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Adolescent Mindfulness Interventions: A Meta-Analysis of the Effects on Anxiety and Depression

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Adolescent Mindfulness Interventions: A Meta-Analysis of the Effects on Anxiety and Depression

Abstract

Regular and repeated adolescent stress can lead to debilitating conditions such as chronic anxiety and/or depression and both conditions have consequences that impact the present, and the future, of those experiencing clinical anxiety or depression. Anxiety impacts about 20% of the population, and it is the most common mental illness in the United States while an estimated 2.2 million (9.1%) adolescents ages 12-17 in the U.S. had at least one major depressive episode in the past year. Standard treatments for these conditions include combined psychotherapy and medication; however, few medications are approved for adolescent use and have side effects. Alternative therapies are being studied and a therapy style that has seen positive results are mindfulness-based interventions that include the main component of mindfulness meditation. Mindfulness-based treatments have increased, and research into mindfulness has expanded for adolescent populations however, a combined effect had not been determined for anxiety and depression. Through meta-analysis of 13 included studies a small to medium effect size for both adolescent anxiety ($g = 0.36$) and depression ($g = 0.32$). Moderator analysis indicates that certain MBIs (ACT and DBT) show greater effect sizes for either anxiety or depression. The results are encouraging but more research in the area of MBIs is needed to determine their viability and cost effectiveness as treatment option for adolescent anxiety and depression. Particular attention should be paid to mindfulness' application in schools for wide spread instruction and benefits derived by the adolescent participants experiencing stress.

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Adolescent Mindfulness Interventions: A Meta-Analysis of the Effects on
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By

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Submitted in partial fulfillment
of the requirements for the degree
Ed.D. in Executive Leadership

Supervised by

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Dedication

This dissertation is dedicated to my father, Patrick J. Carroll and in loving memory of my mother, Joan M. Carroll. Without their love, patience and encouragement to push forward every step of my educational journey and throughout life, I would not be here. They are and continue to be my rock, my will to drive on, to push the limits of my potential, to set goals and to stay the course to each finish line. I have learned from them to work hard and keep trying when times are tough and to never settle for “good enough”. Because of them I choose the road less traveled, and it has made all the difference.

(Thank you Robert Frost for your poetic gift)

The completion of this dissertation, and the doctoral program was made possible with the love, support, and encouragement of my family, friends and colleagues. My husband and children in particular have given so much over the past two and a half years. Their love and support has been necessary and valued during this journey. I hope they too find that life-long learning is a gift that can never be taken away and that it makes life fuller for them personally and for others around them.

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for her ability to help keep things in perspective. There are far too many to name individually but the professors in each of the courses in the leadership program are contagiously well-read, articulate and humorous. I will deeply miss the inspiring and engaging discussions that occurred over the past two and one half years. Thank you, I am forever grateful.

Biographical Sketch

Mary M. Volkomer is currently a Principal at Kingsford Park Elementary School in the Oswego City School District. Mrs. Volkomer earned a Bachelor of Science in 1989 from Flagler College for Accounting. She continued her quest for education in earning a Master's degree in Vocational Technical Education, 1997 and an advance certificate in Educational Administration in 2005, both completed at State University of New York at Oswego. After teaching adolescents in a middle and high school for nine years, an administrative internship was completed at the elementary level. Since, she has worked for ten years in her current position as an elementary principal.

Mrs. Volkomer is certified by the State of New York as a business educator, School District Administrator (SDA) and as a School Administration and Supervisor (SAS). Mrs. Volkomer came to St. John Fisher College in May of 2013 to study in the Ed.D. Program for Executive Leadership. She pursued her research in mindfulness-based interventions and its potential as an effective intervention for adolescents with anxiety and/or depression. The meta-analysis was completed in August of 2015 under the direction and support of Dr. Bruce Blaine and Dr. Deborah B. Johnson.

Abstract

Regular and repeated adolescent stress can lead to debilitating conditions such as chronic anxiety and/or depression and both conditions have consequences that impact the present, and the future, of those experiencing clinical anxiety or depression. Anxiety impacts about 20% of the population, and it is the most common mental illness in the United States while an estimated 2.2 million (9.1%) adolescents ages 12-17 in the U.S. had at least one major depressive episode in the past year. Standard treatments for these conditions include combined psychotherapy and medication; however, few medications are approved for adolescent use and have side effects. Alternative therapies are being studied and a therapy style that has seen positive results are mindfulness-based interventions that include the main component of mindfulness meditation.

Mindfulness-based treatments have increased, and research into mindfulness has expanded for adolescent populations however, a combined effect had not been determined for anxiety and depression. Through meta-analysis of 13 included studies a small to medium effect size for both adolescent anxiety ($g = 0.36$) and depression ($g = 0.32$). Moderator analysis indicates that certain MBIs (ACT and DBT) show greater effect sizes for either anxiety or depression. The results are encouraging but more research in the area of MBIs is needed to determine their viability and cost effectiveness as treatment option for adolescent anxiety and depression. Particular attention should be paid to mindfulness' application in schools for wide spread instruction and benefits derived by the adolescent participants experiencing stress.

Table of Contents

Dedication	iii
Biographical Sketch	v
Abstract	vi
Table of Contents	vii
List of Tables	ix
List of Figures	x
Chapter 1: Introduction	1
Introduction	1
Problem Statement	27
Theoretical Rationale	28
Statement of Purpose	34
Research Questions	34
Potential Significance of the Study	34
Definitions of Terms	35
Chapter Summary	37
Chapter 2: Review of the Literature	39
Introduction and Purpose	39
Discussion	55
Conclusion	56
Chapter 3: Research Design Methodology	58

Introduction.....	58
Systematic Review of the Literature.....	59
Statistical Procedures	63
Chapter 4: Results.....	66
Introduction.....	66
Research Questions.....	66
Data Analysis and Findings	69
Summary of Results.....	78
Chapter 5: Discussion.....	80
Introduction.....	80
Implications of Findings	80
Limitations	84
Recommendations.....	88
Conclusion	89
References.....	90

List of Tables

Item	Title	Page
Table 4.1	Effect Size Follow Up Data for Each MBI	74

List of Figures

Item	Title	Page
Figure 1.1	Theoretical schematization of stress, coping, and adaptation	6
Figure 4.1	Comprehensive study inclusion data	67
Figure 4.2	MBI effect on anxiety	69
Figure 4.3	MBI effect on depression	70
Figure 4.4	Moderator analysis for anxiety	71
Figure 4.5	Moderator analysis for depression	72
Figure 4.6	Moderator analysis for stress	73
Figure 4.7	MBI effect on stress	75
Figure 4.8	Publication bias funnel plot for anxiety	76
Figure 4.9	Publication bias funnel plot for depression	77
Figure 4.10	Publication bias funnel plot for stress	77

Chapter 1: Introduction

Introduction

Adolescence is a time when both physical and emotional changes take place. Adolescents develop schema that inform their perceptions, add to their background knowledge, and direct their actions. Stress can impact that schema and play a detrimental physical and psychological role in the lives of adolescence during the formative academic and social emotional years of growth. The health effects of stress, perceived as negative or overwhelming, can lead to somatic ailments, which are most notably reported during the school year, in the form of headaches and stomach aches, along with social impacts such as school avoidance (Hjern, Alfvén, & Ostberg, 2008; Natvig, Albrektsen, & Qvarnström, 1999). Unfortunately, stress can also lead to debilitating conditions such as chronic anxiety and/or depression. Standard treatments for these conditions include combined psychotherapy and medication (National Institute of Mental Health [NIMH], 2014). While therapy alone does not prove to be as effective without medications, adolescents respond differently to medications than adults (Bylund & Reed, 2007). Bylund and Reed (2007) stated that many of the medications that are approved for adult use are not approved for use in children and adolescents; therefore, there are fewer safe options that can be prescribed. Side effects of medications and the long-term unknown effects are reasons to look at the effectiveness of alternative therapies. Mindfulness-based treatments may provide effective treatment for anxiety and/or depression without

the side effects of prescription medications while providing on-demand therapeutic benefits.

Adolescence and stress. Adolescents are challenged with feelings of stress all 12 months of the year but predominately through the school year, and these levels of stress are higher than the adolescents perceive are healthy. Anderson et al. (2014) conducted a study sponsored by the American Psychological Association (APA). They were looking at stress in American and if adolescents were adopting adults' stress habits. During August of 2013 they surveyed 1,018 adolescents (ages 13-17) and 1,950 adults (18 and over) in the United States. According to Anderson et al. (2014) 13% of the adolescent respondents reported that, during the summer months, their stress levels were at least an 8 out of a 10-point scale, with an overall respondent average of 4.6, while collectively believing 3.9 to be a healthy level. Additionally, 34% of the adolescent respondents expected their stress levels to increase in the coming year (Anderson et al., 2014).

During the school year, the study went on to find that many adolescents report increased levels of perceived stress and that the stress negatively impacts their performance along with impeding on their fulfillment of responsibilities. The results were derived from respondents ratings using the Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983). Eighty-three percent indicated that school was a source, and sometimes a significant source, of stress in their lives (Anderson et al., 2014). Over one in four students (27%) rated their stress levels at an 8, 9, or 10, using the same 10-point scale, during the school year, and only 16% reported a decline in their level of stress in the current year over the previous year (Anderson et al.). Ten percent of the adolescents reported that their grades were not indicative of their true abilities, citing

stress as the cause, and nearly 40% indicated that the stress impacted the fulfillment of their home responsibilities (Anderson et al.).

Adolescents report psychosomatic symptoms of stress during the school year that are correlated with three main contributors: assessments, teachers, and harassment (Hjern et al., 2008; Natvig et al., 1999). During 2002-2003, a sample of students (N = 2,588) across Sweden, ranging in ages 10-18, were studied, using frequent headaches and abdominal pain on a weekly basis, as the main outcome variable (Hjern et al., 2008). It was determined, using a regression model that encompassed gender, grade group, and grade level, that stressors, such as too many assessments, unfair treatment by teachers, and incidents of harassment, were all significant predictors of health outcomes, most notably in girls with an odds ratio ranging from a 1.34 to 3.84 (Hjern et al.).

The greatest impact reported by adolescents at all grade levels were school stressors, such as school work pressure and school assessments. When a group of middle school and high school students, ages 13-17, was asked about school stressors, a range of 20% to over 40% felt the pace was too fast and that there were too many assessments (Hjern et al., 2008). Some of findings were moderated by the grade and gender of the respondent. Notably, the girls in all grade ranges had higher report rates of feeling tense and nervous at school than the boys, with a 13 percentage point differential over the boys (Hjern et al.). Although harassment was indicated as a school stressor, having a negative relationship with a teacher, by feeling unfairly treated, was reported at a higher percentage for girls than harassment (Hjern et al., 2008; Natvig et al., 1999).

The responses for the Hjern et al. 2008 study regarding the perception of “being treated unfairly” was based on a dichotomized item that asked if “there are teachers who

treat you badly or poorly,” while the harassment questions were based on a Likert-type inventory ranging from “almost every day” to “never.” The four questions regarding harassment asked how often “you are accused of things you haven’t done or can’t help doing,” “no one wants to be with you,” “other students show they don’t like you, for example teasing you or whispering or joking about you,” and “one or more students hit or hurt you in some way”(Hjern et al., 2008, p. 113). Harassment was an indicator of pain-related psychosomatic symptoms and negative feelings of safety at school across the age span (Hjern et al., 2008).

Another study of Norwegian students showed a risk of psychosomatic symptoms with school stressors that were indicative of a symbiotic relationship to school alienation. The eight descriptive statements revolving around the idea of school alienation measured the students disengagement with school work and their evaluation of the school experiences being futile and useless (Natvig et al., 1999). Over the course of four years, beginning in 1994, students (N = 862) in ages 10-15 were asked questions regarding experiences at school and their psychosomatic experiences such as headache, stomach ache, back ache, and dizziness, along with psychosocial experiences including irritability, feeling low, nervousness, and sleep difficulties (Natvig et al.). The findings showed that increased distress with school work was followed by increasing psychosomatic symptoms and, similarly, a relationship between school alienation was found with some of the psychosomatic symptoms (Natvig et al.). Natvig et al. (2009) also found that school alienation was strongly correlated with school distress, but increased teacher support decreased school alienation and positively impacted the feelings of decision control for the students.

Positive and negative effects of stress. Reactions to stress are a function of the objective aspects of the stressor (e.g., the stressors consequences or controllability) and the subjective *appraisal* process of the students to manage their reactions to the stressors with the resources available for coping (Folkman, Lazarus, Pimley, & Novacek, 1987; Lazarus, 1999; Lazarus & Folkman, 1987). According to Lazarus and Folkman (1987), stressful events are appraised between people and their environments where the event is considered relevant to their well-being, and it either exceeds or taxes their resources in thought or action for them to manage the stressful transaction. Therefore, how a person perceives and reacts to situations determines that person's emotional and physical response.

The appraisal of the situation is based on the person's judgment of the demand at stake and the controllability of the task in relation to the resources that is available to perform the task (Drach-Zahavy & Erez, 2002). The appraisal process involves three variables: goals, perception of self and the world, and personal resources to interact with the environment (Lazarus, 1999). Figure 1.1 illustrates a systems approach to stress and coping that works together to formulate a mental state (Lazarus).

During the appraisal process (primary, secondary, and reappraisal) a person can determine if a situation or task is within his or her ability or if he or she has the resources to deal with the event or task and not perceive it as a threat or a negatively stressful situation. According to Lazarus (1999), primary appraisal entails *goal relevance* (relevant to well-being) and *congruence* (get what is desired) along with the involvement of ego (self-esteem, values, and morals). While the secondary appraisal is the act of evaluating the options in respect to coping and emotions relative to blaming, there is

potential for success, future beliefs, and expectations (Lazarus, 1999). If an event is worthy of attention during appraisal or reappraisal (determining relevance and/or coping) and is perceived as being out of a person's capability to cope or have the adequate resources to deal with the event, it can cause immediate and even long-term effects on that person's emotional and/or physiological health (Lazarus). As noted in the studies of the students in both the Norwegian and Swedish schools, some students experienced psychosomatic and/or psychosocial impacts from school stressors, resulting in physical and emotional symptoms that impacted their participation and connectedness to their school resulting in school alienation (Hjern et al., 2008; Natvig et al., 1999).

Causal Antecedents →	Meditating Processes →	Immediate Effects →	Long-Term Effects
	Time 1...T2...T3...Tn Encounter 1...2...3...n		
Person Variables Values- commitments Beliefs: Existential sense of control	Primary appraisal Secondary appraisal Reappraisal	Physiological changes Positive or negative feelings Quality of encounter outcome	Somatic health/illness Morale (well- being) Social functioning
Environment Situational demands, constraints Resources (e.g., social network) Ambiguity of harm Imminence of harm	Coping Problem focused Emotion focused Seeking, obtaining, and using social support		
Resolutions of each stressful encounter			

Figure 1.1. Theoretical schematization of stress, copying, and adaptation. Adapted from *Stress and emotion: A new synthesis* by R. S. Lazarus, 1999, New York, NY: Springer Publishing.

A person's appraisal of a situation can either hinder or improve his or her performance. If a person sees an event as a challenge where the goal is not easily attainable but possible with persistence, the physiological changes can improve alertness and attentiveness to a task or situation (Lazarus, 1999; Sapolsky, 2004). Additionally, the perception of how much control one has during the appraisal process, and his or her ability to draw upon personal resources to meet the demand, will determine improved performance, or it will negatively impact performance (Lazarus, 1999). Two possible negative responses are the development of psychopathology in terms of anxiety and/or depression.

Developing psychopathology and the negative impact. During the secondary appraisal process, a person that feels ill-equipped to deal with a situation, or if the frequency of the antecedents challenges his or her coping adaptation, one can suffer from long-term effects that impacts social functioning. Untreated repetitive or chronic stress can result in serious health conditions including anxiety, insomnia, muscle pain, high blood pressure, and a weakened immune system (Anderson et al., 2014). Anxiety is a person's reaction to stress, and those with anxiety have increased activation in the fear and emotion centers of the brain (National Institute of Mental Health [NIMH], 2014). Depression is a condition in which a person feels discouraged, sad, hopeless, unmotivated, or disinterested in life in general (NIMH, 2014). Sadness and grief is expected when dealing with intermittent episodes, such as a loss of a loved one or parents divorcing, but they are generally short in length. Depression is longer term and interferes with daily living for the one experiencing it and for those around them. Stress can also

contribute to the development of major illnesses, such as heart disease, depression, and obesity.

Stress-induced anxiety and depression that is manifested from either home or school has consequences that impact the present, and potentially the future, of those experiencing reoccurring anxiety or depression. The data collected over eight years from the National Longitudinal Survey of Youth in 1997 (N = 2,041) showed that adolescents suffering from anxiety and depression compared to their peers (with less or no anxiety or depression) are more likely to engage in sexual activity by age 16 (62% vs 50%), use or abuse drugs (39% vs. 27%), run away (30% vs. 18%), and are more than twice as likely to not complete their high school education (35% vs.15%) (Macomber, 2009). Moreover, those with anxiety/depression are at a greater risk (27% vs. 16%) to be charged with a crime and will earn considerably less than their peers based on median incomes (Macomber). The negative impact during adolescence has lasting effects into adulthood for those who experience the symptomology of anxiety and depression.

Physiology of stress. The physiology of stress is important when trying to understand the chemical and physical responses both in the brain and in the rest of a person's body. Sapolsky (2004) explained that the propensity of the brain is toward homeostasis, which is the optimal functionality of all systems, such as the ideal oxygen level, the ideal temperature, the ideal degree of acidity, etc. *Stressors* as defined by Sapolsky is anything that disrupts the homeostatic balance of the body and the *stress-response* is what the body does to restore homeostasis. Both the sympathetic and parasympathetic nervous systems are activated at different times during a stress response.

The sympathetic nervous system responds to the brain's appraisal of a stressor requiring mobilization (Lazarus, 1999; Sapolsky, 2004). Therefore, the brain, as the master gland, can experience or interpret situations as stressful and, in turn, activate components of the stress response system. The brain's assessment, which is a primary appraisal of a situation, determines whether the event is deemed worthy of attention. While the secondary appraisal or brain assessment concludes whether the resources and skills are ample to deal with the present stressor (Lazarus, 1999). This determination of "worthy" and "ill-equipped" can result in the release of epinephrine and norepinephrine by the sympathetic nervous system, which can act in seconds, setting forth a chain reaction of secreting glucocorticoids (GC) from the adrenal gland that can be present within minutes and persist up to hours in the body (Lazarus, 1999; Sapolsky, 2004). When these chemicals are secreted, other functional systems in the body are suppressed, such as the immune, digestion, and reproduction systems, by diverting blood flow to the muscles and the hormones released to speed up the heart rate (Sapolsky, 2004).

The brain is sophisticated enough to react to physical, emotional, and anticipated stressors as well as thought-induced stressors. During physical and emotional events, the stress response is helpful to employ and utilize energy to maintain life and mitigate pain, and the hormones secreted also act to sustain alertness for thinking (Sapolsky, 2004). Moreover, the brain adapts so well that even the anticipation of an impending stressful situation can initiate the chemical reactions in our body. Humans, like animals, possess the cognitive ability to anticipate stressors when danger is present, but, uniquely, humans can merely think about a situation and the thoughts can initiate the stress-response system, thereby placing the body out of homeostasis (Sapolsky, 2004).

One's capacity to deal with brief situations causing stress is efficient, but long-term provocation can further stress the body's functions and overtax the systems' efficacy. As mentioned earlier, the stress-response suppresses the immune, digestive, and reproductive systems. When the immune system is suppressed, our body is susceptible to disease and illnesses. The energy needed for repair and restored function is mobilized for emergency responses, while our digestive system remains stalled, holding on to nutrients, waste, and lacking the water for proper functioning. Chronic or regular initiation of the stress-response is known to set up physical factors that contribute to heart disease, energy depletion, sleep disturbances, auto-immune diseases, reproductive difficulties, depression, memory issues, and a host of other maladies (Lupien, Maheu, Tu, Fiocco, & Schramek, 2007; McEwen, 2013; Sapolsky, 2003a, 2003b, 2004).

The regular activation of the stress response chemicals change the plasticity of the brain which is particularly evident in the amygdala, the hippocampus, and the prefrontal cortex. The amygdala's role during the stress response provides identification of a stressful or threatening event and it initiates the coping response, thereby employing the sympathetic nervous system (Hölzel et al., 2010). The event, an amygdala-dependent cognition, is encoded as fear-related learning that is used for future retrieval. The amygdala and the hippocampus work together as part of the limbic system, which establishes, encodes, and retrieves memories. Glucocorticoid secretions impact numerous pathological outcomes including hippocampal-dependent cognition memory retrieval (Lupien et al., 2007; Sapolsky, 2003b). In brief doses, GC sharpens memory retrieval. Inversely, prolonged secretions of GC interfere with memory storage and retrieval (Lupien et al., 2007).

The regular activation of GCs from chronic stress can impede the physiological learning of adolescents in school, thereby creating a cyclical pattern to reinforce anxiety and mood dysregulation. Lupien et al. (2007) conducted a study including 40 participants, using a placebo and hydrocortisone infusion for 100 minutes in duration. The pre-frontal cortex seemed to be impacted to a greater degree when the GCs were elevated, impairing the participants' working memory (temporary storage) rather than the declarative memory in the hippocampus. It has been further argued that stress may pre-program subsequent memory performance and lead to increased vulnerability to psychological and behavioral dysfunction when experienced during critical periods of brain development, as seen in both animal and human studies (Schwabe, Joëls, Roozendaal, Wolf, & Oitzl, 2012). The literature, thus far, supports that stress, anxiety, and depression negatively impact adolescents as seen in somatic issues from day to day but also in increased risk-related behaviors that impede their health and future opportunities.

Although homeostasis is the goal of the physiological responses to stress, chronic stress can change the functionality of the bodies' processes. Adolescence is not only a time of many changes in brain development, it is also a significant period for the development of mental illness and lasting negative effects (Romeo, 2013). It was found that even a month after a chronically stressful period, unlike that of adults, the expected reversibility of those structural and functional changes had not improved. Effective interventions are needed to assist adolescents in reducing the ill effects of chronic stress, anxiety, and depression. Interventions without the side effects or potential long-term

effects (i.e., medications) are needed to alleviate a problem without unknowingly creating another problem for the future.

Psychopathology of anxiety and depression. Knowledge of the physiological processes of chronic stress provides a context in relation to the study of the psychological and behavioral dysfunction, or the psychopathology of anxiety and depression, as mental health disorders. Those suffering from depression have a greater risk (50%) of higher resting levels of GC than those not afflicted, while some continuously secrete GC (Sapolsky, 2004). The secretions of GC prepares the body for the next stressor, as seen in depression, which differs from anxiety, where the body is preparing for an overestimated risk or bad outcome. Anxiety induces a constant state of arousal, showing higher levels of epinephrine and norepinephrine without the higher levels of the GCs (Sapolsky, 2004). Sapolsky's work characterized anxiety as not fear but a distorted, persistent dread and foreboding by the imagination that elicits a constant state of mobilization that is used as a coping response.

The following descriptions for anxiety disorders and depressive disorders comes from the American Psychiatric Association who provides a manual called, *Diagnostic and Statistical Manual of Mental Disorders known as DSM-5[®]: Understanding Mental Disorders*. The DSM-5 is used by clinicians and non-clinicians as a standard for the criteria and common language used to describe symptoms of and treatments for mental disorders. The latest edition was published in May of 2013 (American Psychiatric Association [APA], 2013).

Anxiety. Anxiety disorders differ from normal feelings of nervousness. The APA lists common symptomology for anxiety disorders as: (a) overwhelming feelings of panic

and fear; (b) uncontrollable obsessive thoughts; (c) painful, intrusive memories; (d) recurring nightmares; and (e) physical symptoms, such as feeling sick to one's stomach, "butterflies" in one's stomach, heart pounding, being startled easily, and muscle tension. The term *anxiety disorder* is a group of classified mental illnesses that include generalized anxiety disorder (GAD), obsessive-compulsive disorder (OCD), panic disorder, post-traumatic stress disorder, separation anxiety disorder, and social anxiety disorder. Anxiety impacts over 25 million Americans, and it is the most common emotional disorder according to the APA (2013). Untreated anxiety disorders can push people into avoiding situations that trigger or worsen their symptoms. People with anxiety disorders are likely to suffer from depression, and they also may abuse alcohol and other drugs in an effort to gain relief from their symptoms. Job performance, school work, and personal relationships can also suffer (APA, 2013). Anxiety disorders become chronic and disrupt the functions of an adolescent both at home and at school.

Depression. Major depressive disorder (MDD) is a medical illness that affects how a person feels, thinks, and behaves, causing persistent feelings of sadness and loss of interest in previously enjoyed activities. Depression disorders manifest themselves in a person by feelings of sadness, feeling unmotivated, disinterest in life, feeling hopeless, being irritable, changes in appetite, trouble sleeping, feeling worthless or guilty, increase in restlessness, loss of energy, difficulty thinking and/or concentrating, or making decisions, and thoughts of death or suicide. Although many people feel this way at times, clinical depression interferes with daily living, and bouts lasting more than two weeks confirm a diagnosis of depression. Distinctions between depression and grief are made as they are not seen the same but can occur simultaneously. Three classifications are used

to identify depression: major depression, persistent depressive disorder, and bipolar disorder (Tear & Shah, 2005).

According to the APA (2013), depression affects nearly one in 10 adults each year. Depression can strike at any time, but on average, it first appears during the late teens to mid-20s. Women are more likely than men to experience depression. Some studies show that one-third of women will experience a major depressive episode in their lifetime. Clinical depression can lead to a variety of emotional and physical problems and is a reoccurring issue. Adolescents who develop depression are more likely to have it reoccur into adulthood. Unfortunately, 50% of those diagnosed with depression are likely to have a recurrence within 2 years and more than 80% will have a recurrence within 5-7 years of its first development (Hankin, 2006). It is a chronic illness that usually requires long-term treatment (APA, 2013).

Anxiety and depression during adolescence. Both anxiety and depression negatively impact adolescents physically, emotionally, behaviorally and can affect their future opportunities in life. As mentioned earlier, the physiology of stress can have detrimental effects on a person's body when occurring regularly. The psychopathology of anxiety is initiated by the stress response where epinephrine and norepinephrine continue to illicit a physical response in the body as a person prepares for a stressor. Depression, on the other hand, is a situation in which the body physically prepares for the next stressor, surging glucocorticoids into the body in an attempt to recover from a previous stressor. Emotionally, anxiety and depression interfere with daily life. Behaviorally, anxiety and depression, also interfere with daily living, but they also have lasting consequences.

Untreated or ineffectively treated anxiety and depression can institute a path for future actions that might lead to undesirable consequences and costly results. The National Alliance on Mental Illness (NAMI) states that 50% of all mental illnesses begin by age 14, and 75% begin by age 24 (2013). Additionally, 20% of 13 to 18 year olds have a mental health condition. NAMI also contends the average delay of treatment for mental illnesses from initial symptoms to intervention is 8 to 10 years. Even more alarming, they state that 50% of those aged 14 or older with a mental illness drop out of school; moreover, 70% of youth in the juvenile justice system have a mental illness (National Alliance on Mental Illness [NAMI], 2013). These statistics concur with the findings of Macomber (2009), reporting for the U.S. Department of Health and Human Services, who determined that there is an increase in risk-related behaviors of teens with mental illness over their healthy peers. Adolescents with anxiety and/or depression are more likely to use drugs, engage in sexual activity by 16, steal, destroy property, and they are twice as likely to drop out of school (Macomber, 2009). The third leading cause of death for 10 to 24 year olds is suicide, and 90% of all people who die by suicide have an underlying mental illness (NAMI, 2013).

Anxiety and depression are health concerns, not only during the period of adolescence, but they can potentially impact the adolescents into adulthood. Sixty percent of adolescents experiencing depression will have reoccurrences throughout adulthood (Clark, Jansen, & Cloy, 2012). Bittner et al. (2007) showed that anxiety continues into adulthood. In particular, anxiety impacts about 20% of the population, and it is the most common mental illness in the United States (NIMH, 2014). In addition, an estimated 2.2 million (9.1%) adolescents ages 12-17 in the U.S. had at least one major

depressive episode in the past year, which represents 9.1% of that age group (Kann et al., 2014). Even though depression impacts 9% of adolescents, girls are twice as likely, by age 15, to experience depressive episodes than boys (Federal Interagency Forum, 2014, NIMH, 2014).

There is a comorbid relationship between anxiety and depression even though they are distinct clinical constructs. About 25-50% of adolescents with depression have co-occurring anxiety, and between 10-15% of adolescents with anxiety have depression (Axelson & Birmaher, 2001). Many times adolescents who experience depression have a history of anxiety, and nearly one half of the adolescents diagnosed with depression have both conditions (<http://www.adaa.org/understanding-anxiety/depression>). Axelson and Birmaher (2001) stated that twin and family studies indicate that pediatric anxiety disorders likely share some genetic factors or influences. Comorbidity is not only possible between anxiety and depression but it occurs with other physical illnesses, such as issues with drugs or alcohol, and with an increased risk of suicide (NIMH, 2014). Diagnosis of each factor determines the appropriate treatment or combination of treatments.

Treatment for anxiety and depression. Effective treatments for anxiety and depression are needed to assist adolescents in developing a healthy self-concept, putting strategies in place for dealing with life's stressors, establishing prosocial behaviors, and develop tactics to help them continue in academic pursuits. The following three agencies: the Anxiety and Depression Association of America (ADAA), the National Alliance on Mental Illness (NAMI), and the National Institute of Mental Health (NIMH), all list psychotherapy and prescription medications, alone or in combination, as effective

treatments for both anxiety and depression. Under alternative or complimentary treatments, these agencies list mindfulness meditation, relaxation techniques, and acupuncture.

Psychotherapy. Psychotherapy, also referred to as talk therapy, has been studied to determine its effectiveness for treatment in both anxiety and depression.

Psychotherapies are categorized into five main types: (a) psychoanalysis, (b) cognitive, (c) behavioral, (d) humanistic, and (e) integrative or holistic. The two main types of psychotherapy commonly suggested for anxiety and depression include cognitive behavioral therapy, which is talking to a therapist about one's biased thoughts in relation to one's action; while, interpersonal therapy, focuses on one's behaviors and interactions when dealing with family, friends and others.

Cognitive therapists believe it is dysfunctional thinking that leads to dysfunctional emotions and behaviors. Behavioral therapy focuses on discussions around behaviors and why a person does certain things, and the therapist assists through repeated exposure called desensitization. A combination of the two therapies, such as CBT, focuses on the relationship between thoughts and behaviors, and helps to reframe one's thoughts of "I am not good at anything" to "I am good at some things" to create healthy behaviors. The practice of reframing thought patterns in between sessions is normally a part of CBT, or journaling is used by patients so that they can write down their thoughts to use during their next or succeeding sessions. As a briefer therapy model than psychoanalysis, on average, CBT is recommended for 16 sessions with weekly 50-minute meetings with the therapist, while psychoanalysis therapy can last a year or more. Three meta-analyses focused on the effectiveness of psychotherapy for anxiety and depression.

Erford et al. (2015) studied the impact of counseling for a total of 5,086 participants who were identified with anxiety, were using no pharmacology, and counseling was provided either individually, by group or family counseling, or with psychotherapy (not just CBT). A random effects model was used to analyze a total of 80 coded research articles that were either experimental or quasi-experimental clinical trials with single-group or comparison group (e.g., wait-list control, placebo control) and treatment-as-usual (TAU) methods. The effect sizes ranged from $d = .32$ (CI 95, .14–.50) for the TAU studies to a $d = .60$ (CI 95, .52–.68) for the wait-list studies (Erford et al., 2015). This study also looked at the lasting effects of counseling/therapy and the effect sizes, post treatment, ranging from 6 months to 24 months resulted in effect ($d = .02$) to medium effect ($d = .89$), but these results should be interpreted with caution as the samples were not a progression of the same studies but different studies measuring follow-up measurements, and the number of the studies that had data was small.

Similar to the meta-analyses found for counseling and/or therapy for anxiety, adolescents with depression fared comparably. In 2011, Erford et al. reported on a meta-analysis that included 42 research articles that studied school-aged youth ages 6-17 ($N = 3,472$) who were diagnosed with depression. The meta-analysis utilized a random-effects model, collecting and interpreting data from experimental and quasi-experimental studies. Their aim was to determine the effect of counseling and/or therapy treatment on depression, if any, in length of treatment and if the setting was by moderator, clinical, or school-based. The small to medium effect sizes ($d = \{.25 \text{ to } .55\}$) was found to differ from previous meta-analysis that used a fixed-effects model and the studies were of lesser quality and were less rigorous in their study selection (Erford et al., 2011). As for the

lasting effects, the results yielded small to medium effects ranging from $d = .16$ to $d = .46$ for periods from 6 to 24 months. Erford et. al. (2011) cautioned that the small number of studies measuring the lasting effects should be considered when using the data. There was no reported difference in the study that provided treatment in a clinical setting versus a school-based setting.

Another meta-analysis, published in 2015, looked at providing only CBT, administered via the computer, as a treatment for adolescents diagnosed with anxiety, depression, or both (Ebert, et al., 2015). The Internet-based computerized cognitive behavioral therapy (cCBT) was investigated for its usefulness for providing treatment when face-to-face treatment options were prohibitive for various reasons. This analysis included studies with youths under 18 years of age who had elevated baselines for anxiety, depression, or both, and they used a non-online control group. Thirteen studies were used for the meta-analysis, and the results had an overall mean effect (Hedge's g) size of $g = .72$ with a CI of 95% ranging from .55-.90. One moderator found that treatment effects were greater for over 13 years of age versus the effects for children who were under 13 years old ($g = .95$ vs. $g = .56$) (Ebert et al., 2015). Unfortunately, a limitation to the study was that any lasting effects were not measured beyond post-treatment.

The three meta-analyses indicated that psychotherapy, in general, provides a small to medium effect size for adolescents who are diagnosed with either anxiety or depression. It also was clear that lasting effects are difficult to determine given that few of the studies measured the carryover of treatment effects, and combining them into a meta-analysis did not provide powerful data given number of studies and inconsistency of

timespans measured post-treatment. This further supports the need to find treatments that are not only effective during treatment for adolescents diagnosed with anxiety or depression but it supports the need for lasting benefits while the adolescents' brains continues to develop in a critical time period of their lives.

Medication. Medication used with adolescents for depressive symptoms are selective serotonin reuptake inhibitors (SSRIs), with fluoxetine (Prozac) as the only SSRI found to reduce depressive symptomology efficaciously (Clark et al., 2012). They also noted that tricyclic antidepressants have shown little to no benefit in reducing symptoms. Typically, antidepressant medications are used to work with the neurotransmitters in the brain, such as serotonin and norepinephrine, while some regulate dopamine, which are all mood regulators in the brain (NIMH, 2014). These drugs need as much as six weeks to take effect, and they must be taken continuously, even when the patient feels better, to prevent relapse of the initial condition (NIMH, 2014).

Medication as a treatment regimen may pose other problems for adolescents. The Federal Drug Administration (FDA) has issued a warning on all antidepressants. Specifically, there may be a risk of suicidal ideation when taking antidepressants (Clark et al., 2012; NIMH, 2014). Furthermore, antidepressants have contraindications with many medications and herbal remedies, even when taken with a routine anti-inflammatory drugs, such as ibuprofen (NIMH, 2014). Beyond the warning for suicidal thoughts, the possible side effects include risk of seizures, headaches, nausea, jitters, insomnia, increased blood pressure, stiffness, and sweating, depending on which antidepressant a doctor prescribes (U.S. Food and Drug Administration, 2014). The

possible side effects list does not take into account any long-term problems that might arise when taking such medications for many years.

There are limited traditional approaches that have proven to be effective in the treatment of adolescent anxiety and depression. Given the moderate impact of CBT and the limited pharmacology available for safe and effective adolescent use, treatment for adolescent anxiety and depression remain elusive. The debilitating effects of both psychopathologies warrant investigation into alternate treatments.

Alternative treatments. Alternate treatments are available for anxiety and depression. St. John's Wort, an herbal remedy, used for mild to moderate depression has been found to be effective, but no difference has been noted for severe depression, and its use may interfere with other medication including birth control medications (NIMH, 2014). Regular exercise, eating a balanced diet, and getting enough sleep have shown to assist in symptomology reduction for anxiety (NIMH, 2014). Stress and relaxation techniques, acupuncture, and yoga and meditation have been used in treatment of both anxiety and depression (NIMH, 2014). One such meditation practice that is used is mindfulness.

Mindfulness defined. Mindfulness is a treatment technique for various maladies, including anxiety and depression, which was first used by Dr. Kabat-Zinn for pain relief. Mindfulness is a process that is characterized by a mental state of awareness within the present moment, and it encourages openness, curiosity, and acceptance without judgment (Burke, 2009; Hofmann et al., 2010; Hölzel et al., 2011; Kabat-zinn, 2003; Langer & Moldoveanu, 2000; Siegel, 2007; Vago & Silbersweig, 2012). Mindfulness has been described as an awareness of the body states, thoughts, sensations, the environment, and

one's orientation in the present moment, but it also includes the attention of self-regulation (Hofmann et al., 2010). Moreover, Hoffman et. al. (2010) contended that mindfulness is a method to assist people in responding to stressful situations—reflectively—not reflexively, helping them to mediate avoidance strategies and to alter a person's internal experiences when dealing with stressful situations. Further, they contended that the deep breathing, which is involved in mindfulness meditation, mitigates the activation of the sympathetic and parasympathetic nervous systems that is employed during stressful situations or thoughts.

Mindfulness-based therapies have universal foundations. For the purposes of this study, the working definition of *mindfulness* is the awareness that emerges through paying attention *on purpose*, in the present moment, and non-judgmentally to the unfolding of experience moment by moment. It is derived from the universal idea of dharma, *lawfulness*, or the *way things are*, which is not strictly connected with any philosophy or ideology or belief (Kabat-Zinn, 2003). It is important to note that the contemporary concept of mindfulness has broad applications and cross-cultural usefulness as an alternative treatment, given its non-secular derivation from traditional Buddhist practices.

Mindfulness-based treatments. Mindfulness treatments are mindfulness-based stress reduction (MBSR), mindfulness-based meditation, mindfulness-based yoga, and mindfulness-based cognitive therapy (MBCT). These treatments have increased, and research on them has expanded. Over 500 scientific articles on mindfulness were published during 2012 (Shonin, Van Gordon, & Griffiths, 2013). In 2009, Christine Burke reviewed 15 studies that specifically used mindfulness-based approaches with

children and adolescents (Burke, 2009). Adult populations have been the focus of the studies during the past two decades to reduce anxiety and depression.

MBSR is the merging of Eastern meditation practices into the Western model of medicine that was initially used by a medical doctor, Jon Kabat-Zinn. During the mid-1980s and 1990s, he used this process to assist patients in reducing the pain associated with their medical conditions. Most recently, mindfulness has been utilized and researched as an alternative therapy for anxiety, depression, attention-deficit hyperactivity disorder (ADHD), post-traumatic stress disorder (PTSD), and other emotional regulation disorders (Burke, 2009; Kabat-Zinn, 2003; Lang et al., 2012; van de Weijer-Bergsma, Formsma, de Bruin, & Bögels, 2012; Vøllestad, Nielsen, & Nielsen, 2012).

The Center for Mindfulness at the University of Massachusetts Medical School, to date, has trained over 20,000 individuals in their eight-week MBSR program.

Mindfulness-based stress reduction is one mindfulness therapy that is completed as a group, with 2.5 hour, weekly sessions for eight weeks. It was designed for participants to use their personal resources to effectively deal with pain, stress, and illness (Center for Mindfulness, 2015). The basis for this instruction of meditative practices can be used in a sitting, meditative pose, or it can be utilized while walking, eating, or during yoga exercises.

Mindfulness-based cognitive therapy (MBCT) is similar to Western cognitive therapy in that it is a “talk therapy” with a certified counselor, but it incorporates meditation and the acceptance of the present thoughts in a non-judgmental way to change behavior versus the idea of changing thoughts to change behavior (Greeson, 2009; Kabat-Zinn, 2003; Keng, Smoski, & Robins, 2011; Oberle, Schonert-Reichl, Lawlor, &

Thomson, 2011; Semple, Lee, Rosa, & Miller, 2010). Mindfulness-based cognitive therapy is an 8 week program done in group sessions of instruction for 2 hours in length, instead of 2.5 hours, that involves exercises where participants are taught to recognize their thoughts as indicators of depression, and they are taught to catch those thoughts before they deepen and before they have a relapse of depression. Initially, there is a 1:1 orientation session for each participant. They are trained to be in a *being mode* rather than a *doing mode*. The preferred being mode helps the participants disconnect from thoughts and feelings of being goal oriented and it allows for the acceptance of their present state (Scott, 1994). MBCT was created in 1995 by Drs. Segal, Teasdale, and Williams by combining the elements of MBSR with cognitive therapy to prevent depression relapse. After the initial 8 week sessions are completed, up to four, 2 hour reinforcement sessions are completed within 4 to 12 months later.

Both dialectical behavioral therapy and acceptance commitment therapy are considered mindfulness-based interventions. Although DBT was initially used for patients with borderline personality disorders, its use has expanded for depression, ADHD, binge eating, and PTSD. DBT starts with individual sessions and moves to group sessions for training; homework for practicing new skills is assigned. This form of therapy uses the teachings of mindfulness and acceptance along with cognitive therapy, focusing on mindfulness, emotion regulation, and distress tolerance. The sessions are slightly different in the hours needed and the duration of the program, but each session has a group skills component, homework, and, for adolescents, there are family group sessions as well. Similarly, ACT utilizes the teachings of mindfulness with cognitive therapy to foster psychological flexibility including committed action (Montgomery et

al., 2013). Treatments vary in length. They are offered for long-term and short-term periods, depending on the therapist. The following three meta-analyses were performed utilizing the methods of mindfulness-based therapies.

A meta-analysis was conducted reviewing the impact of MBT, which includes MBSR and MBCT, on adults who possessed anxiety or depression. The research included 39 studies with a total of 1,140 participants. Hofmann et al. (2010) found that through analysis, MBT provided a moderate effect size (Hedges's $g = .63$) on anxiety and mood symptoms (Hedges's $g = .59$) both with a 95% CI of [.53–.73] and [.51–.66], respectively. It is important to note that the effects at follow up, at 27 weeks with a median of 12 weeks, measured on average, the following: for anxiety Hedges's $g = .60$ (95% CI, .48–.71), indicating a moderate lasting effect, and for depression Hedges's $g = .60$ (95% CI, .48–.72), indicating a moderate effect for treatment sustainability. Additionally, MBCT versus MBSR treatments were reviewed to see the differences of effect sizes with respect to anxiety and depression. MBCT had large effect sizes, Hedges's $g = .85$ (95% CI, .71–1.00) for anxiety, and Hedges's $g = .79$ (95% CI, .45–1.13) for depression. Conversely, MBSR had moderate effect sizes of Hedges's $g = .49$ (95% CI, .42–.56) for anxiety, and Hedges's $g = .55$ (95% CI, .44–.66) for depression (Hofmann et al., 2010).

Another meta-analysis, looking at adult populations using mindfulness- and acceptance-based interventions and using populations with a diagnosis of anxiety and depression as a comorbid condition, was performed by Vøllestad et al. (2012). Their research included ACT along with acceptance-based behavior therapy (ABBT). Their inclusion of the two methods in the study recognized the differences in the therapies, but

they saw them as subtle in nature, because the therapies focused on the conceptualization of the mind, mental suffering, and psychotherapeutic cure (Vøllestad et al., 2012). Of the 19 studies that met the inclusion criteria ($N = 491$), 13 were uncontrolled studies. Vøllestad et al. reported an overall effect size of Hedges's $g = 1.08$, (95% CI, .81–1.34) for anxiety at post treatment. For those participants who also had depressive symptoms, the effect size was an overall Hedges's $g = .85$, (95% CI, .66–1.03). Looking solely at the controlled studies, the overall Hedges's for anxiety was $g = .83$, and for depression Hedges's was $g = .72$. There were no significant differences found with mindfulness-based treatment and the combined treatment packages of ACT and ABBT. Only seven studies included follow up data at three months.

One meta-analysis on mindfulness focused exclusively on adolescents and reviewed mindfulness-based interventions as a potential fit for delinquency intervention. Montgomery et al. (2013) included 15 studies that used ACT, MBCT, MBSR, and DBT as mindfulness-based interventions. The previously cited meta-analysis included ACT and ABBT, and the researchers determined the differences to be subtle in nature. Montgomery et al. also included ACT and DBT, which are comprised of behavioral techniques like that of MBCT. The study primarily sought to measure the efficacy of mindfulness therapies with adolescents and, secondly, to determine if these therapies provide an effective treatment for juvenile delinquency. Participant numbers were not included in the research article. No studies were found using MBCT with adolescents that met the inclusion criteria. Only one study used MBSR as the intervention; and although the effect size was positive, the CI range was not statistically different from zero. Of the ACT and DBT studies found for this meta-analysis, none measured anxiety or depression,

because the researchers were looking at measures of psychological well-being, school-attendance, medication use, and pain improvement.

Mindfulness-based treatments can provide a desirable alternative to traditional combined psychotherapy and drug-treatment options. The absence of medications allow for treatment without side effects or contraindications. Once the meditative practice is learned, it may be utilized during the mediating process of appraisal, when a person is faced with the causal antecedents impacting chosen emotions and possible reappraisal changes (Lazarus, 1999). Mindfulness has the potential for accessibility in a variety of versions of this treatment, which are in practice, and it allow for choices that fit lifestyle or age/physical abilities.

Problem Statement

Adolescents are negatively impacted by stress during their present reality which can impact their future opportunities. Reoccurring stress physically and emotionally sets the stage for the development of mental health and disease related issues. Two such mental health concerns that often initially develop during adolescence are anxiety and depression and carryover into adulthood. Anxiety and depression impact 8% and 9% of adolescents, respectively, while many go undiagnosed and/or untreated. Finding effective treatments that are safe and accessible is imperative as this is a vulnerable period of development both physically, emotionally and behaviorally.

Given the promising results on mindfulness-based therapy (MBT) on anxiety and depression in adult populations, determining if MBTs provide an effective treatment for adolescents would be prudent. The variability of mindfulness-based treatments, populations, and limited numbers of participants would best be reviewed meta-

analytically to synthesize which methods, if any, are effective for adolescent populations in the reduction of anxiety and/or depression. There are current reviews of the literature on the topic, along with randomized controlled studies to investigate the correlation of mindfulness-based treatments with a reduction in anxiety and depression, but many of the studies have small populations that are conducted given the availability of both treatment facilities and participants. Moderators, such as community-based treatments or school-based treatments, will need to be reviewed and the effectiveness based on gender will be important, given the increased rate of incidence in female adolescents with anxiety and depression.

Theoretical Rationale

Mindfulness has its roots in 2500-year-old Buddhist practices, but a more contemporary secular model has been constructed from mindfulness-based stress reduction (MSBR), which has been strongly influenced by John Kabat-Zinn. The adaptation of Buddhist practices and the more recent models share the desire for reduction in suffering, enhancement of positive emotions, and improvement in the quality of life (Vago & Silbersweig, 2012). The theoretical framework for this dissertation will be based on the fairly recent, multi-faceted structure of self-awareness, self-regulation, and self-transcendence (S-ART) as constructed from the work of David R. Vago and David A. Silbersweig in 2012.

Mindfulness and neurobiology. The S-ART framework addresses the complexity of the emotional and physiological elements of mindfulness-based treatments involved in clinical health and psychology. The framework is an integrative and neurobiological model influenced by empirical research, a growing understanding of

neurocognition, and the deconstruction of mindfulness meditation practices (Vago & Silbersweig, 2012). The instruments (at least eight) commonly used for the measurement of the state or trait of mindfulness are based on self-reports from participants who may have varying understandings of the conceptual nature of the questions, along with the variability in the definitions of mindfulness that is used in a given treatment program. These concerns are where the S-ART framework attempts to focus on the “neural systems of self-processing and mapping neurocognitive processes” (p. 5) to support the concepts and measures for mindfulness-based meditation treatments and meditation’s impact on neuro systems and neuro structures (Vago & Silbersweig, 2012). This support provides credibility to the physiological changes that occur when practicing mindfulness meditation and knowing what certain parts of the brain structure are used. The reification of the processes during meditation and, as that has been shown with regular meditative practice, provide further support that the S-ART framework may be a way to “unravel the cycle of dysfunctional attitudes toward the self and toward one’s relationship with the world” (Vago & Silbersweig, 2012, p. 6).

Biased self-processing is a common thread that is seen in both historical and contemporary models of psychopathology and that mindfulness may benefit. Although mindfulness practices do not make a distinction in evaluating experiences as being negative, positive, or neutral, these distinctions are what develop affect-biased attention during the appraisal of stimuli (Vago & Silbersweig, 2012). Vago & Silbersweig stated that over time, hypervigilance, avoidance, and disengagement delays become habitual, contextually self-relevant, and highly crystalized sensory-affective-motor scripts and schemas that dictate tendencies towards behavior. Vago & Silbersweig used past and

contemporary works by Aaron Beck (1964) and Jenny Yiend (2010) to support the psychopathology seen in anxiety and depression. The biased loop of “I am worthless” to “life is unfair,” consolidated with “my future is hopeless,” as theorized by Beck (1964), impacts the appraisal process that both Folkman and Lazarus (1987) stated that, upon appraisal, a person determines their available resources to cope with a stressor or event. When reification of the loop that misrepresents self occurs, upon each event when interacting with the world, the risk or vulnerability triggering psychopathology becomes increased as one ages (Vago & Silbersweig, 2012).

The S-ART framework attempts to conceptualize the emotional changes through the corresponding physiological changes as a construct on how mindfulness-based interventions impact practitioners. As mentioned earlier, there are at least eight scales for measuring state and trait mindfulness, including: (a) the Mindfulness Attention Awareness Scale (MAAS) (Brown & Ryan, 2003); (b) the Southampton Mindfulness Questionnaire (SMQ) (Chadwick, 2008); (c) the Philadelphia Mindfulness Scale (PHLMS) (Cardaciotto, 2008), (d) the Toronto Mindfulness Scale (TMS) (Lau, 2006), (e) the Freiburg Mindfulness Inventory (FMI) (Walach, 2006), (f) the Revised Cognitive and Affective Mindfulness Scale (CAMS-R) (Feldman, 2007), (g) the Kentucky Inventory of Mindfulness Skills (KIMS) (Baer, 2004), and (h) the Five Facet Mindfulness Questionnaire (FFMQ) (Baer, 2006). Although each measure has its own internal validity, methodological and conceptual issues remain that question the semantic differences in understanding by intervention participants, definition variability of mindfulness, and the heavy reliance on the reverse-scored items potentially implying that a low score on a scale supports the items opposite (Vago & Silbersweig, 2012). In spite

of the differences, researchers recognize the importance of the self-report measures, the S-ART framework is an attempt to, “expand upon the component processes by focusing on neural systems of self-processing and mapping neurocognitive processes that support mindfulness-based meditation practices onto such systems” (p. 5). An example of work that supports this theory would be that done by Zeidan, Johnson, Diamond, David, & Goolkasian (2010) who studied the short-term impact of mindfulness-based training on executive functioning, working memory, visuospatial processing, and the symptomology of fatigue, anxiety, and mindfulness. Neuroimaging has been used to measure and view the areas of the brain that are used during and after meditative practices, which provide foundational information for the framework and is a way to improve the measurement of mindfulness-based interventions (Chiesa, Calati, & Serretti, 2011; Colzato & Silk, 2010; Hölzel, Lazar, Gard, Schuman-Olivier, Vago, & Ott, 2011; McEwen, 2007; Smith-Osborne, Wilder, & Reep, 2013; Zeidan et al., 2010; Zelazo & Lyons, 2012).

Mindfulness defined and treatment efficacy. The idea of mindfulness has been examined by others as a state, a trait, a process, and an intervention used in both clinical settings and in psychology, which is utilized in treating stress and targeting emotion regulation (Vago & Silbersweig, 2012). Vago and Silbersweig contended that the various descriptions are problematic in synthesizing a comprehensive conceptual framework of self-processing, particularly in the context of neurobiological mechanisms by which mindfulness functions. “The S-ART framework operates using the underlying premise that our perception, cognitions, and emotions related to our ordinary experiences can be distorted or biased to varying degrees” (Vago & Silbersweig, 2012, p. 2). Using this framework, the use of mindfulness is described to reduce such biases through specific

forms of mental training and development of self-awareness (meta-awareness), self-regulation (effectively managing responses and impulses), and self-transcendence (positive relationships with self and others). The S-ART framework is the cultivation of mindfulness through intention and motivation, attention and emotion regulation, extinction and reconsolidation, pro-sociality, non-attachment, and de-centering.

Although different meditation styles share some commonalities, the S-ART framework, as applied to mindfulness, focuses on two core practices of focused attention (FA) and open monitoring (OM). Focused attention is a practice of concentration and insight, while open monitoring is a receptive practice where the practitioner is able to stabilize the mind and decrease rumination by developing a fully absorbed state of concentration. A secular and contemporary view of mindfulness is using increased awareness and responding skillfully to mental distress and maladaptive behaviors (Carmody & Baer, 2009; Hölzel et al., 2010; Kabat-Zinn, 1990).

Mindfulness has been incorporated into mindfulness-based interventions (MBIs). Kabat-Zinn (1990) originally developed a clinical-based intervention using mindfulness for stress reduction for medicinal purposes, called mindfulness-based stress reduction. Another form of mindfulness intervention is mindfulness-based cognitive therapy, originally developed for the preventions of depression relapse, while mindfulness-based relapse prevention (MBRP) is used for the prevention of substance use and addiction. Relaxation response for cardiovascular health and wellness is another form of intervention as is acceptance commitment therapy and dialectal behavior therapy, which were developed for a wide range of psychological problems and borderline personality disorder, respectively (Vago & Silbersweig, 2012).

The MBIs are structured from a generalized framework to decrease clinical symptoms and improve the participants overall health and well-being. Although not all MBIs look exactly the same, some programs “cherry pick” parts from all programs, and call it mindfulness and diminishes the scientific validity when making such modifications. The basic framework ideally is an eight-week program of meditation and Hatha yoga training, with 26 hours of formal instruction (eight, 2.5 hours classes), at-home meditation times (45 min./day for an average of 246 min./wk.), plus an all-day six-hour class the 6th week into the eight-week program (in some cases, a half-day class) (Carmody & Baer, 2009; Vago & Silbersweig, 2012). Mindfulness training is used while the participant is in a seated position, but it also can be implemented during activities such as walking, standing, and eating. Adherence to the basic framework structure will assist in measurement of mindfulness constructs in relation to any possible benefits to the participants.

Efficacy of mindfulness interventions are important in determining the value they can bring to clinical and non-clinical populations. Vago and Silbersweig (2012), identify the efficacy as an important factor in the theoretical rationale of S-ART, but also include the research in possibly short-term effects of meditative practice. Interestingly, some researchers have reported improvements in symptomology and in executive function during short-term training (20 minute sessions) using mindfulness-based practices (Zeidan et al., 2010), while Tang and Posner (2013) reported increases in white matter connectivity after 11 hours of training. Brain researchers are finding that the more mindful people are, the better they are at controlling emotions, which activates the middle part of the brain (amygdala and the dorsal anterior cingulate cortex) by engaging the

prefrontal cortex, which is the area for concentration, emotion regulation, and where attention is activated (Greeson, 2009). But the efficacy of all MBIs for anxiety and depression are not well understood and require more research at this point.

Statement of Purpose

The purpose of this study will be to determine the effectiveness of mindfulness-based interventions for the reduction of adolescent anxiety and depression. It is the aim of this research to determine if the positive impacts seen with current adult populations will exist with adolescent populations that are impacted by adolescents' anxiety and depression symptoms during critical periods of their lives.

Research Questions

1. Do mindfulness-based interventions (MBIs) provide an effective treatment for the reduction of anxiety?
2. Do MBIs provide an effective treatment for the reduction of depression?
3. Does the type of mindfulness-based intervention make a difference compared to other MBIs included in the analysis?
4. What are the longitudinal impacts of MBI after treatment, if any?

This study is limited by the number of adolescent population studies that will have employed different mindfulness-based interventions accounting for variability in populations and their psychopathology levels with anxiety and depression.

Potential Significance of the Study

Given that 9% of the adolescent population in the United States is impacted by anxiety and depression (Federal Interagency Forum, 2014), and that the symptoms of each contribute negatively to adolescents' health and future potential as an adult, it is

imperative that effective treatments are available. Current treatments for both anxiety and depression include a combination of psychotherapy and medications. Medications come with potential risks and side effects along with the need for continued administration for effectiveness. Both psychotherapies and medication are time dependent and may need multi-year commitments to prove to be successful (NIMH, 2014). Concurrently, there is an unknown impact of taking long-term prescription medications on a person during his or her formative years of both brain and accompanying systems.

Mindfulness-based interventions have shown benefits in adults that may alleviate the symptoms of both anxiety and depression, but with the multiple interventions available, along with many other interventions that are being used for treatment with adults, it is unclear whether the interventions are effective for adolescents. The implementation or access of these interventions could provide adolescents with school-based programs and/or additional community-based programs to get the treatment available they need. These mindfulness-based interventions could potentially be a preventative measure, for adolescents, who may have a predisposition toward anxiety and depression but who have not started to show prior to elevated symptoms.

Definitions of Terms

Anxiety – a mood state characterized by worry, apprehension, and somatic symptoms, which is similar to the tension caused when an individual anticipates impending danger, catastrophe, or misfortune. The threat the person is responding to may be real or imagined, internal or external. It may be an identifiable (cued) situation or a more vague fear of the unknown (uncued). The body often mobilizes itself to meet the

threat, whether this is real or imagined, muscles become tense, breathing becomes faster, and the heart beats more rapidly.

Depression – an emotional state lasting two or more weeks with feelings of sadness, feeling unmotivated, disinterest in life, feeling hopeless, being irritable, changes in appetite, trouble sleeping, feeling worthless or guilty, increase in restlessness, loss of energy, difficulty thinking and/or concentrating, or making decisions, and thoughts of death or suicide.

Disorder – a group of systems that can involve abnormal behavior, intense or persistent stress, or the disruption of a function.

Mindfulness – the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of an experience moment by moment.

Primary Appraisal – the determination of a stressor as credible and worthy of attention, while assessing the potential harm of that stressor.

Psychopathology – the scientific study of mental disorder(s). The field covers the theory, research, diagnosis, and treatment of psychological diseases. It is a wide field of study involving several disciplines. Psychopathology is also the study of patterns of behavior or mental processes that are abnormal or unusual.

Secondary Appraisal – according to Lazarus (1999), and additional the determination of a stressor as credible and worthy of attention, while assessing the potential harm of that stressor, which can occur simultaneously with a primary appraisal to determine if the individual has the resources to handle the present stressor.

Stressor – an agent, condition, or other stimulus that causes a state of mental or emotional strain or tension on an organism.

Stress-response – the physical and chemical manipulations the body initiates to restore the body to homeostasis.

Chapter Summary

Adolescence is a critical period in a person's life where many changes, both emotionally and physiologically, are taking place. While stress is a part of everyone's life, patterns of appraisal and coping are formed early in life. Somatic issues and other symptoms show up during adolescence and so, too, can psychopathology, such as anxiety and depression. Both anxiety and depression can impair the emotions and behavior that interfere with daily living, and they can obstruct opportunities that may present themselves in the future.

Effective treatments for anxiety and depression are needed, but commonly effective treatments for adult populations do not imply that they are effective for adolescents. The most commonly prescribed treatments for both anxiety and depression are medications and psychotherapy. Medications used by adolescents for anxiety and depression are prescribed, but the adolescents need to be closely monitored for effectiveness and side effects, such as increased suicidal ideation. Psychotherapy is also recommended for adolescents, usually talk therapies, but more notably, cognitive behavioral therapy.

An alternate form of therapy used with adolescents is mindfulness-based interventions. MBIs have shown to be effective in individual studies, but the participant numbers were small; therefore, they have not had the power to show transferability of

effectiveness across the population. This purpose of this research is to determine the effectiveness, if any, that mindfulness-based interventions have on adolescent populations that experience anxiety and/or depression. The following chapter will provide a basis of the existing research using mindfulness-based interventions. Using meta-analysis, the effectiveness of these treatments are determined for adolescents with a greater degree of precision, than reviewing individual studies. Finding ways to better manage stress, anticipate and recognize biased thinking, and act in prosocial ways to improve relationships is needed to assist this population now and in the future.

Chapter 2: Review of the Literature

Introduction and Purpose

The negative impact that stress has on adolescents is a problem, not only in their current reality, but into the future. Studies have shown that adolescents are subject to stress in their daily lives, particularly at school. Hjern et al. (2008) and Natvig et al. (1999) reported that students experience physical and socio-emotional ailments as a result of their experiences with stress. Both studies also found that stomach aches, headaches, school alienation, and relationship issues are some of the examples that were reported by adolescents feeling stress during the school year. Reoccurring stress can lead to psychopathology, such as anxiety, depression, issues with drug abuse, sleep disturbances, difficulty concentrating, and alterations in grey matter volume with subsequent neural veracity of the pre-frontal cortex (Lupien, McEwen, Gunnar, & Heim, 2009; Romeo, 2013). Adolescents who experience anxiety and depression often continue their patterns of assessment of stressful situations into adulthood. These patterns leave them feeling ill-equipped to deal with their present stressors and, if left untreated, may develop anxiety and/or depression, which lead to a higher rate of risk behaviors that impact their potential of completing school, getting and maintaining a job, and earning statistically less than their counterparts (Axelson & Birmaher, 2001; Macomber, 2009).

The psychopathology of anxiety and depression impact adolescents at a rate of 8% and 9%, respectively, and treatments that have been found to be successful with adults are being used with adolescents (Federal Interagency Forum, 2014; NIMH, 2011).

The most common treatment regimen for anxiety and depression is psychotherapy, such as cognitive behavioral therapy (CBT), interpersonal therapy (IPT), prescription medications, or a combination of both (Axelson & Birmaher, 2001, 2001; Bylund & Reed, 2007; Hankin, 2006). Effective treatments for adolescent populations differ from adult populations with respect to the prescription medications on the market with respect to both their effectiveness and risks (Bylund & Reed, 2007). The few medications that have demonstrated effectiveness have various side-effects, and they also warn of possible increased suicidal ideation (NIMH, 2011). The treatment regimen for both psychotherapy and prescription medications require long-term commitments and administration regularity for positive results (NIMH, 2011). A 2013 review of psychological therapies and antidepressant medications administered alone, or in combination, for treatment of adolescent depression stated that the data does not provide a clear determination of the most effective treatment (Paixão, 2013). The review further concluded that the data did not contradict the use of psychotherapy as an initial treatment but adding medication use only recommended when symptoms were severe and they should be used always in combination with psychotherapy as it may provide a protective effect of suicidal ideation. A 2010 meta-analysis indicated a small to medium effect size (.25–.55 (95%CI)) for psychotherapy, alone, on depression (Erford et al., 2011). Similarly, a meta-analysis studying the impact of psychotherapy on anxiety indicated an effect size range of a .32–.60 with a 95% CI, which is a small to medium effect size as well (Erford, Kress, Giguere, Cieri, & Erford, 2015).

There are treatment alternatives to traditional talk therapies, such as CBT and IPT, and prescription medications for anxiety and depression. Mindfulness-based treatments

have been studied with more frequency, during the past decade, with adolescent populations. While this approach is promising, further research needs to be done to determine the efficacy of mindfulness-based interventions.

Since anxiety and depression interfere with adolescents' daily living, and both have shown to impact their future outcomes, the need for effective treatments is essential. Even though talk therapies and medications are commonly used, they are not without issues of accessibility and risk. Mindfulness interventions can be learned and practiced independently, and they have shown no adverse side effects. The purpose of this study was to determine if mindfulness-based interventions are effective for the reduction of adolescent anxiety and depression. It was the aim of this research to determine if the positive impacts seen with adult populations exist with adolescents who are negatively impacted by their anxiety and depression symptoms during a critical period of their lives. This research was limited to studies that focus on adolescent populations that have employed different mindfulness-based interventions, accounting for variability in populations, and their psychopathology levels with anxiety and depression.

The following literature was reviewed to provide a sample of adolescent research that used various mindfulness-based intervention programs, which either measured the state or trait of mindfulness of the participant or the impact, if any, on the outcomes for a treatment population.

Mindfulness-based stress reduction. Internationally, mindfulness-based programs have been used as school-based interventions. These programs have used or measured mindfulness to assess their impact on adolescent well-being, stress, and depressive symptoms. A pilot-controlled trial in Hong Kong by Lau and Hue (2011) was

based on the decreased attention level of students and its effects on learning. A total of 48 students with low academic performance from two secondary schools took part in the intervention and control groups (which had no intervention). The age range of the participants was 14–16 years. It was hypothesized that the 6 week mindfulness-based program would increase well-being, reduce stress, and reduce the symptoms of depression (Lau & Hue, 2011).

The two schools were selected because the teachers of religious studies were enthusiastic and supportive of contemplative practice. Both were identified as *Band 3* schools, indicating they contained students with lower learning ability and performance in academics. The students in the intervention and control groups were matched based on background data. The intervention group attended a one-day retreat. The same instructor provided a 2 hour session each week for 6 weeks to the two intervention groups.

The intervention was modified and adapted using the mindfulness-based stress reduction program (Kabat-Zinn, 1990). Even though the interested teachers were from religious courses, the intervention was delivered with a secular approach and without religious terminology (Lau & Hue, 2011). The presentation to the participants was designed to increase concentration and reduce stress by using awareness.

During the 6 weeks, there were four main activities: (a) gentle stretching; (b) practicing awareness of self in thought and emotion during daily activities, such as walking, eating, sitting, standing, etc.; (c) performing a body scan; and (d) a loving-kindness practice for one's self and others around the world (Lau & Hue, 2011). A brief overview of the retreat and the six, 2 hour sessions were described but not indicated as a scripted curriculum.

There were five measures to assess pre- and post-intervention. Two were used to assess mindfulness, using both the Mindful Attention and Awareness Scale (MAAS) (Brown & Ryan, 2003) and the Freiburg Mindfulness Inventory (FMI) (Walach et al., 2006). To determine the levels of perceived well-being, they used, the Scales of Psychological Well-Being (SPWB) (Ryff & Keyes, 1995) and the Depressive Anxiety Stress Scale (DASS) (Lovibond & Lovibond, 1993, 1995) were used. Finally, the Perceived Stress Scale (PSS) (Cohen et al., 1983) was used to measure the students' perceived stress over the past month.

Chi-square tests were performed to check for statistical differences among the participants of the control and intervention groups in relation to gender, previous meditative practice experience, and religious faith, and no differences were found. This difference did not last after the post-assessment. The results revealed that the intervention group increased in mindfulness, while the control group decreased in mindfulness, over the 6 week period.

Post-intervention data was assessed using multivariate repeated measures (MANOVA). Comparing the groups, over time, the intervention group improved in mindfulness scores significantly, and the researchers also saw increases in perceived personal growth after the mindfulness training, but they did not see a change in other dimensions of well-being. Further analysis showed that the mindfulness program showed significant changes in reducing the depressive levels of the intervention group, post-intervention, compared to higher levels noted for the control group. However, the measurement of *perceived* stress was not found to be significantly impacted by the intervention program.

Attentional focus continues to be researched for many around the world. The previous study was located in Hong Kong and another study, focusing on lack of attentiveness, was located in the Netherlands (van de Weijer-Bergsma et al., 2012). Ten early adolescents, in the age range of 11-15 (five boys and five girls) and classified as ADHD, were the participants. A treatment center offered mindfulness training to the children and mindfulness parenting training to the families. All of the participants had at least one parent that attended the parenting training. The teachers and tutors of these children were asked to join in the study as well.

The study was of a non-experimental design. All 10 participants that consented and were able to attend were administered pre-tests. Two participants had a change in medication after the pre-test and were excluded from the results (van de Weijer-Bergsma et al., 2012). The treatment was designed as 8 weekly sessions, lasting 1.5 hours each. The hypothesis was that mindfulness training would increase the attentiveness of the participants and reduce their impulsivity.

The measures used for the participants' behavior were the Youth Self Report (YSR) (Verhulst et al., 1996); the Child Behavior Checklist (CBCL) (Achenbach, 1991), and the Teacher Report Form (TRF) (Achenbach & Edelbrock, 1986). Seven additional measures were used: one for executive functioning, the Behavior Rating Inventory of Executive Function (BRIEF) (Gioia et al., 2000); the MAAS (Brown & Ryan, 2003); the Parenting Stress Index (PSI) (Abadin, 1983); the Parenting Scale (PS) (Arnold, 1993); the Flinders Fatigue Scale (FFS) (Gradisar et al., 2007), assessing daytime fatigue and insomnia; the Subjective Happiness Scale (SHS) (Lyubomirsky & Lepper, 1999); and a

computerized baseline speed task and two sustained-attention tasks from the Amsterdam Neuropsychological Task (ANT) (De Sonneville, 2005).

The researchers outlined some of the activities and the structure of the training. It was noted that modifications were made to regular mindfulness exercises in order to adjust to the participants with ADHD (van de Weijer-Bergsma et al., 2012). The training was done in a stimulus-free environment that was highly structured, where an outline of the session was always visible with the sessions consistently starting and ending with short breathing meditation. The parental portion was similar, but it had four main components. The first was to be deliberate and fully present in a non-judgmental way. The second component was to take care of themselves; while the third was to accept the difficulties of their adolescents, and the fourth component was to respond rather than react to difficult behavior.

The results post-intervention with regard to behavior indicated only a significant reduction in externalizing on the father's behalf with no significance by the children or the mothers. No significant difference was noted in attention or internalizing. Neither the executive function assessment nor the mindfulness assessment showed a significant difference post-intervention. Only the fathers saw a significant difference in parenting stress reduction. The intervention did not produce the effects that were hypothesized.

A gender-specific study was found focusing on urban males (Sibinga et al., 2013). A small randomized, controlled trial was done assessing a school-based mindfulness instruction while others received health education. The intervention was based on mindfulness-based stress reduction programs. Both grades 7 and 8 males, N = 44, attending a small tuition-free middle school who had financial need and academic

potential were eligible. Students in foster care, or identified as having behavioral problems, substance abuse, developmental delays, or having significant psychopathology were excluded (Sibinga et al., 2013).

The program was delivered weekly for 50 minutes over 12 weeks, and the class was integrated into the school day. The instructor was an experienced health educator. The focus was on instruction in mindfulness-based practices and of being fully aware in a non-judgmental way. The control group was given a healthy topics structured program instead of the mindfulness practices of the intervention group. Pre-, post-, and follow-up assessments were taken. Measurements were used for mindfulness, rumination, emotion awareness, anger expression, conflict, anxiety, psychological symptoms, depression, perceived stress, and coping approaches.

At the baseline, there were no significant differences between the mindfulness intervention group and those receiving health instruction. Sibinga et. al. (2013) used a regression analysis on the completed post-test data, which indicated a significant reduction in anxiety, $d = .79$, and less rumination, $d = .64$. Among all participants, there was an association between the mindfulness subscale of “acts with awareness” and lower anxiety ($d = -.18$) (Sibinga et al., 2013, p. 800). The intervention participants also had significantly less self-reported angry temperaments ($d = .38$) and less anger reactivity ($d = -.03$). Forty of the participants consented to a cortisol collection at pre- and post-intervention, and overall, the cortisol output had increased for the control group at post-program, but the same was not true for the intervention group.

Beauchemin, Hutchins, and Patterson (2008) conducted a mindfulness meditation feasibility study that utilized both a pre- and post-test design without a control. The

hypothesis was that meditation would reduce stress and enhance social functioning for the 34 participants, each who had a diagnosis of a learning disability. The age of the participants was 13-18 years. They all attend a private residential high school in Vermont that specialized in serving students with a learning disability classification. There were four classrooms selected along with two teachers who participated in the intervention. Students who did not provide assent participated in a silent reading or other non-disruptive activity.

The pre- and post-measures are taken using the Social Skills Rating Scale (SSRS) (Gresham & Elliot, 1990), The State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), and additional questions were asked to assess the participants' likelihood of participating in or continuing with mindfulness meditation. The intervention began with a lengthy initial training with the primary investigator and a classroom teacher (Beauchemin et al., 2008). The first training with students lasted 45 minutes and it was jointly lead by the teachers. The primary interventions were meditation sessions that lasted 5 to 10 minutes and occurred at the beginning of each class period, 5 days per week for 5 weeks (Beauchemin et al., 2008).

The results at post-test indicated that the state and trait of the anxiety scores were significantly less post-intervention. The SSRS data showed at post-test that there was a significant improvement in self-reported social skills, a reduction of problem behaviors, and an increase in academic achievement. Additionally, the teacher-rated data for social skills, problem behaviors, and academic achievement were all statistically significant. The students reported positive feelings about the meditative practice, and most student

indicated they would change nothing about the program, while 20% reported they would increase the meditation time in class (Beauchemin et al., 2008).

Zylovska et al. (2008) conducted a feasibility study using mindfulness meditation as an intervention, but it included participants of mixed ages with adolescents and adults. The inclusion criteria for participation was that the person had to be at least 15 years of age and have with a diagnosis of ADHD. The participants were recruited through the UCLA clinical research program for ADHD via local advertising (Zylovska et al., 2008). The exclusion criteria were substance dependence, a history of psychotic illness, bipolar I disorder, mental retardation, borderline or anti-social personality disorder, conduct disorder, and chronic suicidal or self-injurious behavior (Zylovska et al., 2008). Diagnostic evaluations/interviews were conducted with the interested parties to determine participation based on the exclusion criteria.

The intervention consisted of an 8 week program with a once-per-week evening session, lasting 2.5 hours, and daily home practice beginning with 5 minutes and increasing to 10 minutes during weeks 3-5, and 15 minutes during weeks 6-8. The Mindful Awareness Practices format was described in the article. The goal of the training was to reduce ADHD symptoms, increase attention regulation, and decrease the associated symptoms of anxiety and depression.

The measures used a pre- and post-test that included the Beck Anxiety Inventory (BAI) (Beck, Epstein, Brown, & Steer, 1988), the Beck Depression Inventories for Adults (BDI) Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), the Child Depression Inventory (CDI) (Kovacs, 1992), the revised Children's Manifest Anxiety Scale (RCMAS) Reynolds & Richmond, 1978) for adolescents, and the Attention Network Test

(ANT) (Fan, McCandliss, Sommer, Raz, & Posner, 2002), a computerized measure for attention. In addition measures were used: the Trial Making Test (Reitan, 1979), assessing attentional set-shift and inhibition; the Digit Span Test (Wechsler, 1981), to measure working memory; and the vocabulary subtest of the Wechsler Adult Intelligence Scale Revised or the Wechsler Intelligence Scale for Children (3rd edition) (Wechsler, 1981, 1991), measuring verbal IQ (Zylowska et al., 2008).

Twenty-three participants completed the study. At post-intervention, there was a significant reduction in ADHD symptoms for inattentiveness, hyperactivity, and combined. In adults, both depression and anxiety levels were significantly decreased. No changes were noted in the adolescents for depression or anxiety.

Himmelstein, Hastings, Shapiro, & Heery (2012) measured the impact of mindfulness training for incarcerated youth in an urban setting. “We hypothesized that self-reported mindfulness and self-regulation would significantly increase, and perceived stress would decrease as a result of participation in the treatment intervention” (Himmelstein et al., 2012, p. 151). A total of 32 adolescents were recruited in the juvenile detention center for this research.

Three scales used for assessing the data collected, both at pre- and post-intervention, they were: the PSS (Cohen et al., 1983), the MAAS (Brown & Ryan, 2003), and with the Healthy Self-Regulation Scale (HRS) (West, 2008). These are all self-reports that were completed prior to the intervention, and they were administered by staff.

The intervention was delivered once a week, for an hour, over 10 weeks. Each session began with a mindfulness meditation activity followed by a specific topic for discussion: basic goodness, mindfulness, active listening, impulse regulation, emotional

intelligence, empathy, forgiveness, transforming negative core beliefs, cause and effect, and interpersonal relationships (Himmelstein et al., 2012). The participants were encouraged to practice the concepts they discussed and use the meditative practices in between the scheduled sessions.

All initial participants completed the intervention sessions; however, two failed to complete the post-test so their data was not used in the results. An ANOVA was completed. The change in mindfulness measure was not significant. The results did show a significant decrease in self-reported stress. Self-regulation also had a significant increase in post-test results. The hypothesis was confirmed in the area of self-regulation and stress; however, there were no noted changes in mindfulness, which was anticipated.

Metz, et al. (2013) conducted a study on the impact of the Learning to BREATHE program on the emotional regulation of adolescents using mindfulness practices. The BREATHE program is quasi-experimental in design, and the study used two matched suburban public high schools in Philadelphia. The schools served middle- to high-income families, and the students who were taking a concert choir course were asked to participate. The participants were assigned to the BREATHE intervention group or to the control group who took the regular course curriculum. The first 15 to 25 minutes of each class session was conducted with the BREATHE instructions, and the remainder of the class period the students received regular music instruction. There was no randomization built into this study.

The main purpose of the research was to assess the effectiveness of the BREATHE program for increasing emotion-regulation skills, increasing efficacy, and reducing perceived stress and somatic complaints. Therefore, to assess the concepts, age

and self-report data were collected using the Difficulties in Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004), the Psychosomatic Complaints Scale adapted from the Somatized Index of the Child Behavior Checklist (Achenbach, 1991), and the Affective Self-Regulatory Efficacy Scale (ASRES) (Bandura, 2006). Cronbach's alpha was used for the reliability of the pre- and post-tests. Both Chi-squared tests and independent t tests were computed to assess the statistical differences (Metz et al., 2013).

The results showed a significant reduction in stress level from the pre- to post-intervention, and the reported total difficulties in emotion regulation was found to decrease significantly as well. Decreases in lack of emotional awareness, limited access to regulation strategies, lack of emotional clarity, and psychosomatic complaints were all significant. In addition, there was a significant increase in affective self-regulatory efficacy. The results did confirm the programs' goals for this study.

Mindfulness-based cognitive therapy. Semple et al. (2009) conducted a randomized study of mindfulness-based cognitive therapy for children (MBCT-C) for participants aged 9-13 years. The goal for the study was to increase social emotional resiliency through the enhancement of mindfulness attention. The hypothesis for the study was that MBCT-C would show greater reductions in (a) attention problems, (b) anxiety symptoms, and (c) behavioral problems over the control group. These student participants were all attending a reading tutoring program, and they had significant reading difficulties. A total of 25 children (15 girls and 10 boys) began the program and completed all three assessments measuring anxiety and behavior. The participants were first matched by age and gender, then they were randomly assigned to four independent groups (Semple et al., 2009). Two groups consisted of 9 and 10 year olds; another two

groups consisted of 11- and 12-year-old children, and there was a group, each, of 9 and 10 year olds and a group of 11 and 12 year olds who were the wait-list control groups.

The adapted concepts from MBCT were formed to create an age appropriate, manualized intervention that is delivered in a group format for 12 weeks. The inclusion of mindfulness was to focus on improving self-management of attention, promoting decentering during appraisal, increasing self-regulation and enhancing social emotional development. Each weekly session was a 90 minute group training, which required daily brief home exercises. The measures used for this study were the CBCL (Achenbach, 1991), the Multidimensional Anxiety Scale for Children (MASC) (March and Parker, 1999), and the State-Trait Anxiety Inventory for Children (STAIC) (Spielberger, Edwards, Monturi, & Lushene, 1973).

The results for the first hypothesis, attention problems, were not initially significant, but the time-lagged crossover was significant. The group differences for the second hypothesis, anxiety, were not found using the self-reporting, but some individuals saw reductions. The students who initially had higher levels of anxiety did see significant reductions at the end. The third hypothesis, behavior problems, showed a difference during the treatments, but nothing was significant at post-test or at follow-up. When analysis was completed using age and gender, there was no significant differences.

As a post hoc hypothesis, the analysis showed changes in attention as a mediator for behavioral problems. Correlational investigation showed a significant positive relationship between the CBCL attention problems with changes in behavioral problems at $p < .01$ (Semple et al., 2009). Reductions in one area produced reductions in the other.

Mindfulness-based yoga. Laura Santangelo White (2012) provided mindfulness yoga practices to girls in Grades 4 and 5. This study falls under the category of mindfulness-based stress reduction using yoga for awareness. The students were recruited based on their: (a) willingness to participate in weekly classes for the length of the intervention, (b) willingness to complete daily homework 6 days each week, (c) ability to speak, read, and write the English language, (d) ability to pay attention for one hour, and (e) ability to participate in physical poses (White, 2012). The analyzed sample size was $N = 155$.

All participants were assessed using four different scales. The first was the Feel Bad Scale (Lewis, Seigel, & Lewis, 1984) that measured perceived stress. The second was The Schoolagers' Coping Strategies Inventory (Ryan-Wenger, 1990). The third was The Global Self-Worth Scale (Harter, 1985) for measuring self-esteem, and the last was the Healthy Self-Regulation Scale (West, 2008), a subscale from the Mindful Thinking and Action Scale for Adolescents.

The design was a randomized-cluster, repeated-measure intervention, with a wait-listed control group (White, 2012). The eight-week intervention participants met for one hour each week with 10 minutes of homework for the other 6 days of the week. The results after intervention indicated that there were no significant differences in perceived stress between the intervention and control groups. Also no significant differences in the coping measure between groups were indicated, but over time, the intervention group was more likely to increase their stress scores. In self-esteem measures, no significant differences were found between the groups, but over time both, groups reported a significant increase in self-esteem and in self-regulation (White, 2012).

Acceptance and commitment therapy. A combined pilot study from Australia and Sweden was conducted with adolescents between the ages of 12-18 and 14-15, respectively (Livheim et al., 2014). The Australian study was a randomized control study for female groups plus one replication for a male group. All adolescents were identified with mild to moderate depressive symptoms because the counselor/instructors were asked to exclude those with severe symptoms. There were 66 participants, with an active control of individual attention given by the school's health care group. The eight-week ACT intervention participants were instructed through a manualized ACT program from the Association of Contextual Behavioral Science. The pre-testing showed the intervention group as having higher scores (Cohen's $d = .54$) for depression and significantly higher scores (Cohen's $d = .77$) in dysphoric subscales. Post-intervention, the effect size results were Cohen's $d = .86$ for all intervention groups, and Cohen's $d = .78$ for the girls only. The dysphoric effect size was significant, as well, with a Cohen's $d = .77$ for all, and Cohen's $d = .70$ for the girls only.

Similarly, the Swedish study used an eight-week manualized program, however, it was condensed into six weeks for delivery. The participants were ages 14 and 15 and they were identified with above the 80th percentile for the scales measuring psychological problems. In this study of the 32 participants, only nine were male. The pre-testing of the groups indicated that perceived stress was marginally higher (Cohen's $d = .70$) than the control group, and significantly higher for depression (Cohen's $d = 1.04$). The researchers noted that the mindfulness component for ACT was not administered, as is normally the case, through CD nor downloadable via the Internet for practice. In spite the lack of a practice medium, the mindfulness scale did reflect an increase in

mindfulness with the intervention group (Cohen's $d = .75$). The overall effect for the primary outcome of stress was highly significant (Cohen's $d = 1.20$) as was the secondary scale for anxiety was large with a Cohen's $d = .80$.

Dialectical behavior therapy. The literature found for Dialectical Behavior Therapy focused on adolescents with borderline personality disorders, suicidal ideation, and self-harm. Therefore, a review of the literature for DBT was not connected with the researcher's focus on anxiety and depression.

Discussion

Eleven empirical studies were found and reviewed that either used mindfulness as an intervention or as a measurement to find a correlation with another variable. Of the studies using mindfulness as an intervention, only eight measured mindfulness at pre- and post-intervention. In post-test measurements, the significance across the studies appeared to be in anxiety, attention, stress, depression, executive functioning, and mindfulness. *Appeared* is used because the measurement scales were not the same for all studies and the sampling sizes varied greatly.

Other limitations were noted where some studies used homogenous participants, by gender, race, or condition, which limited the applicability, and the results could not be used to generalize across populations. Multiple studies noted that reductions in depression occurred, but it depended on the pre-test level of depression as to whether a significant difference was found. Initial measures proved important in reviewing the results. This may further indicate that introduction of mindfulness as an intervention would be appropriate for some of the population but not for others. Further research would be required to make that assertion.

Some of the programs used scripted curriculum while others made modifications to previously used interventions. Another limitation found in the review is the consistency and lack of replication of the intervention models among and between the age groups reviewed. Clearly, the research is in an infancy stage, even though the idea of mindfulness-based stress reduction in the United States has existed since the 1990s. Consistency and continued replication will be important to identify the usefulness of the mindfulness treatment.

Using mindfulness as an intervention, the researchers were looking for varied outcomes measuring well-being, depression, rumination, executive function, inhibition control, ADHD symptoms, attention, behavior, etc. Finding the relationship between mindfulness and peoples' emotional self and physiology will take time and replication. Based on the primary studies, it would be difficult to attribute the intervention to having a singular impact, or varied impacts, on anxiety or depression because the participant numbers were too small and there was a variance in the variables measured.

Conclusion

Stress evokes a physiological response in our bodies that when induced regularly, can lead to psychopathology of anxiety and/or depression. Adolescents are particularly at risk due to the stage of growth of their brains and the negative impacts anxiety and depression have on their daily lives and on their futures. Anxiety and depression increase adolescent risk for dropping out of school, using drugs, and going to jail. Initial development of anxiety or depression happens by the age 14 and increases in probability of development by age 24. Girls are particularly at risk of developing anxiety and/or depression as adolescents.

Although the most common course of treatment is psychotherapy, pharmacology, or both, it is important to find effective treatments for anxiety and depression to be used during the period of adolescence—before the adolescents become victim to the emotional dysregulation outcomes that plague nearly 9% of our adolescent population. Medications come with side effects and have warnings associated with increased risk of suicidal ideation for adolescents. Another caveat is that medications only work when they are used. Therapy has shown to have moderate effect sizes in the meta-analysis reviewed, but it is unclear if the effects last over time or require booster sessions of therapy.

Mindfulness-based interventions have shown moderate to large effect sizes in adult populations with anxiety and depression. Mindfulness-based interventions are being used with adolescent populations, but to date, a meta-analysis of the data has not been completed. It is the aim of this research to determine if the positive impacts seen with current adult populations exist with the adolescent populations that are negatively impacted by their anxiety and depression symptoms during this critical period of their lives.

Chapter 3: Research Design Methodology

Introduction

There is a growing body of literature that has examined the use of mindfulness-based interventions and its effects on stress, anxiety, and depression. The literature is varied in the use of mindfulness application paired with cognitive therapy, mindfulness-based yoga, and the practice of mindfulness skill-based instruction and its implementation over time. The literature has a broad usage for medical therapy, psychological therapy, and personal holistic practice. The purpose of this study was to determine if mindfulness-based interventions are effective for the reduction of adolescent anxiety and depression. It was the aim of this research to determine if the positive impacts seen with current adult populations exist with adolescent populations who are negatively impacted by anxiety and depression symptoms during a critical period in their lives.

In the absence of any previous meta-analysis to determine if mindfulness is an effective intervention, compared to current treatment regimens for adolescents, this research was to examine the studies that are directly related to adolescents and the impact of the mindfulness interventions on their reduction in anxiety and/or depression psychopathology. Also the goal of this research was to determine which method of mindfulness-based interventions has the greatest influence, on the symptoms of adolescent anxiety and depression.

Systematic Review of the Literature

The empirical studies revolving around the use of mindfulness-based interventions were researched, and a systemic review was completed based on the criteria. All of the studies selected were empirical studies that examined the use of mindfulness-based interventions and measured the constructs of stress, anxiety, and/or depression as a dependent variable. Randomized control trials were used along with quasi-experimental studies that all used a control group for comparison. The process for providing the mindfulness intervention ranged both in delivery methods and in duration of implementation, some included follow-up data. Many of the studies measured multiple dependent variables, such as optimism, depression, stress, cortisol levels, adult rating scales, attention, behavior, social competence, and ADHD rating scales, while others did correlational studies with mindfulness, but for this systematic review and meta-analysis, the focus was specifically stress, anxiety, and depression for effect size determination.

Mindfulness-based interventions have been found in the broader research for adults and adolescents used for reduction of stress, anxiety, and depression, clinical and non-clinical samples. Given the small number of studies, clarity was needed to determine the delivery method, if any, for adolescents and the duration of the intervention that proves most effective to alleviate stress, anxiety and depression of this population. A synthesis of the current research that was available is required in order to determine the effectiveness of mindfulness-based interventions as a valuable and viable intervention for adolescents when other adult effective treatments have varied outcomes with this population.

The goal of this study was to answer the following questions.

1. Do mindfulness-based interventions (MBIs) provide an effective treatment for the reduction of anxiety?
2. Do MBIs provide an effective treatment for the reduction of depression?
3. Does the type of mindfulness-based intervention make a difference compared to other MBIs included in the analysis?
4. What are the longitudinal impacts of the MBI after treatment, if any?

Criteria for inclusion and exclusion. The databases searched included APA PsycNet, Cochrane, Education Source, ERIC, JSTOR, Medline, ProQuest, PubMed, SAGE, and Science Direct, and they were accessed using the search criteria keywords: mindfulness, mindful, stress reduction, mindfulness therapy, meditation, intervention and students, youth, adolescent and early adolescent, MCBT, MBCT-C, ACT, DBT, MSBR. Additionally, the words, treatment, program, and prevention were used in place of the word of *intervention*. The intervention types included were mindfulness yoga, mindfulness-based cognitive therapy, and mindfulness meditation. Studies not providing interventions, but have collected data to find correlations were not included in the analysis. The primary focus was the inclusion of randomized control studies that served participants of adolescent ages, 11-18. Peer-reviewed articles were assessed for the inclusion criteria, and bibliographies were searched for other relevant sources. Additionally, dissertations and conference papers were sought for possible inclusion, and the bibliographies were analyzed for possible inclusive studies. An attempt to acquire segregated data was made when instrument data was shown combined in the research articles and the instrument measures separate constructs in subscales.

The exclusion criteria were medical research papers in relation to severe mental disorders or medical conditions such as cancer and pain relief from disease. Studies that included age ranges below 11 were excluded unless the median age range fell within the inclusion criteria. Although inclusion of 19 and 20 year olds were considered if the median age of the participants fell within the inclusion criteria. Correlation studies were not included because the measurement of the constructs will not work in determining effect size with intervention-based studies. Qualitative studies and literature reviews were excluded in order to statistically measure the effect size of the constructs in this study. All of studies included were available in English.

The studies were coded such that the following variables could be explored as moderators of the mindfulness effect.

1. Types of studies. Experimental and quasi-experimental studies were sought due to their strength for analysis and application for determining the effect of an intervention on the participants who are reflective of the population served.
2. Types of participants. The participant age range of interest is adolescents ranging in age from 11-18.
3. Types of settings. Clinical and non-clinical studies were used, noting the use of identified psychopathology participants and the severity of psychopathology in the analysis. School-based and community-based settings were explored during the analysis for effect size differences.
4. Types of intervention. Mindfulness-based interventions, including MBSR, MBCT, ACT, DBT, mindfulness-based yoga, mindfulness in schools program

(MiSP) and other forms of mindfulness-based meditations, were included to determine the best delivery method based on effectiveness.

5. Types of outcome measures. Studies that provide sufficient data for one or more of the constructs were used in determining the effect size for anxiety and/or depression were included in this analysis. Others studies with insufficient data were excluded in the analysis.
6. Intervention/treatment model. The intervention model's specifics for duration of treatment and home practice is noted; instructional versus practice length and follow-up timeframe, if any, is noted.
7. Timeframe. The timeframe for study retrieval was the past 10 years. Ideally, the most current research was of most interest for those considering mindfulness as an intervention to assist in the reduction of anxiety and depression symptoms of adolescents.

Coding of articles. The articles that met the inclusion criteria were reviewed using a coding instrument. The instrument contained categories that included bibliographical information, the studies' design, the age range of participants, the number of participants, the intervention used, the duration and frequency of the intervention, if follow-up data was collected, the subject population—either clinical and non-clinical—and the primary goal.

To ensure coding reliability, a random 20% audit of the data was completed by a previous doctoral candidate who used coding for his or her own dissertation, and has no connection with the research contained in this analysis. The coding instrument was used to allow for replication.

This meta-analyst established the rules to determine which scales were used in the studies that have more than one instrument that measured the same construct. According to Lipsey and Wilson (2001), different measures will often appear in a study that measure the same construct as well as different measures used in various studies measuring the same construct. When presented with two or more instruments that measured the same construct the self-reported measure was used first and if there were two or more self-reported measures the one most commonly used across studies was chosen and used for analysis. All of the statistics from the primary studies were converted into effect size statistics using the Comprehensive Meta-Analysis software, version 3 and this software was used for the calculations needed for moderator analysis.

Statistical Procedures

Outcome measures for anxiety and depression are common among the selected studies; however, the instruments to measure the outcomes differ. In order to address the variability of the instrument tools used to measure the same constructs, such as anxiety and/or depression, the use of standardized mean difference is essential. This procedure creates a uniformity in the results from various psychometric tools used to measure said variables. The standardized mean difference or the *d*-index, was used to uniformly value the effect size of the studies to compare the outcome measure(s) of a study. When comparing the effect sizes of the studies, the standardized mean difference was used from the provided data or it was calculated if it was not already expressed in standard terms.

Using a common metric is necessary, and the respective standard error for each study indicates the precision of the effect size of a study. Because all studies do not use the same scale, a standardized mean difference will need to be calculated to create an

index that is comparable across studies (Borenstein, Hedges, & Rothstein, 2007). Cohen's d could have been used for the purposes of this study, but given the small number of participants in the studies and the difference in instrumentation used to measure the constructs Hedges's g provides for a standardized mean difference with a bias correction. Therefore, Hedges's g was calculated for all studies to measure the within-group effect sizes for anxiety and depression.

Once these values were collected, the weighting of the values was done using inverse variance to accurately give proportional weight to those studies that have more power or value to their effect size of an intervention or treatment. Although the studies share commonality, they are not the same and would be imprudent to assume the effect sizes are the same. To account for the variation among the studies, a random effects analysis approach begins by assuming that the true effect sizes for individual studies are normally distributed. The weighting was an effort to use the observed effects as a way to calculate an estimated population effect. A tau-squared (T^2) calculation was used to determine the between-study variance, while the within-study variance was observed and collected from the study data. Using random effects analysis, it looks at both, within-studies and between-studies variance, and uses both parts when assigning the weights (Borenstein et al., 2007).

The power of the random effects model is that it accounts for the weighting of effect sizes to provide a proportional value to the individual study, because it acknowledges the individual moderators, such as age or gender, among the selected studies. Finding a true mean effect is the reason and value of meta-analysis in determining the impact of the independent variable on the dependent variable.

An effect size computation is largely dependent upon three key factors: (a) the measure of the outcome variables; (b) the design of studies being reviewed; and (c) the statistical analyses that have been reported (Lipsey & Wilson, 2001). The key metric for the calculation of effect sizes for this work was Hedges's g , due to its incorporated correction for bias for small sample sizes (Borenstein et al., 2009). The scale used for interpretation of effect size magnitude was one developed by Cohen (1977, 1988) but referenced as a widely used convention by Lipsey & Wilson (2001). Effect size (ES), when reviewing behavioral science research for standardized mean difference is considered small with an $ES \leq .20$, medium $ES = .50$, while large $ES \geq .80$ (Lipsey & Wilson, 2001).

Publication bias. One short-fall of meta-analyses is that overall effect sizes can be overestimated based on publications bias. Most mindfulness studies are small, so excluding them and only using large studies is not recommended. In order to account for publication bias, a funnel plot was created to determine the effect size changes, accounting for the potential of the research not found using the search criteria key words and databases. Ideally, the funnel plot shows symmetry, however, if many of the smaller studies show to one side, Duval and Tweedie's Trim and Fill method is used to remove the most extreme small studies (Borenstein et. al., 2009). Using this procedure requires a recalculation of the effect size by providing an unbiased estimate of effect size. The fill portion of this model was computed and adds back in the original studies and its mirror image to readjust the confidence interval.

Chapter 4: Results

Introduction

As stated in Chapter 1, this study meta-analytically combines research that examined the use of mindfulness-based interventions with adolescents, measuring anxiety, depression and/or stress, to determine if MBIs are effective in reducing associated symptomology. This chapter reveals the results organized by the research questions as stated in the first chapter. The studies that met the inclusion criteria are presented in Figure 4.1, indicating the study name, participant population information, location, construct measured and the MBI used for intervention, along with the type of control group used. Given the negative impacts associated with adolescent anxiety and depression, these two constructs are discussed separately and then it looks at the effect of MBIs on stress as it is associated with the development of disease and psychopathology. Finally, the issue of publication bias was reviewed for the collection of studies found that met the inclusion criteria.

Research Questions

1. Do mindfulness-based interventions (MBIs) provide an effective treatment for the reduction of anxiety?
2. Do MBIs provide an effective treatment for the reduction of depression?
3. Does the type of mindfulness-based intervention make a difference compared to other MBIs included in the analysis?
4. What are the longitudinal impacts of MBI after treatment, if any?

Author	MBI	Research Type	Control	Total N	Age(s)	Setting	Outcome Measure	Treatment Model	Follow-up Data	Measure
Livheim et al. 2015	ACT	Quasi, Female randomized into treat and control, males were not, single sex groups	TAU (18)	51	12 - 18	High School, Manualized ACT program, TAU Standard care by School Counselor	Depression	Manualized 8 week group program delivered in school	n/a	RIAD-2
Livheim et al. 2015	ACT	RCT 1:1 Female, 2:1 Male, Single sex groups	TAU (17)	32	14 - 15	High School, Manualized ACT program, TAU School/Nurse Counseling	Stress, Anxiety and Depression	6 X 90 mins/weeks, after school	n/a	PSS DASS - A DASS - D
Swain et al. 2015	ACT	RCT, Active and Waitlist Control	CBT(10), CBT waitlist (23)	49	7 - 17	Clinical, Therapists	Anxiety, Depression	10 x 1.5 hrs. weekly, group	3 months	MASC-C CDI
Hayes, L. et al. 2011	ACT	RCT	TAU (11 completers)	38	12 - 18	Clinical	Depression	ACT individual sessions average # 21, TAU average session # 16	3 months ACT(8), TAU(4)	RADS-2
Mehlum, L. et al. 2014	DBT	RCT, single blind randomized trial	Enhanced Usual Care (EUC) 19 weeks of 1x/wk care	77	12 - 18	Outpatient clinic	Depression	60 min/wk individual therapy and 120 min. 1x weekly multifamily skills session, phone coaching as needed	n/a	Dep. SMFQ (self report) and MADRS (interviewer)
Goldstein, T. et al. 2015	DBT	Pilot Randomized Trial 2:1 ratio	Standard of Care (SOC) (6)	20	12 - 18	Outpatient clinic	Depression	60 minuter, 1/wk individual, 1/wk group for months 1-6, up to 36 sessions over 12 month period, telephone coaching as needed	n/a	KSADS assessment DRS (depression rating scale) subscale
Kuyken, W. et al. 2013	Meditation	Quasi, Non-randomized controlled parallel group vs. matched control group	TAU (Personal, social, health and religious studies) (266)	522	12 - 16	School	Depression	Manualized, 9 scripted lessons 1x/week	3 months	PSS CES-D Depression

Figure 4.1. Comprehensive study inclusion data.

Author	MBI	Research Type	Control	Total N	Age(s)	Setting	Outcome Measure	Treatment Model	Follow-up Data	Measure
Sibinga, E. M. S. et al. 2014	MBSR	Mixed Methods, RCT	Active Control Healthy Topics (HT) (15) 8 week programming	35	13 - 19	Non-clinical setting	Stress and Anxiety	2 hour sessions 1x/week for 8 weeks plus a 3hour retreat	no	PSS STAI SCL-90R - Dep SCL-90R - Anx
Sibinga, E. M. S. et al. 2013	MBSR	RCT	Active Control Healthy Topics (HT) (19) 8 week programming	41	12 - 13	School	Stress and Anxiety	12 weekly 50 minute sessions	no	PSS MASC - anxiety SCL-90R anxiety
Lau, N. & Hue, M. 2011	MBSR	Quasi, experimental and control, matched non-randomized TAU	TAU (24)	48	14 - 16	School	Stress and Depression	2 Hour session 1x/week for 6 weeks, after the fourth lesson a 7hour, one day retreat, encouraged daily home practice	n/a	PSS DASS
Beigel, G. et al. 2009	MBSR	RCT, waitlist control	TAU (52)	74	14 - 18	Clinical setting	Stress, Anxiety and Depression	Manualized 2 hours/week for 8 weeks plus at home practice	3 months	Stress, PSS Anx-STAI Dep - SCL-90*
Raes, F. et al. 2014	BLEND	RCT, cluster randomized control trial	TAU(185 completers) FU (175)	393	13 - 20	School	Depression taken at baseline T2, and T3, and FU	8 weekly 100 min sessions, 15 min daily at home practice	6 months	DASS-21
Semple et al. 2010	MBCT	RCT, Matched by age and gender, waitlist, 4 groups	waitlist (12)	25	9 - 13	Therapists, reimbursed for travel	Anxiety	12 X 90 min/weekly, group, encouraged home practice	3 months	STAI

Figure 4.1. Continued Comprehensive study inclusion data.

Data Analysis and Findings

Do mindfulness-based interventions (MBIs) provide an effective treatment for the reduction of anxiety? Seven studies were found that used an instrument to measure pre and post data for anxiety. Five of the included studies reported the pre and post raw data while two reported Cohen's d value statistics used for this analysis. When testing the null hypothesis, using a population total $N = 649$, Hedge's g was calculated for the standardized mean difference and resulted in a small to medium effect size of 0.36, 95% CI [0.19, 0.51]. The mindfulness-based interventions overall effect significantly reduced the participants' anxiety, $z(6) = 4.43$, $p = 0.00$. This analysis rejects the null-hypothesis. Figure 4.1 provides the individual values and the overall effect size data for the studies that measured anxiety.

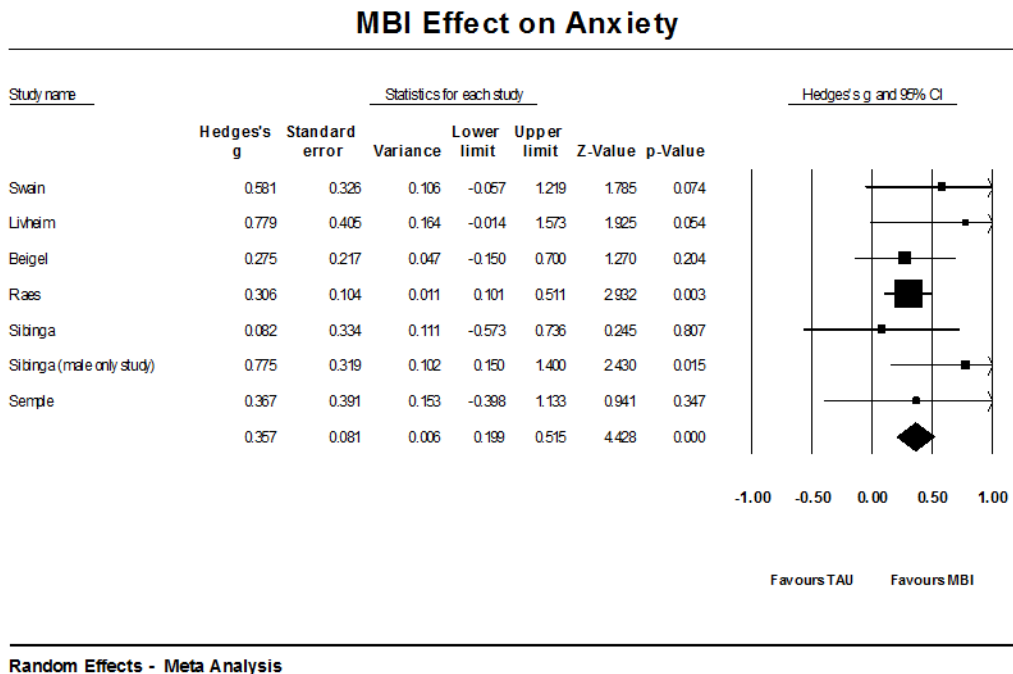


Figure 4.2. MBI effect on anxiety.

Do mindfulness-based interventions (MBIs) provide an effective treatment for the reduction of depression? Twelve studies were found that used an instrument to measure the pre and post data for depression. The population analyzed had a total N = 1,380 with ten studies reporting raw data on pre and post measurement and two reporting Cohen's d value results from the analysis. Using a random effects analysis, the overall Hedge's g was 0.32, 95% CI [0.16, 0.47] which is a small to medium effect size ameliorating the depression of participants, $z(11) = 4.08$, $p = 0.00$ similar to the results found for anxiety. Therefore the null hypothesis is rejected. Figure 4.2 lists the individual study values along with the overall effect size.

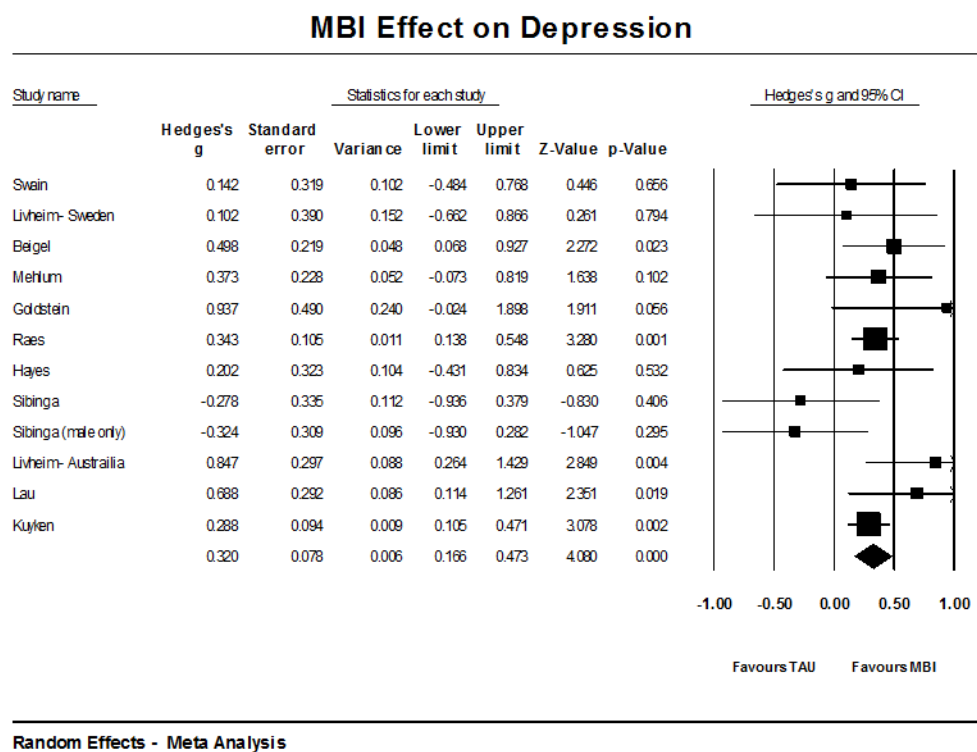


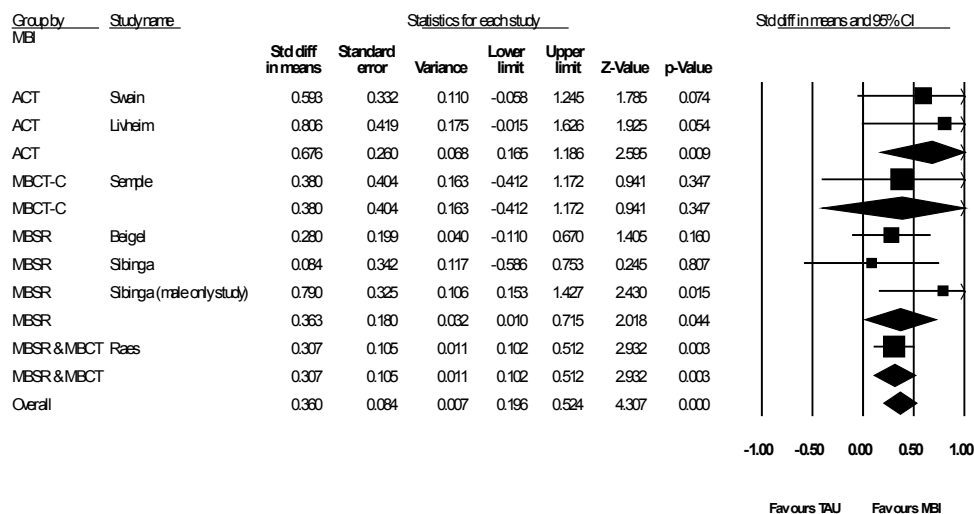
Figure 4.3. MBI effect on depression.

Does the type of mindfulness-based intervention make a difference compared to other MBIs included in the analysis? Although there were 13 studies included in the meta-analysis, not all measured the same outcome variable nor were they

the same type of mindfulness intervention, i.e. ACT, DBT, etc. In order to answer the research question, the studies were separated into groups by outcome variable (anxiety, depression and stress) and then divided into subgroups by intervention type (ACT, DBT, MBSR, MBCT, MBSR & MBCT, MiSP) to perform a comparative analysis, identifying the type of MBI as a moderator to the outcome variable.

Overall the MBI, Acceptance Commitment Therapy (ACT), N = 81, provided the most robust effect size of 0.676, 95% CI [0.16, 1.18], which is a medium to large effect size reducing anxiety as seen in Figure 4.3. Two studies were used in this calculation and both were individually small studies reporting significant reductions in the participants self-reported feelings of anxiety. One was a school-based program, Livheim et al. (2014), while the other was a population of DSM IV identified participants that received care in a clinical setting. Based on this analysis ACT seems to provide a greater degree of anxiety relief than the other MBIs that were included in this meta-analysis. When compared to the overall MBI anxiety effect size of 0.36, 95% CI [0.19, 0.51], with an N = 649, the

Does the Type of MBI Make a Difference in Anxiety?



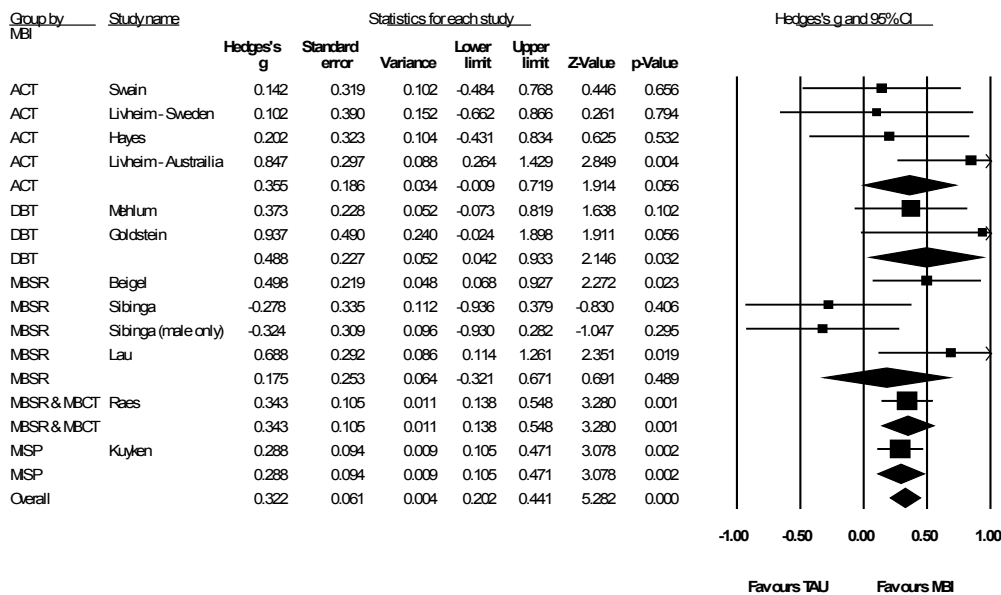
Random Effects – Meta Analysis

Figure 4.4. Moderator analysis for anxiety.

cumulative ACT effect size is considerably greater. Caution should be used in over estimating the impact of ACT when the values are based on two of the seven studies while the remaining five included studies reflect three differing types of MBIs.

The moderator analysis for the depression studies is a more modest and indicates Dialectal Behavioral Therapy (DBT) as the MBI with the greatest overall reduction in depressive symptoms for adolescents as seen in Figure 4.4. DBT has the highest collective effect size of 0.49, 95% CI [0.04, 0.93] which is a medium effect size value. There were only two studies in the computation for DBT (N = 97), as compared to twelve total studies (N = 1,380) collectively with 0.32, 95% CI [0.16, 0.47] as an overall Hedge's g. One DBT study researched participants that were clinically diagnosed with depression displaying reoccurring self-harm behaviors, Mehlum et al. (2014) while the other study consisted of bi-polar diagnosed participants, Goldstein et al. (2015). Both utilized a control group getting treatment as usual (TAU) or also referred as standard of

Does the MBI type make a difference on Depression?



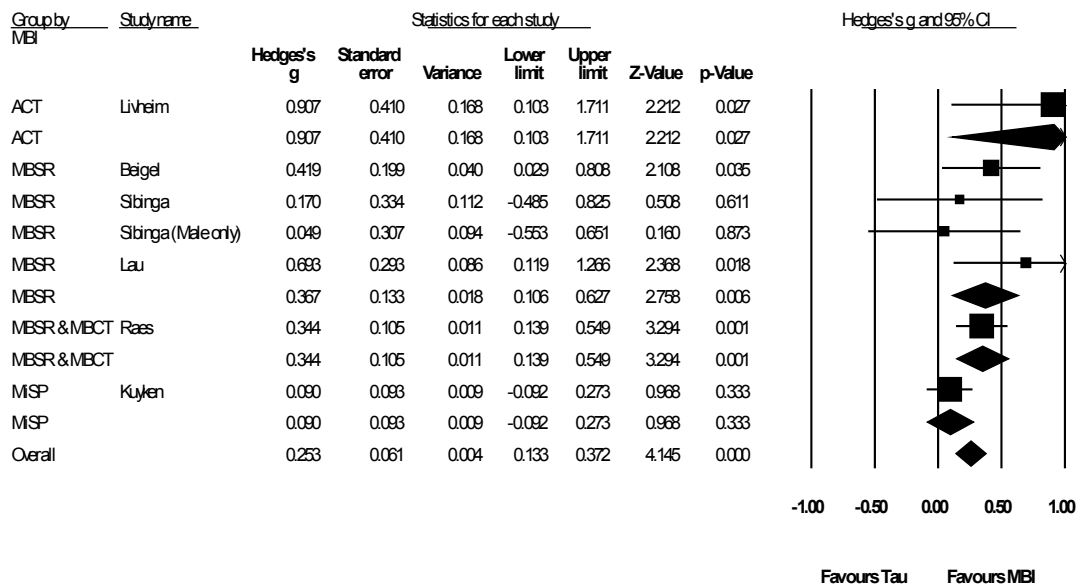
Random Effects - Meta Analysis

Figure 4.5. Moderator analysis for depression.

care (SOC). It is important to note that both studies utilizing DBT as the intervention used clinically depressed populations dissimilar to the other MBIs measuring depression which included data from non-clinical general population samples. Therefore, it remains unclear if the baseline level of depression is a mediating factor for the treatment effect and this query was not within the intended scope of this meta-analysis.

Although ACT may seem the most promising in reducing stress based on one studies results, the moderator analysis for the construct of stress indicates another mindfulness-based intervention as superior for a reduction of symptoms. Mindfulness-based Stress Reduction has a combined effect size of 0.36, 95% CI [0.10, 0.62]. As shown in Figure 4.5, the four studies using MBSR (N = 198) that assessed participants' stress fared better than the overall MBIs stress effect at 0.25, 95% CI [0.13, 0.37] with a total N = 1,145 from all seven studies.

Does the Type of MBI Make a Difference with Stress?



Meta Analysis

Figure 4.6. Moderator analysis for stress.

What are the longitudinal impacts of MBI after treatment, if any? There were between two and four studies that had follow-up data to use to measure the long-term effects of MBIs on the three constructs anxiety, depression and stress, see Table 4.2. The longitudinal data for anxiety included two studies, Raes et al. (2014) and Beigel et al. (2009). The effect size is 0.40 using random effects and calculating Hedges's *g* as the standardized mean difference is higher at follow up than at post measurement. The follow up data for measuring depression showed a slightly higher effect size with

Table 4.1

Effect Size Follow Up Data for Each MBI

Outcome Data	Study Name	N	Follow Up Term	Hedges's <i>g</i>	CI	
Anxiety	Beigel et al.	74	3 mos.	0.63	0.17	1.09
	Raes et al.	245	6 mos.	0.31	0.09	0.52
	Overall	319		0.40	0.17	1.10
Depression	Beigel et al.	74	3 mos.	0.55	0.09	1.01
	Raes et al.	245	6 mos.	0.33	0.12	0.54
	Hayes et al.	12	3 mos.	1.78	0.47	3.10
	Kuyken et al.	446	3 mos.	0.25	0.07	0.44
	Overall	777		0.38	0.15	0.62
Stress	Beigel et al.	74	3 mos.	0.42	-0.04	0.87
	Raes et al.	245	6 mos.	0.34	0.13	0.56
	Kuyken et al.	446	3 mos.	0.09	-0.10	0.28
	Overall	765		0.24	0.04	0.45

Hedges's $g = 0.38$ with four studies included compared to $g = 0.32$. Stress had the lowest effect size at follow up $g = 0.24$ using random effects including three studies with follow up data. Both anxiety and depression had an increased effect size at follow up than determined at post measurement. Stress on the other hand showed a slightly lower effect size at follow up than at post measurement by 0.06.

In addition to the four research questions this meta-analyst reviewed the MBIs impact on stress for the studies found that measured stress as a dependent variable. Although the moderator analysis reported small to medium positive effects on stress utilizing MBSR the overall combined MBI showed a slightly lower positive effect size with Hedge's g at 0.30, 95% CI [0.07, 0.49] indicative of a small to medium effect size. This analysis was using random effects model and the results reflect that MBIs ameliorate the negative properties of stress on adolescents. The population analyzed for stress totaled $N = 1,145$ and the Z value of 2.6 was calculated thereby rejecting the null-

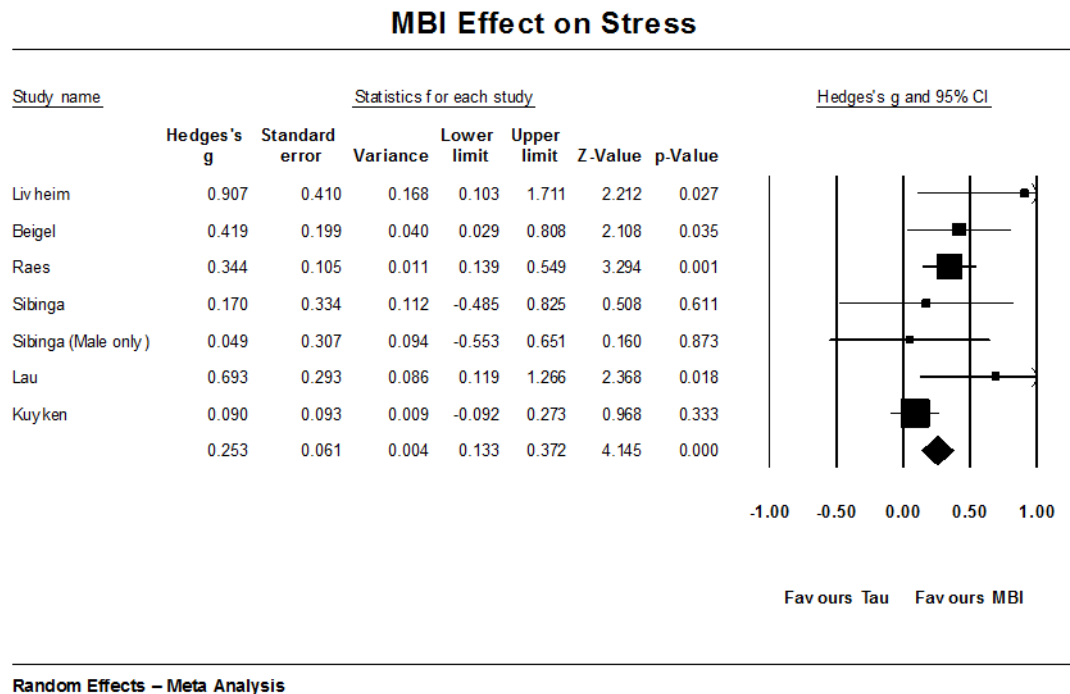


Figure 4.7. MBI effect on stress.

hypothesis. In Figure 4.6, it displays the seven studies that measured stress as a construct along with their corresponding values.

Publication bias. To address publication bias the meta-analyst reviewed the funnel plots for each construct anxiety, depression and stress, including imputed studies to adjust the effect size results by adding in additional studies to create symmetry in the funnel plot, correcting for bias. The Figure 4.7 shows the funnel plot for anxiety that includes an adjusted effect size including imputed studies. The shaded in blocks are the additional study(ies) for determining the adjusted effect size. Using CMA software v3, the following calculations were performed to determine bias. The Begg and Mazumdar (1994) rank correlation determined a Tau value of 0.19 with a two-tailed p value of 0.55.



Figure 4.8. Publication bias funnel plot for anxiety with adjusted effect size.

Additionally the same calculations were performed to determine publication bias for depression. The funnel plot presented in Figure 4.8 shows the adjusted effect size, no change, and no imputed studies for inclusion. The funnel plot is symmetrical and indicates the results are not by chance. The funnel plots and calculations for both anxiety and depression display symmetry and although there is risk for publication bias, the

adjustments to the effect size are minimal indicating a greater degree of confidence in the effect sizes from the included studies found during the search process.

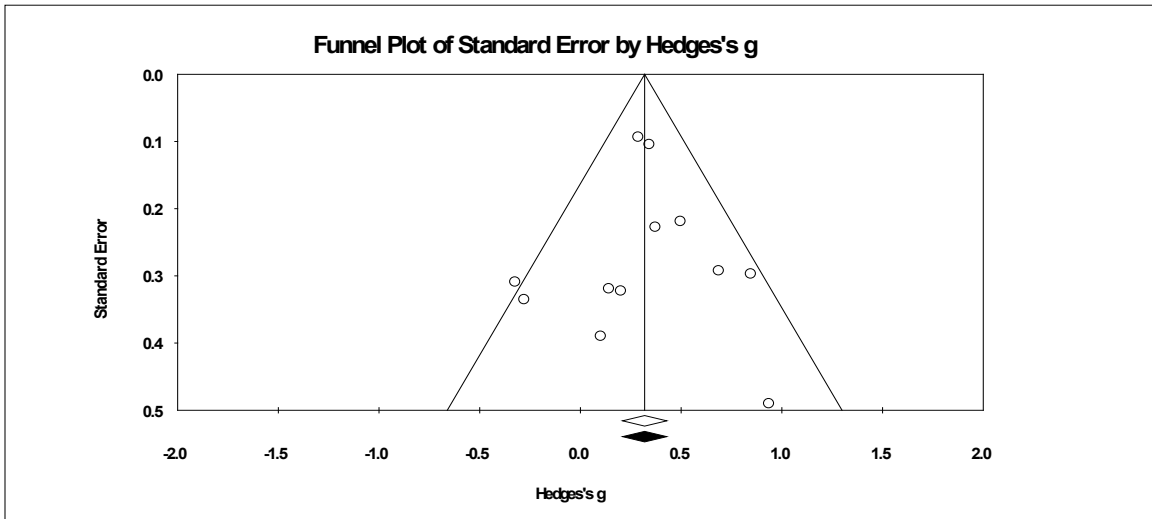


Figure 4.9. Publication bias funnel plot for depression with adjusted effect size.

Finally a funnel plot was created to indicate the publication bias risk for stress using the same software. In Figure 4.9 the funnel plot is displayed including the imputed studies, and an adjusted effect size. The funnel plot for stress without the imputed study is also symmetrical even though each positively reported study lies to the far right of the plot, showing greater effect size reports for the individual studies, which is indicative of

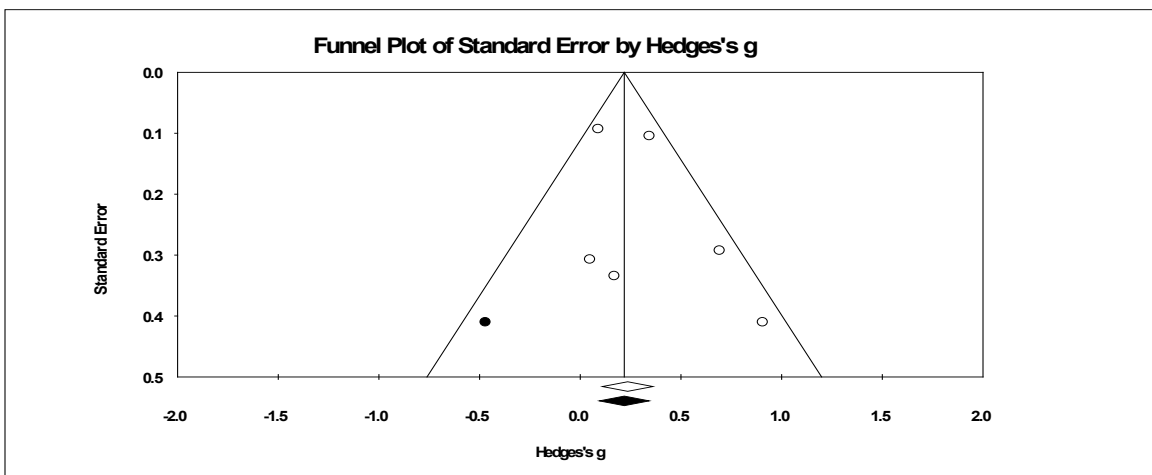


Figure 4.10. Publication bias funnel plot for stress with adjusted effect size. increased risk for publication bias.

The fail-safe n was also determined for each construct to determine the number of non-significant studies it would take to make the current published studies effect size non-significant. Only seven studies were found using the search criteria and that met all inclusion criteria by measuring adolescent anxiety. Twenty-eight non-significant studies would need to be found to bring the p -value to a point of non-significance. Depression had a fail-safe n of 62, as this research included twelve studies in the analysis of MBIs effect on depression. Sixty-two missing showing non-significance would be needed to bring the effect size to non-importance. Additionally there were only seven studies used for the meta-analysis that measured stress. There would need to be eighteen additional non-significant studies found to reduce the effect to non-importance. Due to the small amount of studies found in this meta-analysis there is risk that bias has occurred and that research has been done but not published that would relegate the small to medium effect sizes found to non-significance. However most of the studies published and found were small and often the small studies are not published resulting in increased risk for bias.

Summary of Results

Thirteen studies were found that measured one or more of the constructs, anxiety, depression and/or stress to use in the analysis of this research. Overall small to medium effect sizes (0.36, 0.32, and 0.25) were calculated for studies using various mindfulness-based interventions from pre to post intervention data. The results are encouraging that mindfulness-based interventions can provide assistance in reducing the negative effects of anxiety, depression and stress for adolescents during a critical period of their development. Additionally, when reviewing the moderator effects of each type of MBI,

the results show promise for both ACT and DBT to ameliorate the symptomology associated with the pathology.

Although the follow up data for anxiety is very promising, as it increased to a Hedges's $g = 0.40$, it only accounted for two studies that had measured anxiety beyond the intervention, the other five did not include that data. The follow up data for depression too shows an increase but notably stress, indicated a slight drop off in the positive effects of the MBIs impact. One MBI that showed a greater overall impact for reducing anxiety was ACT providing larger effect size estimates than the other MBIs in the study. Depression on the other hand showed a greater degree of relief with the use of DBT but included two studies that was comprised of only diagnosed depressive participants.

When reviewing the risk for publication bias, both anxiety and depression showed funnel plots that were symmetrical and had higher fail safe n studies needed to counteract the calculated effect and bring it to zero. Stress on shows less symmetry and only required eighteen additional studies that showed no effect to bring it to zero. The analysis revealed mindfulness-based interventions to have an overall effect on the intervention population in comparison to the control groups but there is some risk of publication bias that needs to be taken into account for the data's application for generalizing the impact on anxiety, depression and stress.

Chapter 5: Discussion

Introduction

Adolescents are negatively impacted by stress during their present reality which can impact their future opportunities. Reoccurring stress physically and emotionally sets the stage for the development of mental health and disease related issues. Two such mental health concerns that often initially develop during adolescence are anxiety and depression and carryover into adulthood. Anxiety and depression impact 8% and 9% of adolescents, respectively, while many go undiagnosed and/or untreated. Finding effective treatments that are safe and accessible is imperative during a vulnerable period of development as adolescents suffer the negative consequences physically, emotionally and behaviorally.

Mindfulness-based interventions have shown effective for adult populations in the reduction of anxiety, depression and stress symptomology. While emergent research has been published using such interventions with adolescent populations, reviewing this research meta-analytically was needed to discern if the collective impact had positive effects on anxiety, depression and stress during adolescence. This chapter discusses the implications of the findings, presents limitations of the analysis, and makes recommendations for future research.

Implications of Findings

The findings reveal a small to medium effect size for both anxiety (Hedge's $g = 0.36$) and depression (Hedges's $g = 0.32$). The results are similar to the meta-analysis

that was done on the effects of psychotherapy when the analysis used a random effects model (Erford et al., 2011). The results are encouraging that mindfulness-based interventions do consistently show positive effects on anxiety, depression and stress. Moderator analysis indicates that ACT currently reports higher effect sizes for reducing anxiety and DBT shows a greater effect on depression than the other MBIs analyzed. Further investigation into interventions that produce higher than average effects on the reduction of anxiety and depression is needed, when these health impairments produce life impeding properties on those that suffer from the psychopathology.

As mentioned in Chapter 2, the most common treatment regimen for anxiety and depression is psychotherapy, such as cognitive behavioral therapy (CBT), interpersonal therapy (IPT), prescription medications, or a combination of both (Axelson & Birmaher, 2001, 2001; Bylund & Reed, 2007; Hankin, 2006). Effective treatments for adolescent populations differ from adult populations with respect to the prescription medications on the market and their effectiveness and risks (Bylund & Reed, 2007). The few medications that have demonstrated effectiveness have various side-effects, and they also warn of possible increased suicidal ideation (NIMH, 2011). Although three to five studies included in the meta-analysis were using populations that were clinical and had access to standard treatment, including medications, in combination with a MBI, 13 studies total were used with non-clinical participants. In each of the outcome constructs, anxiety, depression and stress, less than one third of the studies included clinically diagnosed participants. The inclusion of non-clinical adolescents is important to show MBIs reliability and positive impact to general groupings of participants and not just with clinical patients who may be combining treatment of an MBI with medications. The

only caveat is the strong impact of DBT with clinically diagnosed depression. Both studies were clinical subjects that were receiving treatment as usual for their bi-polar and self-harm behaviors in combination with an MBI. The effect size of 0.49, 95% CI [0.04, 0.93], was the overall Hedge's g for these two studies. It should be noted that DBT was only used with these two studies as an MBI, and only measuring depression as an outcome.

In addition to using DBT for depression research, two other MBIs used non-clinical subjects to measure depression as an outcome. The two largest studies were school-based and both reported positive impact on depression symptomology (Kuyken, et al., 2013; Raes, et al., 2014). Kuyken et al. utilized the MiSP intervention with 256 participants receiving treatment and Raes et al. (2013) combined a treatment from both MBSR and MBCT with 185 participants receiving treatment. These interventions were generalized with adolescent student populations, delivered within the school day, ensuring participation of those that produced consent and provided assent to the treatment. The implications for increased use of MBIs in schools to ensure access, and delivery in a cost effective manner to a broader population is encouraging. The follow up data for these two studies showed a slight decrease in the effect on depression reduction, while other studies showed lasting effects on the reduction of anxiety as well. Further investigation would be prudent as all studies did not include follow up data for each type of MBI.

Since anxiety and depression interfere with adolescents' daily living, and both have shown to impact their future outcomes, the need for effective treatments is essential. Even though talk therapies and medications are commonly used, they are not without

issues of accessibility and risk. As mentioned earlier, a 2010 meta-analysis indicated a small to medium effect size (.25–.55 (95%CI)) for psychotherapy, alone, on depression (Erford et al., 2011). Similarly, a meta-analysis studying the impact of psychotherapy on anxiety indicated an effect size range of a .32–.60 with a 95% CI, which is a small to medium effect size as well (Erford, Kress, Giguere, Cieri, & Erford, 2015). This meta-analysis shows positive reductions in anxiety and depression as, $g = 0.36$ and $g = 0.32$ respectively using mindfulness-based interventions.

The treatment length for the interventions included in this analysis was six weeks to twelve weeks in length with one requiring a twelve month period for a DBT administration. As evidenced by the analysis there are noted increases in positive effects post treatment at follow up both anxiety and depression, at 0.40 and 0.38 respectively over the post treatment effect of 0.36 and 0.32. Caution must be taken to rely on this increased effect as the number of studies that provided post-treatment data is reduced from the studies included in each outcome measure. As mentioned earlier in the literature review, the treatment regimen for both psychotherapy and prescription medications require long-term commitments and administration regularity for positive results, especially in the case of medication use (NIMH, 2011). Thereby providing increased evidence that MBIs have a positive and lasting effect on adolescent anxiety, depression and stress without requiring continued instruction but can be utilized at will.

Mindfulness interventions can be learned and practiced independently, and they have shown no adverse side effects. The effect size analysis shows increased emotional regulation given the positive effects on anxiety, depression and stress. Knowing the negative outcomes that result from emotional dysregulation the findings of this study are

encouraging and hopefully will foster continued research in the area of mindfulness and the potential benefits it can bring to adolescent populations world-wide.

Lastly, the clinical importance of this analysis can be viewed comparing the effect size data to the standard deviations of the three main instruments utilized in the included studies, one for each construct. When reviewing the normative data for adults using the State Trait Anxiety Inventory (STAI) and specifically looking at the state anxiety metric, the $M = 22.10$ with $SD = 10.64$ (Vera, et al., 2007). The effect size for anxiety was found with this analysis with adolescents positively impacts anxiety by $g = 0.36$, 95% CI [0.19, 0.51]. This translates into a 3.8 point decrease in the state score using the STAI instrument. The depression instrument utilized most often in the included studies was the Depression Anxiety Stress Scale - 21 (DASS- 21) and this instrument has a depression subscale $M = 1.34$ with $SD = 1.74$ (Yosuff, 2013). The resulting effect size for depression through this analysis was $g = 0.32$, 95% CI [0.16, 0.47]. That would be a 0.56 point decrease in the subscale score. Additionally, the instrument used most to measure stress in the included studies was the Perceived Stress Scale (PSS) and the normative data was $M = 15.60$, $SD = 6.67$ (Nordin & Nordin, 2013). The overall effect size for stress was $g = 0.30$, 95% CI [0.07, 0.49] in reducing the negative effects of stress. This would translate to a 2.0 point reduction in the instrument total.

Limitations

As with any meta-analysis there are inherent limitations bearing in mind that across studies there are differences in study design, target participants, settings, intervention differences, intervention protocols, timeframe for treatment, active or treatment as usual control groups and instruments used to measure the constructs.

Another limitation was the small number of published random control trials and quasi-experimental studies that measured anxiety, depression or stress with adolescents receiving a mindfulness-based intervention.

This analysis included ten randomized control trials (RCT) and three quasi-experimental studies. Each study measured anxiety, depression and/or stress as an outcome. Each outcome variable had a combination of RCT's and quasi-experimental studies included in the analysis. Although the preferred design was RCT which include randomization and blind study protocol, the quasi designed studies had great value in their inclusion as two employed matched groups for control and treatment as well.

Kuyken et al. (2013), a quasi-experimental design had started with 522 participants which was the largest study include in the analysis and also school-based. Another quasi design study was Lau & Hue (2011) which was also school-based that matched the participant groups. The third quasi design study, completed in Australia by Livheim et al. (2014), had randomized the female participants but not the male participants as they were small in number and given the age range, the researchers determined the males would make one intervention group with no females included.

The variation in participants for this analysis ranged in general population samples to adolescents with a clinical diagnosis from out-patient clinics. One such general population sample was in a school setting where the schools were invited to participate, and interested teachers were trained to deliver the intervention as seen in Kuyken et al. (2013). To exemplify the range another study's participants were recruited from an out-patient facility that meet the DSM IV criteria for bi-polar disorder but with self-harm behaviors that were reoccurring and present within the last 16 weeks (Mehlum

et al., 2014). In addition, most all included studies were female dominate, with three not reporting gender data, and one being exclusive to male participants (Sabinga et al., 2013).

Differences in settings and interventionists were noted in the included studies. Although seven of the 13 were school-based and teachers were trained for delivery of the intervention, except one in particular, had a therapist travel to the reading program to deliver the MBCT to the students (Semple et al., 2010). The other six were served at out-patient clinics or in a community center location by trained interventionist or therapists. It is important to note that the school-based and teacher delivered treatment was with manualized protocols, and each had multi-day trainings for delivery.

The obvious notable difference was that the mindfulness-based interventions were varied. Four of the included studies used ACT as an intervention, five used MBSR, two used DBT, one with a combination MBSR and MBCT treatment, and lastly, one that used a meditation-based treatment called Mindfulness in Schools Program (MiSP). The MBSR and MiSP are mediation based and include encouraged home practice, while the others are multimodal where mindfulness is combined with behavioral or cognitive therapy, such as MBCT, ACT and DBT. The variance in treatment presents as a limitation to generalize the effects depending on the intervention used and protocol followed.

Another limitation is the timeframe used for the length of treatment. The range for most treatments were 8 to 12 weeks; however, one study continued treatment for over the course of twelve months with pre and post measures (Goldstein et al., 2015). That twelve month study was using DBT while the other study that used DBT as a treatment was measured at post in nineteen weeks. The treatment length for the same treatment

was not the same to compare even though they both offered individual sessions, group sessions and phone coaching as needed (Mehlum et al., 2014; Goldstein et al., 2015).

Based on the inclusion criteria, instruments must be used to measure either anxiety, depression and/or stress. Four different instruments were used to measure anxiety, seven different instruments were used to measure depression and two different instruments measured stress. The calculations for variance are used in meta-analysis to account for the variation but this too is a limitation when considering each instrument used has varying degrees of acceptability for reliability and validity based on the instruments psychometric testing and use.

Although only 13 studies met the inclusion criteria, the imputed funnel plots of standard error, by the standard difference in means, added asymmetrical small studies to determine publication bias showing all within the acceptable range. This can be explained as the studies included are all small with the exception of two. As mentioned in Chapter 3, if many of the smaller studies show to one side, Duval and Tweedie's Trim and Fill method was used to remove the most extreme small studies (Borenstein et al., 2009). Using this procedure requires a recalculation of the effect size by providing an unbiased estimate of effect size. The fill portion of this model was computed and adds back in the original studies and its mirror image to readjust the confidence interval. Using funnel plots, they all showed symmetry, but adjustments to the effect size were made when adding in the imputed studies. However, the relatively low number of non-significant studies needed as set by the fail-safe n is a concern and a limitation. The fail-safe n for anxiety, depression and stress were 28, 62 and 18, respectively.

Recommendations

Considering the positive effects of mindfulness-based interventions on anxiety, depression and stress, it is important to continue research into the application of specific interventions. Ideally having more RCT's and quasi-experimental studies to analyze would provide a greater degree of precision to the effect size analysis. Also replication and consistency in the intervention protocols would provide further data to determine the most effective MBI for anxiety, depression and stress. Specifically, continued research into the use for reduction of stress, potentially as a protective factor for the development of anxiety and depression would be recommended, especially in school settings where the research indicates that students feel increased stress during the school year. Additionally, using school-based settings for intervention delivery would be recommended for continued research to investigate and consider the cost effectiveness of this delivery model versus clinical applications.

The calculated benefit as seen in this analysis of mindfulness-based interventions for adolescents during this developmentally critically period is important to note but more important to increase application and continue research. This is a period of time when the development of psychopathology is greatest and carryovers into adulthood. The onset of adolescent anxiety and depression along with the delay in treatment, results in devastating consequences. Eight to 12 week mindfulness programs previously developed, delivered by teachers with scripted protocols has the potential of positively impacting many youth prior to, and during adolescence. The initial reduction in symptomology, the potential for lasting results, the wide spread application with little financial commitment for school districts could assist districts in increasing graduation

rates, and increasing healthy choices made by students in their care. Caring for the social and emotional health of students is more than a state held expectation, it's the right thing to do when developing the future of any community.

Conclusion

Adolescents are negatively impacted by anxiety, depression and stress both at home and at school. The potentially negative outcomes that occur with those that suffer from the symptomology not only impact the life of the individual but impacts the lives of those around them. Mindfulness-based interventions may alleviate feelings of the emotional dysregulation in those that suffer mildly or clinically from anxiety and depression. The results of this meta-analysis show that mindfulness-based interventions do present as effective treatments for anxiety, depression and stress, similar to that of psychotherapy. Although there are limitations to the analysis as explained earlier, overall the results are encouraging and with further research mindfulness may positively impact a greater number of adolescents. Further investigation into the benefits particularly on stress reduction as potentially a protective factor in preventing anxiety and/or depression would be recommended.

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