or CBT bare limited resemblance to traditional meditation other than encouraging elements of self-

reflection and/or awareness among adolescent participants. MDT significantly affected the reduction of sexually aggressive behavior in adolescents that is beyond the scope of ordinary classroom management practices. What is interesting to note is the key feature that distinguishes MDT from CBT is that the therapist does not challenge or attempt to alter the maladaptive behavior or schema which may resemble aspects of more traditional forms of meditation where teachers may offer instruction and guidance but do not evaluate the content of a students thoughts or challenge their orienting schemas.

Nee and Farman (2007) documented the effectiveness of Dialectical Behavior Therepy that used "Mindfulness" (DBT) in a one hour weekly individual therapy session and a two hour group skills training session on Ms. B, aged nineteen, who met the criteria for Borderline Personality Disorder (BPD) using the SCID-II diagnosis while being incarcerated in a high-security prison for attempted murder. The researchers assessed the participant using a battery of 10 psychometric at pre-DBT, mid-DBT, post-DBT and six month after the final intervention.

Ms B. suffered emotional, physical and sexual from a young age, experienced problematic foster care placements, bullying at school, violent intimate adolescent relationships, exhibited self-harming behaviors, substance misuse, visual and auditory hallucinations, and disassociate experiences linked to anger control issues. In stage one researchers tried to decrease her para-suicidal behavior, dependence on intoxicants/medication, and lack of self–esteem and self-worth by using DBT to foster awareness and understanding of the her present emotional dysregulation; Stage two focused on Ms B. acknowledging her self-destructive behavior and increasing her ability

to manage emotional states in more productive ways. Ms. B learned "PLEASE MASTER" skills, Wise Mind skills, distress tolerance skills, interpersonal effectiveness skills, and core mindfulness skills while DBT helped her see her reliance on dysfunctional relationships, avoid these types of relationships, develop self-worth and more positive self-perceptions, thus decreasing the need for external validation or medication.

Data revealed that Ms B. had 23 incidents of self-harm in the six month prior to intervention, 21 incidents during the initial six month of DBT training, 12 incidents during the six month follow-up period; in addition to the reduced frequency of incidents the severity of the incidents also decreased to the point that incidents formerly characterized by self-cutting tended to include only scratching behaviors. She made significant progress on psychometric scales and behavioral measures after one year of treatment, she successfully completed a drug treatment program, had no further criminal sentencing, became a peer mentor, participated in a domestic violence prevention course and became a representative of the prison on several public occasions.

The study failed to reveal some significant details of her incarceration, for example at what point during her sentence did therapy begin and it seemed that by the end of the study she no longer was serving a sentence which could have impacted emotional and behavioral outcomes. In addition while the study made an extensive list of the skills employed in the course of treatment, it did not describe the skill in detail but rather described its intended effect on the individual, clarification of the technique would help to illuminate a direct causal link between intervention and behavior and would

eliminate the possibility that maturity of the client fostered the improvement in affective and behavioral outcomes. The study failed to control for many variables and draw links between confounding variables to the point that the study does little to support the argument that mindfulness helps reduce destructive thoughts and tendencies in dysfunctional individuals. Also the critical role of the therapeutic relationship inhibits the introduction of this therapeutic technique into a classroom environment.

Although the studies in this section differ significantly from traditional forms of meditation, they none- the-less include elements of 'mindfulness' and given the paucity of studies done on school age populations are included to illustrate the potential impact that mindfulness has on emotional and behavioral outcomes. The studies consistently suffered from a lack of transparency when describing the therapeutic technique, which contributed to a lack of clarity about the impact of mindfulness in this setting in contrast to the other therapeutic elements used.

Meditation, Meta-Cognition and Behavioral Outcomes in Adults

Although this section deals with adult populations, it is important to consider the implications that this research may have on the school environment as a whole, which includes students, teachers, families, communities and administrators of education. Easterlin and Cardena (1999) found that perceptions of high stress in meditators and controls produced significantly lower levels of acceptance and positive affect scores, but scores fell more steeply for more inexperienced meditators indicating that meditation improved acceptance of dissonant or painful events for meditators with longer term meditation experience. Lillis and Hayes (2007) provided evidence that meditation

affected the way an individual responds to the automatic judgment associated with prejudice and racism. While Bowen, Witkiewitz, Dilworth and Marlatt (2007) documented how meditation affected an individuals ability to abstain form addictive behavior despite the experience of thoughts and feelings associated with alcohol craving and addiction. Finally, Chin- Yen Lin, Tsung-Hsien Kuo, Yen-Ku Kuo, Yen-Lin Kuo, Li-An Ho and Chien-Ting Lin (2007) investigated the impact that differential lengths of Zen meditation on student perception of motivation, learning and the quality of the classroom climate.

Easterlin and Cardena (1999) gathered quantitative data on the cognitive and emotional difference between 24 Vipassana meditators who had attended three or more 10 day courses and maintained a daily practice for at least three years and compared results to a group of 19 shorter-term Vipassana meditators without this level of experience and found that the more adept meditators reported significantly greater levels of self-awareness, acceptance and more positive affect scores. The researcher gave the mostly Caucasion subjects (n = 40) who ranged from twenty four years to sixty four years of age (M=39.8, SD=9.26), and identified as either Buddhist (n = 17), Jewish (n = 5), Catholic (n = 2), Moslem (n = 1), Protestant (n = 1) or no religious affiliation (n = 9), a pager that went off at random time intervals between the hours of 8:00am and 8:00pm, at which time the subjects filled out a specially designed three minute Experience Sampling Form (ESF) that recorded their thoughts, feelings, perceived levels of stress and current activities.

Researchers conducted two MANOVA's 2 (beginning vs. advanced) x 2 (high vs. low stress) on 546 EFS ($r > 0.7$) questionnaires (minimum of 13 EFS from each participant) with a significance level of $p < 0.01$. There were no significant differences in neuroticism between the two groups ($p < 0.01$) but there was a trend for higher trait anxiety among the less experienced meditators. The State Trait Anxiety Index form B (STAI-B) with more than adequate validity and reliability scores measured means of 34.7 for beginner, who still had an average of one year experience and 29.1 for more adept meditators with at least three years of meditation experience. Although perceptions of high stress in either group produced significantly lower levels of acceptance and positive affect scores, scores fell more steeply for beginners ($F(1,540)=21.99, p =$ < or equal to 0.0001) indicating that meditation improved acceptance of dissonant or painful events for meditators with longer term experience.

Interestingly even the beginning meditators had almost a year of experience practicing Vipassana meditation, which probably influenced the formation or augmentation of character traits of acceptance and ability to maintain more positive affective states when experiencing situations of higher stress than non-meditators. Establishing two additional control groups, one that had no prior meditation experience but learned the technique at the on-set of the study and one that expressed interest but did not learn the meditation technique but rested during the intervention period could have enhanced the validity of the results that meditation produces a character trait of greater acceptance of stressful or dissonant events. In addition the main questionnaire featured self-reporting of subjective states, which failed to control for the possible expectation and

subsequent perception that meditation helped practitioners to remain balanced and calm in adverse situations.

In another study Lillis and Hayes (2007) examined "Mindfulness Meditation's" impact on the reduction of racial and ethnic prejudice amongst two classes of undergraduate psychology course students. Volunteers participated in either an Acceptance and Commitment Therapy (ACT) intervention or attended lectures drawn from a textbook on the psychology of racial difference used in the undergraduate course. Previous research found the effectiveness of educational strategies emphasizing the negative moral aspect of prejudice and attempting to change erroneous beliefs and negative behaviors are limited to individuals who already are low in terms of racial and ethnic biases The study looked at how ACT impacted students' relationship to their thoughts and feelings rather than changing the content of those ingrained biases. Thirty–two students from two undergraduate classes of the Psychology of Racial Difference, who ranged in age form 20-37 years old and came from a variety of different ethnic backgrounds including 3 African American students, 3 Latino students, 5 Asian American Students and 21 Caucasian students completed an 11-item assessment specifically designed to measure prejudicial awareness, thought acceptance and flexible actions on five different occasions.1) prior to the non-random assignment to an initial intervention (A), 2) after the first intervention (B or C), 3) four days later and prior to the second intervention (A), 4) after the second intervention (B or C) 5) and at a one week follow-up (A) . Lillis, a skilled ACT therapist, administered the ACT intervention program but did not reveal the hypothesis or identify the strategy to the students. The experimental design

followed a well-known time series design to control for order. The ACT intervention used experimental exercises to help students identify prejudicial thoughts, feelings and behavior; to accept those experiences as a natural part of learning within a racist society; to become aware of the automatic processes of evaluation and judgment as they occur and to evaluate whether ones actions are consistent with their values about how to treat others. While the lecture specifically addressed common stereotypes and group strengths of African Americans, Asian Americans and Latinos while identifying the importance of recognizing and addressing one's biases, accepting different worldviews and recognizing uniqueness of individuals.

The study revealed that the process variable of acceptance and flexibility deserved further attention because unlike the other variables it displayed a consistency across orders of presentation and time periods. Standard mediational analysis regressed for ACT vs Education on pre to follow-up change in scores in positive action intention produced significance (β =-.43, z =- 3.73, $p < 0.001$) and accounted for 18.4% variance. The researchers maintained that an individuals increased awareness of their thoughts, coupled with the recognition of the on-going process of evaluation and judgment that occurs in relationship to these thoughts while simultaneously not directly giving attention to the content of those thoughts allowed individuals to increase the flexibility of their behaviors.

Two variables, acknowledgement of bias ($r = .32$, $p = 0.009$) and general defusion ($r = .56$, $p < 0.001$) correlated most significantly with positive behavior post-intervention. While the Education class seemed to include features also presented in the ACT class and rendered them somewhat indistinct. Students in the ACT intervention completed

sentences that allowed them to recognize automatic unproductive cognitive habits and allowed them to experience how difficult it is to change the ways they think and behave in various situations despite actively seeking to change these maladaptive patterns.

The study suffered from non-random quality of subject assignment, the small sample size and a lack of control for pre-existing character traits of college students taking a course on the psychology of racial difference that may have impacted the effect the intervention had on them. Since the students in this study are ethnically diverse, biographical information including the participants past experience with cross-cultural challenges could have added depth to study outcomes. The research seemed only to identify areas of worthy of future research rather than present any definitive results. The acknowledgement of bias and general diffusion had an impact on subsequent behavior intentions and that acceptance and flexibility deserved further attention but it did not define these in relationship to prejudice. The question remains whether therapeutic interventions that allow individuals to observe maladaptive or dysfunctional thought patterns are sufficient to alter behavior predicated on those negative thought patterns or to alter the automatic processing of incoming information in terms of their established cognitive biases.

Bowen, Witkiewitz, Dilworth and Marlatt (2007) gathered evidence that that inmates in a minimum security jail who practiced 8-10 hours of mindfulness training daily over a 10 day period reported they had greater acceptance, non-judgment and non-reaction to their thoughts, feelings and sensations despite the continued intrusion of unwanted thoughts, cravings, and feelings. Apparently the frequency of unwanted

thoughts may not be as significant as the manner in which individuals respond to those thoughts, feelings and cravings. Through on-going meditation practice the inmates developed new patterns of non-reaction to the content, feelings and sensation of associated with craving alcohol. Those who successfully completed the course had a decrease in the quantity and frequency of alcohol use following the meditation course while they didn't experience any significant decrease in intrusive thoughts but did react to them differently then the control group.

Meditators ($N = 57$) learned how to focus on the observation of their breath and/or body sensations, while trying to accept and not react to the content of their thoughts, feelings and sensations. Throughout the course the participants refrained from reading, writing or speaking except for asking questions to the instructor.

The 173 (Control, $N = 116$) participants in the study completed both pre and post-course assessments and follow-up assessments at 3 and 6 months intervals, after they had been released from prison. Participants ranged in age from 19-58, with a mean age of 37.4 (SD=8.6). 79% of the participants were male, 21% female. Sixty percent identified as Caucasian, 13% as African American, 8% Latino/a, 8% American Indian, and 1-2% as either Pacific Islander, Alaskan Native, Asian American or other. The control and experimental groups were equivalent on all demographic characteristics.

Several previous studies suggested that thought suppression often results in an increase, rather than a decrease in unwanted thoughts and behavior (Wegner, 1997; Wegner, Schneider, Carter, & White, 1987). Research on additive behaviors documented that thought suppression actually is counterproductive in regards to refraining from

smoking and heavy social drinking. Suppressing alcohol-related thoughts and urges increased rather than decreased alcohol consumption after cue exposure when compared to controls.

Contrary to thought suppression strategies, mindfulness meditation seeks to develop an individual's ability to accept, refrain from judging and reacting to thoughts, feelings and sensations experienced while meditating. Individuals who participated in the 10-day Vipassana meditation course reported greater decreases in their attempts to avoid unwanted thoughts than individuals who did not take the course.

The researchers administered the White Bear Suppression Inventory (WBSI) to measure the extent to which participants suppressed unwanted thoughts related to addiction. While they assessed the frequency and peak weeks of alcohol using the Daily Drinking Questionnaire (DDQ) and documented alcohol related negative consequences using the Short Inventory of Problems (SIP).

At the three months follow-up period participants (n = 81) completed an assessment to determine if the Vipassana course affected subsequent thought suppression subscales which in turn mediated the relationship between pre-treatment drinking variables (total drinks per week and average SIP scores) and drinking variables at the three month follow-up assessment. For Avoidance subscale, partial mediation was supported. For the intrusion subscale, the first two analysis,, both necessary for mediation, resulted in non-significant regression weights (WBSI-intrusion on treatment condition (β = -.10, p = 38) and drinking outcomes on WBSI-intrusion (drinks: β =.20, p = .07; SIP: β = .17, p = .07).

Meditators reported a greater decrease in their attempt to suppress unwanted thoughts than controls. This decrease in thought suppressing behavior partially mediated the relationship between meditation and alcohol consumption after being released from jail for three months.

Meditators didn't try to suppress unwanted thoughts, feelings etc. but attempted to remain neutral and non-reactive to the content of their thoughts. In fact previous research indicated that the suppression of alcohol related thoughts actually increased consumption upon subsequent exposure to it. The WBSI revealed that Thought Avoidance and Intrusive Thoughts scores remained similar between pre and post-intervention for both meditators and controls. Meditators and controls decreased their consumption of alcohol, but the meditators cut their consumption to a much greater extent than non-meditators (Control, baseline drinks = 43.98, follow-up = 27.77; meditators, baseline drinks=64.83,follow-up=8.38). This study revealed that although the subjects still had thoughts about and craving for alcohol, the meditators refrained from the consumption of alcohol to a greater extent than controls

The attrition rate of participants in this study was 47% at 3 month and although it is not uncommonly high for this population, it does compromise the value of the conclusions drawn from the data. In addition it remains unclear if the meditators continued to practice subsequent to their release from prison or did they simply participate in one ten day course. It seems likely, that if after the initial training course, meditators continued to practice, better results, in terms of avoiding intoxicants, could be expected. Future studies need to control for and document the relationship between on-

going practice and intoxicant consumption. Alcohol and drug consumption can be quite a problem even for relatively young children, so regardless of the mechanism in which meditation decreases intoxicant use, the fact that there is a decrease remains significant.

Chin- Yen Lin, Tsung-Hsien Kuo, Yen-Ku Kuo, Yen-Lin Kuo, Li-An Ho and Chien-Ting Lin (2007) investigated the impact that differential lengths of Zen meditation experience ranging from less than one year to greater than ten years had on the learning motivation of working adult learners (N=450), their learning outcomes and the psycho-social classroom climate and determined that length of meditation history did not correlate with a linear ordered response for all learning categories. The subjects drawn from meditation classes held in the two largest cities of Tawain, included students from a variety of backgrounds who completed a questionnaire using a five point likert scale to evaluate the quality of their experiences. The students rated their motivation, the learning outcomes and the classroom climate within the meditation class and their everyday lives.

Cronbach α values for all categories within the questionnaire measured between 0.89 and 0.94 which established satisfactory internal consistency and reliability for the variables measured, well above the accepted value of 0.7. A one-way ANOVA and post–hoc analysis of the length of meditation experience revealed a non-linear ordered response of students perception of motivation, learning outcomes and classroom climate. While the most experienced meditators with ten plus years of experience did perceive better student cohesiveness, individuation, involvement and master support than their less experienced peers, it did not follow that students with 7-10 years of experience perceived the next best results. Rather it seemed that the order followed a more or less consistent

pattern of 1) >10 years, 2) 1-3 years, 3) 4-6 years, 4) 7-10 years and 5) <1 for the perception of student cohesion, interpersonal relationships and individuation and 1) 1-3 years 2)>10 years, 3) 4-6 years, 4) 7-10 years and 5) < 1 year for learning outcomes and self-management of emotions.

These results suggested that after some experience meditating (1-3 years) students experienced substantial improvement in their affective states and attitude to work related and everyday life matters, therefore students had greater motivation to learn and practice meditation. While very experienced meditators (>10 years) had similar expectations of benefit derived from maintaining a meditation practice. However since intermediate learners (4-10 years) are often aware of the difficulties of maintaining a daily practice as well as how easily one's mind is still disturbed by various thoughts, cravings, external distractions and memories which may account for their more limited perception of improvement than beginners. In addition the students may suffer from learners fatigue that occurs after performing similar activities over time. Although the study revealed that the intermediate students failed to perceive more positive benefits and exhibited less motivation to participate in meditation classes, it did not document if any of these perceptions resulted in students stopping to participate in the class. The study simply evaluated perceptions rather than performance, further studies need to document whether the perceptions significantly affected behavioral outcomes.

The study itself suffers from several methodological flaws including the lack of a control group, the lack of socioeconomic profile and background of the subjects, the lack of measurements other than self-reporting questionnaires that more often measure the

subjective perceptions rather than more objective performance measures. Despite these shortcomings the study is valuable because it illuminated the non-linear dimension of students perception of the quality of their learning outcomes over time. It seems that students need to perceive that there is tangible evidence of improvement in either affective, cognitive or behavioral dimension in order to remain motivated over an extended period of time. Although, students may be discouraged by less significant gains made after the initial introductory period, meditation is an intervention where benefits accrue overtime despite the students increasing awareness of difficulties that lie in the path. The students may regard the experience of these difficulties as a sign of more minimal levels of improvement than they formerly experienced and therefore be more apt to evaluate the variables measured more negatively than either beginners or adepts but may continue to meditate despite a decreased level of motivation and learning subjectively experienced by students.

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subjectively experienced by students.

The significance of the studies in this section is that meditation may cause a change in the perceptions of an experience that influences subsequent actions. Easterlin and Cardena (1999) found that high levels of stress produced anxiety in meditators but long-term meditators reported significantly greater levels of self-awareness, acceptance and more positive affect scores despite the perception of significant stress in their lives. Furthermore Bowen, Witkiewitz, Dilworth and Marlatt (2007) and Lillis and Hayes found that meditation affected the way individuals relate to their intrusive, biased, negative and addictive thoughts as well as possibly pre-empting harmful behaviors predicated on biased or addictive thoughts. Although these studies were done on adult populations, they are useful to consider not only in light of the stress associated with academic environments but also because of the impact biased behavior may have on different student populations and the ideal of an inclusive education. This section clearly showed that although meditators may experience aversion and craving their behavior may not be influenced by the quality of their thoughts. In other words if a teacher does not like a student for whatever reason, an experienced meditator will be able to prevent their projections and negativity from impacting the student.

This chapter reviewed the benefits derived from the practice of meditation and drew connections between the practice of different techniques, length of time practicing meditation and subsequent change in academic, affective and behavioral domains. The studies examined physiological brain based evidence, differential academic performance scores, affective diagnostic measures, longitudinal case studies, behavioral reports, self

and outside observer reports to determine the relationship that exists between complex nuerocognitive task of meditation and subsequent academic, social and affective performance of the participant population.

The research attempted to draw conclusive links between meditation and improved attentional, affective and behavioral states conducive to participation within an academic or a social environment. Researchers drew connections between the practice of a meditation and the reduction of dysfunctional or pathological affective states that may limit not only interfere with academic performance but even circumscribe participation within society.

Each section referenced different meditation technique and how they impacted client populations. The initial studies used physiological measurements to support claims that meditation caused greater ACC activation, prefrontal cortex activity, increased blood flow to specific regions of the brain and oscillation of neurons in higher gamma band frequencies that highlighted the physiological impact meditation had on cognitive structures. These studies linked certain meditation practices like Vipassana, Zen, TM and Tibetan Buddhist Meditation Techniques to better cognitive, affective and behavioral outcomes for long-term meditators.

The therapeutic models like ACT, CBT, MBSR, DBT, Communicating Quietly highlighted how some elements of "mindfulness" like the non-judgmental observation or recognition of the contents of one's thoughts without reacting to them helped to ameliorate the intensity of counterproductive affective state or negative behavior predicated on them. These techniques introduced the element of a therapeutic relationship

into the intervention that may have influenced experimental outcomes and compromises the independence of the meditator. The student must be at a certain cognitive developmental stage and maturity level to practice the therapeutic models that include observation as a key element. These studies provided some evidence that observation and self-reflection on one's own emotional state and thought patterns may sufficiently attenuate maladaptive behavior patterns.

SUMMARY

Chapter One introduced the importance of including meditation as part of an on-going classroom routine because it enhances cognitive abilities and emotional intelligence of students. Chapter two outlined the historical development of meditation in various parts of the world. Chapter three provided evidence for the possible connections between meditation and subsequent change in cognitive, affective and behavioral domains. Chapter four will analyze the common themes present in the current research base and outline suggestions for further studies.

CHAPTER IV: CONCLUSION

Introduction

Meditation despite its historical role as a means to cultivate a calm and quiet mind, has only recently been introduced into academic setting in the U.S. Throughout the centuries meditation has been practiced to promote concentration, awareness, gain insight and cultivate equanimity. It has used to create a more balanced mind that is better able to deal with the vicissitudes of life.

Current research has supplied evidence that on-going meditation practice influences cognitive, affective and behavioral outcomes in subjects. This paper examined the professional literature concerning the changes experienced by those who practice meditation on an on-going basis. The research has provided empirical evidence that supports the claim that meditation is an effective means to foster and maintain desirable academic and social outcomes. Chapter 4 will summarize the research findings, discuss the implications of those findings for students, parents, teachers and administrators and make suggestions for further research.

Summary of Findings

Chapter three arranged the presentation of findings in several distinct sections, the first section explored the impact meditation has on the physiological structures and processes of the body. The second major section examined the impact of meditation on academic achievement and the well- being of subjects. The third major section examined whether “Mindfulness Meditation” attenuated or altered dysfunctional affective states. The fourth major section assessed mindfulness as an element of therapeutic intervention

for adolescents at risk, while the fifth section delivered results on the affect that meditation had on specific types of detrimental thought patterns like prejudice, bias, drug and alcohol cravings that can lead to anti-social or destructive behavior.

The initial four studies in the first section examined the link between meditation and improvement in several areas of physiological function. These studies presented strong positive outcomes that on-going meditation practice resulted in structural and functional changes correlated with enhanced ability to sustain attention, concentrate, accept dissonant or stressful events, process distracting or disturbing thoughts and generally improved an individuals cognitive flexibility and conflict resolution skills.

These studies used imaging techniques to document increased blood flow or activity in specific regions of the brain associated with the ability to sustain attention (dorsal medial prefrontal cortex, putamen), to regulate emotions and reconcile conflicts (rostral ACC). Pegnoni and Celic (2007), supplied evidence that linked meditation to the prevention of age–related neurological and cognitive decline. The study conducted by Lutz, Greischer, Rawlings, Ricard and Davidson (2004) reported that long-term meditators had higher-amplitude gamma band synchrony patterns (25 - 42Hz) and higher ratios of gamma band activity to slow rhythms compared to controls, which suggested synaptic changes associated with enhanced attention, perception, working memory and learning in subjects who maintain an on-going practice of meditation. Although these studies present convincing evidence of the powerful impact meditation has on cognitive structures the flaws off the study failed to control for the ways long-term meditators may differ from the general public in their lifestyle habits and value systems. Future studies

may want to control for this features by introducing a second control group that are similar in these domains but do not meditate, establishing a more analogous control group to compare the data.

Barnes, Trieber and Davis (2001) revealed the positive impact that meditation had on blood pressure outcomes and cardiovascular responses in a group of adolescent meditators at risk for hypertension even after the introduction of stressors into the experimental situation. The results are significant, since high blood pressure is often associated with stress and on-going stress is a widely recognized impediment to academic performance and success. The attenuation of stressors can positively impact emotional and educational outcomes for students, teachers and administrators. This study failed to identify what the health education class that the control group participated in consisted of, since health education may influences a subjects subsequent dietary, exercise level and lifestyle habits that may also impact blood pressure result of the controls. Researchers need to establish a third control group where no intervention is administered but the participants are at rest for the scheduled intervention period. In addition the simulation of stressful events may not impact the subjects like the authentic experience and somewhat compromise the results.

Another group of studies examined the influence TM had on cognitive, affective and behavioral outcomes of students who practiced TM twice daily for 10-15 minutes. These studies provided the main evidence of the impact of meditation on school age children and youth. Hall (1999) documented an improvement in GPA for those students who practiced meditation throughout the semester. The researcher failed to control for the

Hawthorne Effect and it is possible that improvement resulted the expectation meditation would correlate with better grades. Rosen and Benn (2006) collected data that revealed students who meditated at the beginning and ending of each school day for 10 minutes displayed greater alertness, self –control, self-reflection, flexibility and improvement in their academic work. The result could have been impacted by the fact that the individuals conducting the interviews were aware of the objective of the intervention. Either researchers could have interpreted the results in a more favorable way or students could have wanted to make a favorable impression on researchers and therefore may have been biased in their reporting of outcomes .So and Orme-Johnson (2000) linked TM to wakeful hypo-metabolic states characterized by a state of restful alertness. The students who meditated showed significant improvement on tests that measured the speed of information processing that positively correlates to IQ, "practical intelligence" that predicts success at work, field independence that predicts academic achievement, and a test for creative thinking that measured cognitive, emotional, volitional domains and reflected the ability to comprehend, analyze, engage, think outside the box, and synthesize material.

A later study by the same researchers had a similar design to the previous one except that the students were younger and female, and instead of a napping control group, the researchers contrasted outcomes to a group of students who practiced a form of contemplation meditation that required the students to think about the meaning of something. Contemplation meditation according to the researchers keeps the mind thinking at the surface level and prevents the meditator from entering a hypo-metabolic

meditative state characterized by restful alertness. So and Orme-Johnson (2000) suggested that all meditation techniques do not produce the same results which is important to consider when reviewing the evidence of therapeutic validity of interventions that introduce "mindfulness" as an add on to one of the many models of cognitive therapy. The researchers not only controlled for the Hawthorne Effect but had several control groups to compare data and administered a half a dozen states that confirmed the cognitive and affective benefits of meditation.

Although research studies in this area provide evidence that meditation has a direct impact on cognitive structures, brain and body physiology and behavioral traits associated with improved attention, cognitive flexibility, cognitive and emotional processing speeds, conflict resolution skills and the reduction of stress, further studies need to document the affects of meditation directly on school age children and youth.

A significant issue that future researchers will have to face is whether data collection procedures that require specific technology will be permitted on school age children and youth. Until then research on adult populations will continue to supply the main evidence that structural and physiological changes occur in the mind and body as a result of on-going meditation practice that support improved academic and social outcomes.

Meditation may include some or many of the following qualities, focus on the maintenance of a visualized image, the repetition of a phrase, the feelings of loving-kindness for all sentient beings, the observation of breath, sensations, thoughts, or feelings, the non-judgmental acceptance of the moment, the redirection of attention to a

primary task, the cultivation of equanimity, the gaining of insight into a particular experience, the awareness of the quality of one's mind or mental habit pattern. It is therefore difficult to adequately control for or even describe all the confounding variables that may influence outcomes. Future education research needs to not only carefully control for confounding variables but also investigate meditation techniques that can be practiced in school by everyone due to their non-sectarian nature.

Long-term meditators are also likely to differ in terms of their value systems and lifestyle habits from the general population, as some meditation traditions offers "guidelines" to support an individual's development along the path. Therefore, future studies need to look at and control for this indirect influences on emotions and behaviors.

Another area of research focused on the cognitive and affective differences between longer-term and shorter-term meditators and between meditators and non-meditator. Easterlin and Cardena (1999) found that longer-term meditators reported significantly higher levels of awareness, acceptance and more positive affective states even when experiencing distressing events. Although the perception of stress produced significantly lower levels of acceptance and positive affect scores for both groups, it is noteworthy that long-term meditators had greater acceptance for dissonant or painful events than controls. The theme that emerges from the research indicates that on-going meditation promotes greater acceptance of stress producing or painful events and prevents the deterioration of emotional states in response to stressful experiences and events. Meditators trained to non-judgmentally observe the meditation experience without giving special significance to either the quality or content of intrusive thoughts or

the positive or negative dimensions of an experience can transfer this skill to real life experiences.

Broderick and Korteland (2004) outlined how early mental habit patterns of rumination in elementary school students not only interfered with the immediate attention and concentration available for academic tasks but it also is a strong indicator of later development of depressive symptoms. They found that students who adopted this maladaptive coping style to deal with unwanted events and experiences benefited from the practice of mindfulness because it allowed them to meta-cognitively step back and observe the nature of their thoughts in a non-judgmental way. Mindfulness allowed students to interrupt negative repetitive thought cycling characteristic of maladaptive coping styles. Broderick et al. (2004) also found that although distraction, defined as doing something that the student enjoys, is better at attenuating dysphoric moods than rumination, they both interfere with the ability to remain on task in the classroom and may disturb or distract other students. The teacher then must use her time and energy to redirect students to appropriate classroom activity. Although it can be argued that most individuals find themselves feeling depressed on occasion, research devoted to studying meditations effect on mood disorders may again not be relevant to student populations in a general classroom.

Beauchemin, Hutchins and Patterson (2008), added to the theme of " cognitive interference" or repetitive cycling of negative non-productive thoughts by describing how poor academic performance is often associated with anxious individuals because not only have they developed expectations of low self-efficacy and competence, their

preoccupation with anxious thoughts and experiences heightened the occurrence of attentional lapses that negatively impacted academic performance. The pre and post-test results, of the well-validated and widely used State-Trait Anxiety Inventory identified that meditation as an intervention strategy had a significant impact on the reduction of anxiety in subjects that practiced "Mindfulness Meditation."

Whether anxiety leads to perceptions of low self-efficacy and competence, which negatively impacts academic performance and peer relationships, or skill deficits in these area cause anxiety that prevents students from being successful in academic and social spheres, meditation can interrupt the destructive cycling of negative thought patterns that limit successful outcomes. Meditation allowed low-achieving learning challenged students to interrupt the cycle of low-efficacy self-perceptions that contributed to academic failure. The study however did suffer from failing to establish an analogous control group or to identify socioeconomic characteristics of the participant population which renders results somewhat incomplete.

Semple, Reid and Miller (2005) examined how children diagnosed with high levels of Trait Anxiety could self-manage these states by redirecting their attention to their breath every time they became aware that their focus and attention had moved elsewhere while meditating. Children used mindfulness to observe their breath, their sensations and their internal experiences without judging or distorting the experience of the moment. In this study the fact that the children received a lot of extra attention and involvement from the facilitators, which needs to be controlled for in future research because this dimension alone can account for some of the positive outcomes observed in

the subjects.

The study conducted at the Dhavantri School in Bhuj, India documented parental perceptions of behavioral, cognitive and affective change in their children with autism as a result of implementing an on-going meditation program in the school. Children with autism often display significant language delays, social skill deficits, difficulty developing peer relationships, inappropriate behavior in social interactions. Although the study did not establish a control group it nonetheless provided evidence that parents perceived an improvement in their children's sociability and general behavior. Four out of the five children showed improvement in regards to their ability to follow directions, self-regulate their emotions and attend to their bodily needs, while three out of five of the subjects also showed improvement in reduced hyperactivity, tactile sensitivity and self-injurious behavior, while two of the subject also displayed improvement in relation to, language usage, obsessive speech patterns, sound sensitivity, need for rigid routine, object fixation and violent behavior but none of the five showed reduction in the frequency of repetitive stereotypical motor mannerism. Although future studies need to address the methodological flaws present in the qualitative structure of the research, parental perceptions of their child's behavior is an important element in the development of school home connections that provide continued support for the child's on-going success and development.

The cognitive therapeutic models that include "mindfulness" as an integral part of the intervention are many including Acceptance and Commitment Therapy, Mindfulness Based Stress Reduction, Mode Deactivation Therapy, Dialectical Behavior

Therapy etc. These models of intervention mandate that observation and examination of one's thought and mental habit patterns are critical to eliminating the unwanted behavior because reactive maladaptive behaviors are often predicated on these thoughts or impulses. The therapeutic process provides an avenue for the interruption of these habits because mindfulness allows the client to become aware of them.

Although Boozin and Stevens (2005) attempted to establish the usefulness of MBSR in breaking the link between insomnia and subsequent intoxicant used to ameliorate the pathological disorder. The study did not reveal any significant gains from the intervention program. Completers did not fair any better than non-completers on any of the variables such as reduction of daytime sleepiness, worry, mental health distress and in fact completers reported twice as many days of drug use as non-completers during the treatment intervention. The outcome suggests that the type of mindfulness incorporated into MBSR is insufficient to overcome the strong cravings associated with alcohol and drug addiction in the adolescent population under study or to significantly ameliorate insomnia.

Birnbaum (2005) attempted to observe the therapeutic effects of practicing "mindfulness" within a therapeutic relationship. She failed to adequately explain the critical attributes of mindfulness she used because of the seemingly contradictory elements of the technique. She initially described the client as constantly observing mental activity and bodily sensations but later described her paying close attention to her "inner voice" while meditating and the later reporting out her feelings to the facilitator. If an individual seeks answers from an experience, then she is not observing but looking at

the content of her thoughts and experience for some answers. The many therapeutic models that incorporate mindfulness as an element of treatment seem to apply similar contradictory approaches into the process and structure of intervention.

Birnbaum (2000) acknowledged that "different thoughts and feelings are linked to key therapeutic issues," how then can it remain a non-judgmental process of observation.

Leoni's (2006) study suffered from the same lack of clarity and seemingly contradictory nature of some elements of the intervention. Although the researcher identified the critical role of becoming aware of the quality of the breath, feelings, thoughts and experience in the moment, she also described a visualization where the incoming breath is blue and calm, while the out-going breath is red and agitated. The lack of clarity about what she regarded as meditation impaired her ability to collect more than anecdotal evidence. Furthermore her study failed to present data on whether the intervention successfully indicated a reduction of suspension rates and an improvement of academic performance, her initial question. She offered only anecdotal evidence on how it impacted her therapeutic abilities and moderated a students self-perceptions.

Trupin, Stewart, Beach and Boesksy (2002) researched the behavioral effects of DBT on a population of adolescent offenders housed in either the mental health unit or within the general population of a Juvenile Rehabilitation facility. Participants from the mental health (MH) unit experienced a significant reduction in behavioral problems and affective disorders during the intervention period, due to the fact that they started with higher rates of severe affective and behavioral disorders. Although the youth from the MH population did not experience less behavioral problems compared with an analogous

period in the preceding year, there was a significant reduction in the use of punitive actions by the staff of the MH unit. This study is noteworthy because even though behavior outcomes for the adolescents in the MH unit did not improve significantly compared to the previous year, the staff ‘s use of punitive actions against these youth during the DBT intervention decreased. Since staff participated in DBT training before the commencement of the program, perhaps awareness of their own thoughts, behaviors biases etc. contributed to a different evaluation of a potential disciplinary situation and subsequent use of punitive actions. This highlights an area that needs further investigation, how teachers can use “mindfulness” to come out of their own biased and negative mental habit patterns that may not only effect their relationship with students but the entire classroom climate.

Teachers as well as students may experience high levels of stress within the classroom. Teachers may be under significant pressure to try and satisfy all the academic and social needs that exist within the classroom and may react in negative ways towards students that they have identified as “problems,” therefore habituating a pattern of reaction or a pattern of neglect that is not conducive to supporting those students. Meditation can help teachers not only to uncover their biases, prejudice and negative mental habits but also develop habits where they aren’t reacting to students who “push their buttons”.

Apsche and Bass (2005) investigated the potential benefits of three different therapeutic models on adolescents diagnosed with conduct disorder or personality dysfunction and found that MDT, that seeks to unconditionally validate the schema of the

aggressive or sexually violent offender, results in significant reduction of sexual aggression in a population of incarcerated youth. In the MDT condition, “mindfulness” referred to the self-monitoring and recognition of feelings and emotions in the sexually aggressive youth. The study documented lower post-intervention scores on the Child Behavior Checklist on all variables measured, including somatic complaints, anxiety, depression, withdrawn behavior, aggression, for adolescents in the MDT condition. The unique therapeutic element within MDT of complete validation of a client’s maladaptive schema needs to be adequately controlled for to be able to sufficiently isolate variables and identify causal links between intervention and outcome.

Despite the success of using therapeutic interventions that link “mindfulness” with the reduction of physical or sexual aggression and affective disorders these models can not be recommended for a regular classroom environment because of the critical role the therapist and the time consuming quality of the intervention. These articles are non-the-less included in the discussion about the positive impact meditation has on academic and social performance in the classroom not because they reflect appropriate meditation forms for the classroom but rather they provide evidence that “mindfulness” is a non-sectarian technique that can be applied in public schools.

The last section provided quantitative evidence that although maladaptive thought patterns may arise in the minds of individuals, action predicated on these thought patterns can be interrupted by remaining neutral or non-reactive to the content or cravings associated with these experiences. The studies in the last section determined that meditation techniques that included non-judgmental observation of the quality and

content of thoughts, feelings and sensations but did not seek to artificially suppress the maladaptive thoughts allowed individual to not react to the content of their thoughts with self-harming or biased behavior towards others. Although meditators did not measure any reduction in the frequency of unwanted thoughts, in this case craving for alcohol, their peak week consumption of alcohol was none-the-less sufficiently reduced.

Although the studies presented in this paper overwhelmingly support the use of meditation to promote better cognitive, affective and behavioral outcomes for those who practice it, many of the research studies conducted on children and youth consistently suffered from small sample size, non-randomly selected participants, unclear definitions of the technique being used, and the short duration of the research study which therefore compromise the findings of the study. Therefore future research needs to address these methodological deficiencies to provide more conclusive research-based evidence about meditation's impact on cognition, emotions and behavior of school age children and youth. Despite the shortcomings of using research conducted on adults to suggest similar outcomes for children and youth, at this point research conducted on adults still provided the best research based evidence of how the brain's structure and function changes as a result of meditation

Classroom Implications

Meditation establishes a new routine for dealing with intrusive, distracting or compulsive thoughts that may interfere with an individual's ability to engage productively in the academic and social experiences occurring in the classroom. An increasing number of individuals present with symptoms consistent with Asberger's

Syndrome, Autism Spectrum Disorder, Attention Deficit Disorder, Anxiety Disorders, Obsessive Compulsive Disorders, Oppositional Defiant Disorders and stress related symptoms, addiction and may benefit from meditation that trains the mind to observe the natural breath and not give significance to compulsive, self-centered, biased, anti-social, addictive thoughts and cravings or established maladaptive reactions to them.

Meditation allows individuals to respond to incoming experience in new ways rather than in routine relatively established habit patterns. Students who engage in repetitive negative thought patterns like self-blame or self-denigration can use mindfulness to interrupt these chronic automatic habit patterns to establish less destructive reactions to external stimuli or internal cognitive emotional processes. Low self-esteem and expectations of low self-efficacy can interfere with both academic and social performance in the classroom or may and result in a self-fulfilling prophecy. Mindfulness as instrumental in changing the observational perspective of the individual rather than the nature of the thought content encountered during observation (Teasedale, Moore, Hayurst, Pope, Williams and Segal, 2000, p.618). Mindfulness can be utilized to develop awareness of cognitive distortions that may or may not be pathological but none-the-less interfere with interpersonal relationships because they contain biases that affect ones interactions with others. When one is less distracted and uncomfortable, one can think more clearly, and when one thinks more clearly, one can really begin to understand, in a deeper way, “these are just my thoughts bothering me and this is something I don’t have to listen to” (Schwartz, 2002, p. 294).

Research suggested that meditation provides individuals a practice of not-reacting

to compulsive or non-productive thoughts, emotions and behaviors thereby enhancing student's ability to self-regulate their emotions and behavior. A non-sectarian meditation technique that focuses on the observation of the natural breath to concentrate the mind is well suited for introduction into the classroom. This technique offers students an opportunity to learn how to direct and re-direct their attention to their natural breath and can apply this skill in the classroom when working on classroom assignments and attending to academic instructions. Students who have trouble with impulse control, intense emotional reactions and attention deficits make it difficult for them to participate in the classroom activities. Meditation can be used in situations where even a momentary pause in reaction can prevent a social issue from escalating into a verbal or physical conflict. Rather than respond to the immediate situation, students can observe their breath and delay reaction to a perceived insult or injustice that is often the cause of conflict. Observation of the natural breath provides students with a concrete physical experience to improve concentration, attention and to regulate their reaction to non-productive mental habit patterns.

According to Napoli (2004) the handful of therapeutic programs that have been implemented, which incorporates some form of 'mindfulness' have shown success in reducing violent behaviors in children (p.2). If violent behavior is initially predicated on violent thoughts or impulses, these impulsive thoughts and impulses can be treated in a similar way to intrusive thoughts that compel an individual to act in a compulsive way. A student who regularly practices meditation can revert to this practice in highly charged emotional situation, and instead of reacting impulsively to a perceived insult, the student

can observe their natural breath rather then the aversive stimuli. Likewise a student who is used to quietly observing their breath without reacting to the quality and content of the thought that arises in the mind is in a better position to not react to a perceived insult, slight or injustice with an increase of either verbal or physical aggression. Violent behavior may be a reaction to erroneous interpretation of incoming data as threatening or harmful and if students are given an opportunity to become better observers through the practice of mindfulness then these mistakes in interpretation may be prevented or caught before they escalate to either verbal or physical violence.

Teachers can also benefit from practicing meditation that allows her/him to acknowledge and perceive their own biases, prejudices and beliefs that influence and often interfere with interpersonal relationships because the teacher's reactions and behavior may rely on outmoded or erroneous ideas. The teacher has an opportunity to become aware of their thought and behavior patterns that may not be relevant to the current situation. Even short-term impartial spectator status causes increased activation of the prefrontal cortex, which indicates a higher degree of observer attentiveness to incoming data (Beauregard, Levesque, and Bougouin 2001; Ochsner et al., 2002). Repetition or on-going practice of a skill supports the development of mastery in that area by the creation of new neural networks in the basal ganglia area of the brain (Graybiel, 1998).

With practice teachers can become skilled non-reactive participant observers, which can assist them in providing relevant curriculum and support to their students. Academic and social demands on teachers are considerable within and outside of the

classroom. They must be culturally, academically and socially sensitive to the needs of each child while creating an environment where all students feel valued and respected. This is no easy task and a meditation practice can help develop and enhance a teacher's ability to mediate emergent and evolving themes within the classroom rather then remain stuck in outdated or automatic cognitive responses or behavior patterns. Anyone in a particular state for a long time often runs the risk of stabilizing that state in the nervous system (Jensen, 2004, p.78).

The research findings offer some support for the argument that meditation can be a useful technique to incorporate as a daily activity in the classroom. . Since observation of the natural breath is a risk-free exercise that requires a minimum of time and resources to implement in the classroom and more than likely strengthens concentration, improves working memory, supports comprehension and improves behavior in school age children and youth, it may be a useful practice to incorporate into daily classroom activity despite the lack of conclusive proof.

Meditation may foster attention, impulse control and interrupt chronic maladaptive behavior patterns, attitude and beliefs that are often automatic and based on past negative experiences and events. Negative memories and experiences are fairly entrenched in the nervous system. If an individual develops the habit through meditation of not evaluating or reacting to current experiences based on the way similar experiences have been processed in the past, then the automatic process of evaluating and reacting to the present in terms of the past can be interrupted and the individual has the opportunity to experience the present without reference to emotions and behaviors that were

associated together in the past.

Implications for Further Research

The research done on adult subjects may not be transferable to populations consisting of children or youth for a variety of reasons. The initial studies that provided clinical evidence that meditation causes physiological, and structural change within the brain and body may not be directly correlate with younger student populations. Direct evidence on the physiological effect of meditation on younger populations needs to be provided to establish a clear and direct relationship between meditation and structural and functional change conducive to academic and social outcomes in the classroom. Due to the nature of the tests used to measure these variable it is unlikely that MRI' or SPECT imaging scans will be administered to young subjects to measure change in cognitive structure and function.

Future research needs to establish several experimental and control groups to highlight certain relationships and to control for the Hawthorne effect which produces positive outcomes not because of the quality of intervention but because the environment has been modified due to an intervention. The different groups consisting of students who have 1) practiced meditation for three or more years, 2) practiced meditation for three to six month, 3) initiated meditation training as part of the research study, and 4) been asked to sit quietly with their eyes closed during the scheduled meditation period but have not been given any formal meditation instructions. Since the benefits of meditation accrue over a lifetime, it is important to document and differentiate the cognitive and behavioral change that occurs over longer periods of time.

Large longitudinal studies need to be developed that measure a student's affective predisposition, cognitive skills and deficits before and after an on-going meditation routine is implemented in the classroom, tests similar to the ones administered to students to determine if they are eligible for an Individual Educational Plan (IEP). Studies that establish, define and measure how meditation effects anxiety levels in students needs to be conducted on school age populations because it is likely that anxiety, stress and a history of dissonant or painful events most likely interferes with attention, working memory and processing of new experiences and information in the classroom. Finally, the study needs to include age-appropriate non-sectarian meditation techniques that can be practiced by all individuals regardless of their religious or philosophical orientation.

Conclusion

In conclusion, meditation implemented as a daily practice in students lives can enhance their ability to concentrate and attend to classroom instructions while offering a mechanism to self-regulate their behavioral responses to the environment. Behavior that is more conducive to cooperative attentive participation in the classroom offers greater opportunities for engagement in the learning process. If students engage more fully in a supportive and non- threatening learning environment they can benefit from social, emotional and academic opportunities available in the classroom to a greater extent.

The research examined in this paper has many implications for the classrooms. First, the studies led by Newberg, Alavi, Baime, Pourdehnad, Sanntanna and d'Aquilli, (2001), Hotzel, Ott, Hempel, Wolf, Stark et al.(2007), Pegnoni and Cekic (2007), Lutz, Greischer, Rawlings, Ricard and Davidson (2004) provided significant evidence that on-

going meditation has a significant impact on cognitive structures associated with attention, concentration, processing of dissonant or painful experiences and emotional self-regulation. Since paying attention to instructional tasks and learning activities is essential for academic success it seems reasonable to conclude that mental exercises that augment a student's attentional capacity would enhance academic outcomes. Furthermore if a student's inattention is manifested in ways that distract or disturb other students then the negative behavior impacts the academic and social environment, not only preventing other students from learning but also requires the teacher's time and attention to ameliorate the condition. If students are better able to process and self-regulate their emotions than not only will their be a reduction of conflict within the classroom but students will be able to use meditation to manage mild to moderate mood disorders.

Easterlin and Cardena (1999) documented that the on-going practice of meditation allowed individuals to better cope with stressful, dissonant and painful experiences. More experienced meditators maintained a less reactive more balanced affective state in response to stressful life events than less experienced meditators. The ability of more experienced meditators to remain calm when unwanted stressful situations occur in their life is a skill that most students can benefit from using in the classroom. Since the classroom and external environment does not always meet students' or teachers' expectations, it is helpful for students and teachers to be able to remain calm in the face of stressful or adverse environments. Some students, specifically students who lie on the autistic disorder spectrum find it difficult to work in noisy environments, adjust to schedule changes or new routines, and find peer relationships stressful. These students

would most likely benefit from meditation that promotes calm acceptance of dissonant events. The study conducted by Barnes, Trieber and Davis (2001) documents the affect of TM on blood pressure of African American youth who typically are exposed to greater environmental stresses due to the existence of bias, prejudice, discrimination and white privilege in society that often expose them to greater levels of violence and hostile environments. The subjects in this study experienced markedly less reactivity to social stressors than the control group post intervention.

Beauchemin, Hutchins and Patterson (2008) documented how the classroom environment can be stressful for learning challenged students not only because of perceptions of low self-efficacy, compromised competence, preoccupation with negative thought patterns and experience of lapses of attention but also because of specific deficits in one or more skill areas. Since anxiety for these students, whether, it is a precursor or result of academic deficits was significantly reduced post-intervention, it seems to suggest that meditation can positively impact the academic performance of students characterized as anxious or learning challenged in a number of ways. First, students can use meditation in anxious or aversive situations to self-regulate their emotions so that anxiety doesn't interfere with their performance, secondly they can use meditation to reduce the effect of "cognitive interference" characterized by self-doubt, expectations of low self-efficacy, rumination, compulsion or any other negative type of thought pattern that distracts them from attending to incoming information in the classroom. Finally, by using meditation to cultivate calm in aversive situations, students will less likely opt for distractive and procrastinating behaviors and more likely to successfully engage in the

learning environment. Students who meditate will be better able to focus, concentrate and comprehend the experiences and the learning that is happening in the classroom.

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