Teaching Mindful Awareness Skills to Middle School Students and Its Relationship to Student Engagement with School and Student Test Anxiety

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TEACHING MINDFUL AWARENESS SKILLS TO MIDDLE SCHOOL STUDENTS
AND ITS RELATIONSHIP TO STUDENT ENGAGEMENT WITH SCHOOL AND
STUDENT TEST ANXIETY

A DISSERTATION

Submitted to the Faculty of
Montclair State University in partial fulfillment
of the requirements
for the degree of Doctor of Philosophy

by
KATHY SHOEMAKER
Montclair State University
Upper Montclair, NJ
2017

Dissertation Chair: Dr. Dana Heller Levitt
MONTCLAIR STATE UNIVERSITY
THE GRADUATE SCHOOL
DISSERTATION APPROVAL

We hereby approve the Dissertation

TEACHING MINDFUL AWARENESS SKILLS TO MIDDLE SCHOOL STUDENTS
AND ITS RELATIONSHIP TO STUDENT ENGAGEMENT WITH SCHOOL AND
STUDENT TEST ANXIETY

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ABSTRACT

TEACHING MINDFUL AWARENESS SKILLS TO MIDDLE SCHOOL STUDENTS AND ITS RELATIONSHIP TO STUDENT ENGAGEMENT WITH SCHOOL AND STUDENT TEST ANXIETY

by Kathy Shoemaker

This study examined the relationship between teaching mindful awareness skills to middle school students and both student engagement and test anxiety. The moderating effects of certain cultural characteristics (gender, race and ethnicity, socioeconomic status [SES], English as a second language [ESL], and disability status) on the relationship between teaching mindful awareness skills and both student engagement and test anxiety was also examined. A quasi-experimental pre-/post-test research design with a control group was employed. The Child and Adolescent Mindfulness Measure (CAMM), the Healthy Self-Regulation Scale (HSR), the Student School Engagement Measure (SSEM), and the brief version of the FRIEDBEN Test Anxiety Scale (B-FTAS) were administered at pre- and post-test. Two hundred eighty students assented to have their data used at pre-test and 242 students at post-test, which led to a matched dataset of 191 students. Due to a lack of fidelity of the control group, analysis was completed for the intervention group (N = 107) only. Data were analyzed to determine differences between pre- and post-test results and between demographic groups. Two separate hierarchical multiple linear regression analyses were conducted to investigate the predictability of teaching mindfulness directly and as moderated by the cultural characteristics of gender, race and ethnicity, SES, ESL and disability status to change students’ engagement with school and
students’ level of test anxiety. Results indicated that post-test scores on the HSR predicted both student engagement and test anxiety, while post-test scores on the CAMM had a predictive relationship only with student engagement. Results were also analyzed at the subscale level providing further detail. Finally, students reported a high level of enjoyment learning mindfulness and half of students used mindfulness outside of class.
ACKNOWLEDGEMENTS

In my first course in my doctoral program, Dr. Jeremy Price gave our class advice that I reflected back on time and again as I learned to navigate my way through this process, “you are the author of your journey through the program, do not turn your goals over to anyone else.” That said, I would not have completed this journey without the support and guidance I have received from my professors, advisors, and colleagues at Montclair State University and my family and friends.

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DEDICATION

I have come to realize that my desire to support a healthy trajectory for adolescents is deeply rooted in the significant challenges that each of my parents experienced in their adolescent lives as outcomes of World War II. Their histories taught me that one can overcome great adversity to create a hopeful and happy adulthood. As a child, their stories were real-life fairy tales that stirred my empathy, imagination and appreciation of the resourcefulness and resilience of the adolescent spirit. Perhaps it is their stories that led to my initial work with adolescents, but it is the joy and admiration I feel when working with adolescents that has changed the trajectory of my life.

The adolescents I have worked with in youth ministry, education, prevention groups, school counseling, and substance abuse treatment, as well as raising my own sons, have taught me volumes about the complexity of this developmental stage. Regardless of status, no child goes through adolescence without being “at-risk” and regardless of risk factors, no child lacks potential. Adolescence is marked by increased risk and increased potential. Rapid brain changes that occur during this stage present an opportunity to strengthen or rewire connections that support a healthy trajectory into adulthood. Through my prevention and counseling work with adolescents, I have learned that when students develop skills, abilities, and mindsets that support possibilities and their potential, they can better navigate risks and plan for hopeful futures.

It is the many lessons I learned from my students that led me to pursue teaching mindfulness to middle school students as a universal, preventative intervention and it is to my adolescent students, clients, my parents, and my sons that I dedicate my dissertation.
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Chapter One

Introduction

Adolescence is a developmental period identified with significant and asynchronous changes to physical, cognitive, emotional, and social functioning that plays a role in how middle school students perceive themselves, others, and situations they experience (Cozolino, 2013; Davidson, Dunne, Eccles, Engle, Greenberg, Jennings et al., 2012; Siegel, 2013). Its onset affects the way students manage emotions and stress, engage with peers and teachers, and how they learn (Broderick & Jennings, 2012; Cozolino, 2013; Siegel, 2013). For many students in the U.S., adolescence coincides with transitions to and from middle school. Evidence suggests that engagement in school can decrease at the transition to middle school and again at the start of high school (Hektner, 2001; Sulkowski, Demurray, & Lazarus, 2012; Yazzie-Mintz & McCormick, 2012).

School connectedness, or engagement with school, serves as a protective factor for adolescents that contributes to both academic and lifelong success, as well as avoidance of numerous high risk behaviors associated with negative life outcomes (Benson, Scales, Hawkins, Oesterle, & Hill, 2004; Hektner, 2001; Sulkowski et al., 2012; Upadyaya & Salmela-Aro, 2013; Yazzie-Mintz & McCormick, 2012). Increased focus on test performance during middle school can add additional stress and anxiety (Segool, Carlson, Goforth, von der Embse, & Barterian, 2013; Tang, Yang, Leve, & Harold, 2012;

Educational transitions may happen at times that are not optimal for the developmental needs of adolescents causing an imbalance that may show up as a lack of engagement or motivation. This is often related to fit between the student and the environment or developmental stage and the environment. Negative fit with the environment can produce cynicism and alienation from school. Factors that can accompany the transition to middle school and contribute to negative fit include 1) increased focus on grades, 2) competition and perceptions of lower emotional support from teachers, and 3) lower sense of belonging in the classroom (Benson et al., 2004).

Engagement research indicates a need for special attention to promoting student engagement with school by schools, for students of color, students of immigrant parents, and students living in low-SES families or impoverished communities (Balfanz, Bridgeland, Bruce, & Fox, 2013; Bridgeland, Dilulio, & Morison, 2006; Heckman & LaFontaine, 2010; Lewis & Burd-Sharp, 2013).

As students enter middle school, the results of state-mandated, high-stakes standardized tests begin to have greater consequences. Students who perform below proficient on sections of these exams are often assigned to remediation classes. They may be pulled out of “non-essential” classes that students often enjoy (i.e., art, music, or computers) or may be required to attend classes afterschool or on weekends, precluding
them from participating in extra-curricular activities (Taylor, 2014; von der Embse et al., 2013; von der Embse & Hasson, 2012). Prescribed remediation based on low test scores can be stigmatizing and lead to further decay in students’ sense of academic self-efficacy (Rollins, 2014). Pulling students out of the classes they enjoy or limiting their ability to engage in their interests with their peers after school limits exposure to activities that are positively correlated with increased student engagement (Busteed, 2013; Scales, 2010; Taylor, 2014).

While a growing body of research indicates that engagement with school is a predictive factor for academic and life success, it also indicates that achievement tests have a low predictive value of students’ academic outcomes in high school and college (Farrington, Roderick, Allensworth, Nagaoka, Keyes, Johnson, & Beechum, 2012). Yet these high stake tests have important consequences for the test takers, and for teachers and schools as well, with low test scores leading to negative teacher evaluations and sanctions for school districts. Since the federal mandate of these high-stakes tests, researchers have noted the growing rate of test anxiety among elementary and middle school students (Lowe & Lee, 2008; Lowe, Lee, Witteborg, Prichard, Luhr, Cullinan et al., 2008; von der Embse et al., 2013; Whitaker-Sena et al., 2007). Research indicates that more than one third of all of students in U.S. public schools experience some level of test anxiety. Test anxiety has been found to disproportionately affects girls, minorities, students with disabilities, low-SES students, and poor test-takers (Lowe & Lee, 2008; Lowe et al., 2008; Segool et al., 2013; Zeidner, 1990), groups that have been the focus of
the No Child Left Behind Act (NCLB; 2008) and who often perform lower on standardized tests than their peers (Lowe et al., 2008; von der Ebse et al., 2013).

Based on the convergence of the onset of adolescence with the transition to middle school, the issues of fit that can occur, and the increased level of anxiety around testing for students and school faculty, middle school students are at a greater risk of experiencing negative consequences that can lead to disengagement, low motivation, and heightened anxiety (Benson et al, 2004; Siegel, 2013; Upadyaya & Salmela-Aro, 2013). According to three decades of research (Black, 2015), mindfulness practices can relieve stress, improve positive mood, reduce negative mood, and enhance social, emotional, behavioral, and physical health outcomes. Mindfulness can also increase awareness of one’s thoughts, feelings, and actions, and improve attention, cognitive control, and emotional regulation (Beauchemin, Hutchins, & Patterson, 2008; Kabat-Zinn, Massion, Kristeller, Peterson, Fletscher, Pbert et al., 1992; Linden, 1973; Rempel, 2012; Shapiro, Carlson, Astin, & Freedman, 2006; Shonin, Van Gordon, & Griffiths, 2012).

To date these outcomes are more strongly correlated with adults than with adolescents and children, with less than 5% of mindfulness research pertaining to children and adolescents (Black, 2015). Although research on mindfulness in schools first occurred in the 1970s and showed promise for reducing test anxiety and increasing ability to focus attention on the task at hand (Linden, 1973), teaching mindfulness did not gain interest within the educational discourse. With a burgeoning body of research around the benefits of mindfulness and its applicability for children and adolescents, there has been growing interest in mindfulness research within educational settings.
Background Research

There are many inter-related aspects of adolescence, student engagement with school, and test anxiety that converge at the transitions to and from middle school. Mindfulness research has shown promise as an intervention for test anxiety (Linden, 1973; Tang et al., 2012). While there is little research linking mindfulness to student engagement, mindfulness enhances cognitive functioning, focused attention and self-regulation, psychosocial, emotional, and physical health, and overall well-being. These are important to healthy adolescent development and can contribute to student engagement with school (Beauchemin et al., 2008; Kabat-Zinn et al., 1992; Rempel, 2012; Shapiro et al., 2006; Shonin et al., 2012; Siegel, 2013).

Adolescent Development

Developmentally, there is an enormous amount of variability among adolescents at any given age. As a whole, adolescents go through rapid, inconsistent physical growth, including structural brain changes that also affect their cognitive, psychological, emotional, and social development. During this developmental time (approximately 11-24 years) structural growth and pruning create and strengthen neural connections. The brain’s capacity to change and develop through learning and new experiences is called neuroplasticity. Neuroplasticity creates new neural pathways and strengthens linkages through deep practice and through sparks of insight that may create an instant alteration. The process of neuroplasticity is neither positive nor negative. It simply creates or
reinforces neural connections for both desirable and undesirable habits based on new learning and/or practice (Cozzolino, 2012; Davidson et al., 2012; Doidge, 2015; Montgomery, 2013), which impacts school performance and achievement of important development tasks (Cozzolino, 2013; Davidson et al., 2012; Siegel, 2013).

These structural changes are significant in the process toward adult mental functioning, but during adolescence the neural networks that lead to this outcome are not fully developed or integrated. This can contribute to heightened anxiety and worry (Clewett, Bachman, & Mather, 2014) and hyper focus on social interactions, fairness, and perceived injustice that can affect motivation and engagement (Siegel, 2013). This time of uneven yet plastic brain development can also avail adolescents with a second chance to change unhealthy patterns developed in childhood, before they become embedded in their rapidly changing neural circuitry (Cozolino, 2012; Davidson et al., 2012; Montgomery, 2013). Based on the high capacity for structural brain change during adolescence, reinforcing healthy habits related to motivation, engagement, and risk taking is important for healthy developmental outcomes (Cozzolino, 2012; Montgomery, 2013; Siegel, 2013). Mindfulness has been shown to strengthen neural connections in key areas of the brain that are dominant in cognitive functioning and self-regulation (Davidson et al., 2012; Siegel, 2013), which may mitigate some of the negative affect and reactivity that can be associated with typical adolescent development, test anxiety, and decreased school engagement at the transition to middle school.
Student Engagement with School

The transition from childhood to adolescence comes with greater expectations and demands placed upon them (Benson et al., 2004; Hektner, 2001; Siegel, 2013; Yazzie-Mintz & McCormick, 2012). Transitioning well can lead to engaged lives of accomplishment and life-satisfaction, with feelings of self-worth, a sense of competence, and well-being. At the other end of the spectrum, for those who disengage and do not find a way back to a healthy path toward productive, engaging adulthood, there can be feelings of self-doubt, alienation, disconnect, and hopelessness (Benson et al., 2004).

Student engagement with school refers to the level of attention, interest, enthusiasm, curiosity, optimism, or motivation students experience when learning. It may be observable through outward behaviors, such as attending class, listening and participating in discussions, and turning work in on time. Student engagement with school encompasses aspects of intellectual, emotional, behavioral, physical, social, and cultural engagement (Great Schools Partnership, 2013). It facilitates academic achievement and student well-being (Benson et al, 2004; Hektner, 2001; Klem & Connell, 2004). Student engagement, academic achievement, and well-being are interrelated. They all contribute to student success and are strong predictors of student outcomes in high school and college (Farrington et al., 2012) as well as rewarding job possibilities, life satisfaction and positive perception of self (Benson et al., 2004; Upadyaya & Salmela-Aro, 2013). Conversely, diminished engagement with school is a risk factor for low academic achievement and dropping out of school (Wasserman, Keenan, Tremblay, Cole, Herrenkohl, Loeber et al., 2003). Disengagement may be
displayed as boredom, depression, anxiety, anger, rebelliousness, damaging property, unexcused absences, withdrawing from school, class, or learning, absence of engagement, cheating, being passive, not trying, or giving up easily (Fletcher, 2013).

While student engagement is predictive of on-time high school graduation, higher grades, engagement over the lifespan, and overall well being, there is lack of clarity about what actually constitutes engagement. Most models identify three components of student engagement that contribute to attitude: affect, behavior, and cognition; others include components such as aspirations, belonging, and productivity (Hazel, Vazirabadi, Albanez, & Gallagher, 2014). Factors that encourage student engagement include physical and psychological health, well-being, life skills, ethical behavior, academic success, and involvement in helping others (Benson et al., 2004). Promoting student engagement leads to better outcomes, such as academic success, positive self-perception, better job prospects, higher life satisfaction and general well-being for students especially among racial and ethnic minorities, students with immigrant parents, students living in low SES families, and in impoverished communities (Balfanz et al., 2013; Lewis & Burd-Sharp, 2013). Conversely, components of test anxiety, including physiological arousal, emotional, cognitive, and behavioral factors, and/or sense of social pressure (Lowe & Lee, 2008; Lowe et al., 2008; von der Embse et al., 2013; Zeidner, 1998) can hinder student engagement with school.

**Test Anxiety**

With the passage of the No Child Left Behind Act (NCLB) in 2001, the federal government included a mandatory requirement of high-stakes testing to measure school
performance. While the Every Student Succeeds Act (ESSA) was signed into law in December 2015 to replace aspects of NCLB, all states must still assess all public school children in grades 3-8 on math and literacy skills annually (USDOE, 2015). In an educational environment that has moved toward increased measurement of student and teacher proficiency through the use of high-stakes testing, poor performance on these exams has consequences for schools, faculty, and most importantly students (Lowe et al., 2008; Taylor, 2014; von der Embse & Hasson, 2012; Whitaker-Sena et al., 2007). Remediation efforts in subject area content aimed at raising student test performance have been only partially effective and come at a cost to adolescent students' psychological, emotional, and social development (Broderick & Jennings, 2012; Tang et al., 2012; Taylor, 2014). In addition to being stigmatizing, an unintended result of remediation classes can include reinforcing a sense of low academic self-efficacy (Rollins, 2014). Both test anxiety and low academic self-efficacy during middle school can further contribute to decreased student engagement (Bandura, 1977; Breso, Schaufeli, & Salanova, 2011; Cuhna, & Paiva, 2012; Wasserman et al., 2003).

Test anxiety affects as many as one third of all students and has increased as school accountability required by the NCLB has increased (Lowe et al., 2008; Segool et al., 2013; von der Embse et al., 2013; von der Embse & Hasson, 2012). Students with high test anxiety also tend to be more self-critical, have stronger feelings of academic inadequacy and self-disgust and lower levels of acceptance and mindfulness (Cuhna, & Paiva, 2012; Sarason, 1984). Test anxiety may manifest as physical symptoms and debilitating thoughts and feelings, or off-task behaviors that distract or interfere with test
anxious students’ ability to process or remember information and instructions in high-stakes testing situations (Lowe et al., 2008; Whitaker-Sena et al., 2007; von der Embse et al., 2013). As students feel anxious about testing and then experience debilitating physiological symptoms, cognitive behaviors, or social humiliation, test anxiety tends to be reinforced and gets worse with subsequent exams (Lowe et al., 2008; Whitaker-Sena et al., 2007). Test anxiety tends to be negatively correlated with self-efficacy. Students who are confident in their academic abilities tend to feel less test-anxious and students with high test anxiety tend to lack confidence in their academic abilities (Onyeizugbo, 2010).

While most schools address poor test performance with academic remediation to boost test scores, exploring test anxiety and ways to avoid or reduce it is a more recent endeavor (Cuhna & Paiva, 2012; Tang et al., 2012; von der Embse et al., 2013). One of the first mindfulness studies ever conducted in school effectively employed teaching meditation as an intervention for test anxiety (Linden, 1973). Although mindfulness research in schools remained limited until recently, it has proven to be an inexpensive, non-remedial intervention that has shown potential for counteracting the effects of test anxiety (Tang et al., 2012) and counterproductive academic behaviors that may contribute to disengagement with school (Schwager, Hulsheger, & Lang, 2015; Wisner, 2015).

**Mindful Awareness in School**

As early as 1973, research indicated the usefulness of teaching mindfulness in schools, in particular for test anxiety. Students trained to alter their emotional states
became more relaxed within a testing environment and better able to focus attention on the task at hand (Linden, 1973). Perhaps, then, mindfulness was ahead of its time. In the years since, researchers have demonstrated many benefits of mindfulness practices for self-management and self-regulation, psychosocial, emotional, and physical health and overall well-being (Davidson & Beagley, 2012; Fisher, 2006; Rempel, 2012; Shapiro et al., 2006; Shonin et al., 2012; Wisner, 2014).

While the vast majority of this research has focused on adults (Black, 2015), interest has recently reemerged in research focused on benefits of mindfulness on adolescent development and in educational settings (Beauchemin et al., 2008; Broderick & Jennings, 2012; Fisher, 2006; Rempel, 2012; Tang et al., 2012; The Hawn Foundation, 2011; Zoogman, Goldberg, Hoyt, & Miller, 2015). There is also growing interest in moving beyond remediation toward intrinsic engagement in schools (Busteed, 2013; Rollins, 2014; Taylor, 2014; Wisner, 2014). It appears that the renewed effort to move mindfulness into schools is a concept ready to take root with programs such as Mindful Schools, MindUp, Learning to Breathe, and Cultivating Awareness and Resilience in Education aimed at teaching mindfulness to teachers or to students directly (Broderick & Jennings, 2012; Jennings, Snowberg, Coccia, & Greenberg, 2011; Rempel, 2012; Tang et al., 2012; The Hawn Foundation, 2011).

Primary measurable components of mindfulness are self-regulation of attention and present moment orientation characterized by curiosity, openness, and acceptance (Bishop, Lau, Shapiro, Carlson, Anderson, & Carmody, 2004). There are qualities of youth including being open, ready to learn, and creative that lend themselves to
cultivating mindfulness at this age (Sanno, Saekow, Kelly, & Radke, 2014). Intentional self-regulation is also associated with thriving in adolescence and throughout life (Davidson et al., 2012; Lerner, Lerner, Bowers, Lewin-Bizan, Gestsdottir, & Urban, 2011). Teaching mindful awareness skills to middle school students may impact student engagement with school (Wisner, 2014) and impact student test anxiety (Tang et al., 2012).

**Statement of the Problem**

Based on the prevalence of high-stakes testing in schools, the growth of test anxiety among middle school students, and the decline in student engagement that begins with the transition to middle school that coincides with the onset of adolescence, middle school can be a vulnerable time for students (Benson et al., 2004; Meschke, Peter, & Bartholomae, 2011). Conversely, based on rapid brain development that is characteristic of adolescence, new healthy habits can be learned that strengthen neural networks that can lead to positive outcomes through neuroplasticity (Cozolino, 2013; Siegel, 2013). The current focus in middle school on academic remediation for poor test performance may actually be reinforcing neural pathways that support test anxiety and negative feelings toward school that contribute to a student’s sense of disengagement with school (Cozolino, 2013; Doidge, 2015; Montgomery, 2013). Additionally, research indicates that a student’s gender, race and ethnicity, SES, learning English as a second language (ESL), and disability status are factors in both student engagement with school and test anxiety. Adequately addressing the diverse needs of students is important to successfully engaging students with school and for test performance objectives (Balfanz et al., 2013;
Lewis & Burd-Sharp, 2013; Hazel et al., 2014; Lowe et al., 2008; Whitaker-Sena et al., 2007; von der Embse et al., 2013a).

While mindfulness research shows promise for decreasing test anxiety (Linden, 1973; Tang et al. 2012) and for increasing indicators related to student engagement with school (Beauchemin et al., 2008; Broderick & Jennings, 2012; Fisher, 2006; The Hawn Foundation, 2011), the vast majority of mindfulness research has been conducted among adult populations (Black, 2015; Burke, 2010; Rempel, 2012). Teaching mindful awareness skills to adolescents has shown promising outcomes related to improved attention, cognitive and emotional regulation, and positive mood; decreased stress, anxiety and negative mood; and enhanced social, emotional, behavioral, and physical health outcomes (Broderick & Jennings, 2012; Rempel, 2012; Semple, Lee, Rosa, & Miller, 2010; Shonin et al., 2012; Siegel, 2010a; The Hawn Foundation, 2011). While these findings are optimistic, many of the studies involving adolescent participants have been very small and/or focused on special populations with few generalizable outcomes (Burke, 2010; Rempel, 2012). Renewed interest in research on mindfulness in schools has been a rather recent phenomenon and research specifically focused on middle school students is particularly scant. Researchers have all noted the need for further research including well-designed, well-controlled, replicable studies with sizable populations to expand the research base around mindfulness and adolescents (Broderick & Jennings, 2012; Burke, 2010; Felver, 2013; Reid, 2009; Rempel, 2012; Tang et al., 2012).
Research Questions

Based on the current research on the impact of student engagement and test anxiety on students’ academic performance and healthy adolescent development, along with renewed interest around the positive impact of teaching mindful awareness in schools, this study aimed to assess teaching mindful awareness skills to middle school students and its relationship to student engagement with school and to student test anxiety. Specifically, the primary research questions under investigation in this study were:

(1) To what extent does teaching mindful awareness skills to middle school students predict change in student engagement? and

(2) To what extent can teaching mindful awareness skills to middle school students predict change in students’ level of test anxiety?

The secondary questions were:

(1A) To what extent do characteristics of gender, race and ethnicity, SES, ESL, and disability status moderate the relationship between teaching mindful awareness skills to middle school students and change in student engagement? and

(2A) To what extent do characteristics of gender, race and ethnicity, SES, ESL, and disability status moderate the relationship between teaching mindful awareness skills to middle school students and change in students’ level of test anxiety?

The goals of this study were: (1) to expand the body of mindfulness literature focused on adolescents in schools; (2) to contribute to generalizability by assessing the effects of teaching mindful awareness skills as part of regular classroom instruction in a
diverse, mid-sized suburban middle school; and (3) to add to a more nuanced understanding of how demographics, such as age, gender, race and ethnicity, low-SES, or disability status may have moderating effects on student engagement with school, the experience of test anxiety, and on learning mindful awareness skills.

**Significance of the Study**

Since engagement with school is a strong predictor of school success and well-being across the lifespan, it is important to support students who are already engaged and intervene early for those who show signs of disengagement (Balfanz et al., 2013; Benson et al., 2004; Sulkowski et al., 2012; Upadyaya & Salmela-Aro, 2013; Yazzie-Mintz & McCormick, 2012). During adolescence, when developmental and educational transitions collide, prevention efforts focused on supporting student engagement or on lowering or preventing test anxiety can shift negative patterns before they get incorporated into rapidly changing neural connections (Fisher, 2006; Tang et al., 2012). In fact, Sanger and Dorjee (2015) suggest that based on the plasticity of adolescent brains, adolescence may provide a late opportunity for neurocognitive interventions to shift life trajectory toward positive outcomes. Neuroscience research shows a connection between mindfulness and strengthening of key neural pathways (Davidson et al., 2012). Contemplative education research suggests that learning mindfulness is a foundational skill for healthy development and learning (Greenberg & Harris, 2012; Langer, 2000).

Little research exists connecting mindfulness interventions (MIs) to middle school. Understanding the effectiveness of MIs among middle school students is key for design of developmentally appropriate interventions (Black, 2015). Research suggests
MIs can strengthen the ability to shift perspective, facilitating objectivity, empathy, and tolerance without reactivity (Wisner, 2014), which may benefit adolescents undergoing rapid, inconsistent, and sometimes baffling changes. Mindfulness enhances self-regulation (Roeser & Peck, 2009), which is correlated positively with student engagement and negatively with test anxiety, indirectly linking MIs to student engagement and test anxiety.

A literature search yielded no published studies that directly explore the relationship between mindfulness and student engagement in K-12 schools. An early MI study with elementary students suggests it reduces test anxiety (Linden, 1973), although few studies have aimed to replicate it. A recent study suggests mindfulness affects test anxiety by reducing rumination, allowing for more effective use of working memory for on-task behaviors (Mrazek, Franklin, Phillips, Baird, & Schooler, 2013). This finding may have implications for healthy adolescent development and academic achievement. Rumination can negatively affect present moment, appropriately focused attention, impacting both learning and mental health. This may be particularly important, since the onset of depression and anxiety disorders often coincide with adolescence (APA, 2014). Exploring how teaching mindful awareness skills in class may affect student engagement and test anxiety contributes to the body of research regarding promotion of positive youth development efforts within schools and may provide additional approaches for addressing disengagement, test anxiety, and deficit remediation. It also contributes to the mindful learning discourse, which posits that mindful awareness skills are foundational for
healthy development and learning (Greenberg & Harris, 2012; Langer, 2000; Roeser & Peck, 2009).

**Theoretical Framework**

This study followed an integrative approach to adolescent development and thriving, through the lens of neuroscience and positive youth development. It assessed the impact of teaching mindful awareness skills in middle school on aspects of adolescent development that affect student outcomes related to school. Mindfulness research has shown promise for strengthening neural connections in and between areas of the brain that support cognitive, emotional, and behavioral regulation, as well as positive affect, while reducing stress and anxiety.

The transition toward a strengths-based, positive approach to adolescent development is a relatively recent shift for developmental science (Lerner, 2005). Positive youth development (PYD) is a set of ideals shared across disciplines that support building assets such as competence, confidence, connection, character, caring, and contribution. These assets have been implicated in accomplishment, social-emotional engagement, self-efficacy, and well-being during adolescence and across the lifespan (Benson et al., 2006; Benson & Scales, 2011; Jayawickreme, Forgeard, & Seligman, 2012; Lerner, 2005; Lerner, Almerigi, Theokas, & Lerner, 2005). Neuroscience continues to expand our understanding of adolescent development, mechanisms of cognitive functioning, and managing behaviors and emotions including anxiety (Bostic, Nevarez, Potter, Prince, Benningfield, & Aguirre, 2015; Davidson et al., 2012; Pfeiffer & Blakesmore, 2012). It also suggests the power of developing mindful awareness skills
for integration and strengthening of neural networks, which contribute to focused attention, self-regulation, attuned communication, and insight (Davidson et al., 2012; Siegel, 1999; Siegel, 2013). Together these findings create an underlying foundation from which to build theory related to the importance of exploring the experiences of middle school students and their developmental and educational needs. Of particular interest to this study are aspects of brain development, functioning, and structural changes that impact adolescent students’ cognitive and social-emotional development, academic performance, and engagement with school (Clewett et al., 2014; Cozolino, 2013; Pfeifer & Blakemore, 2012; Siegel, 2013; Tang et al., 2012, Zelazo & Lyons, 2012).

Since the field of neuroscience is vast, the specific theoretical lens used within this study was Interpersonal Neurobiology (IPNB). IPNB is an area of neuroscience that uses an interdisciplinary approach to understanding core aspects of the inter-relationship between the mind, the embodied brain, and interpersonal relationships that contribute to integration and healthy mental functioning and overall well-being (Siegel, 1999). Applying IPNB and PYD to adolescent development and educational research provided a deeper understanding of how to develop new, effective ways of approaching the challenges that students and schools face in an environment of increased accountability and the anxiety it can create.

In relation to learning, IPNB has highlighted the importance of the relationship between the medial prefrontal cortex (mPFC), which is important for executive function, attention, and self-regulation; and the limbic area, which plays a key role in motivation,
memory, associative and emotional learning (Siegel, 2013; The Hawn Foundation, 2011; Wright, n.d.) and anxiety, including test anxiety (Clewett et al., 2014). Higher levels of mPFC functioning are associated with positive developmental outcomes in youth, including better perspective-taking skills, improved on-task behaviors, mastery, self-efficacy, self-esteem, and relationship success (Davidson et al., 2012; Siegel, 2013; Tang et al., 2012) and lowering test anxiety (Linden, 1973; Semple Reid, & Miller, 2005). All of these are linked to positive outcomes in school (Hazel et al., 2014; Ouweneel, Schaufeli, & LeBlanc, 2013).

There is evidence that skills can be taught and attitudes fostered that develop and strengthen the connections with the mPFC that lead to improved functioning (Cozolino, 2013; Siegel, 2013; The Hawn Foundation, 2011). IPNB identifies nine functions of the mPFC that emerge with healthy mental processing and are implicated in healthy adolescent development: bodily regulation, attuned communication, emotional balance, fear extinction, insight, empathy, morality, and intuition (Siegel, 2010a; Siegel, 2013). Practicing mindful awareness has been shown to improve these nine mPFC functions and to calm the limbic area; allowing for increased focus on learning, ability to approach challenging situations with less worry, and sense of empathy, compassion, purpose, meaning, and social-emotional well-being. It also fosters an open, curious attitude (Broderick & Jennings, 2012; Siegel, 2013; Tang et al., 2012; The Hawn Foundation, 2011; Zoogman et al., 2015). Many of these skills have also been implicated in enhancing self-efficacy, student engagement, resiliency, and overall well-being (Benson
et al., 2004; Seligman, 2011; Siegel, 2013) and lowering test-anxiety (Linden, 1973; Semple et al., 2005).

**Summary**

The onset of adolescence and transition into middle school tend to coincide. Each tends to bring with it significant changes and a new set of expectations. At this same point, student engagement with school starts a downward trajectory. Since student engagement is a predictor of academic and life success and avoidance of numerous high-risk behaviors, addressing ways to nurture its existence or encourage its renewal is an important goal for schools (Balfanz et al., 2013; Bridgeland et al., 2006; Heckman & LaFontaine, 2010; Lewis & Burd-Sharp, 2013). High-stakes testing has become the norm in U.S. public schools and has resulted in increased test anxiety (Lowe et al., 2008; Segool et al., 2013; von der Embse et al., 2013) and subject matter remediation programs (Taylor, 2014), each of which can contribute to decreased student engagement with school (Benson et al., 2004; Scales, 2010; Taylor, 2014). Mindfulness shows promise as a universal preventative intervention in schools that can benefit all students by lowering stress, promoting social skills, and improving academic performance for adolescents (Beauchemin et al., 2008; Felver et al., 2013 Sanno et al., 2014).

There has been one recent study that identified increased student engagement with school as an outcome of teaching mindfulness skills in an alternative high school (Wisner, 2014). No other research was found that specifically linked teaching mindfulness to student engagement for students in K-12 schools. There is very limited, yet promising research related to the effects of mindfulness on test anxiety. This study
explored teaching mindful awareness skills to middle school students as a universal intervention to support student engagement with school and to address student test anxiety. Of particular interest were student populations for whom research indicates a tendency to score lower on high-stakes exams and/or to have higher rates of disengagement.

**Organization of the Dissertation**

This dissertation is organized into five chapters. The theoretical framework for this study, Interpersonal Neurobiology (IPNB), is embedded within each chapter. The first chapter provided an overview and rationale for the study while connecting the theoretical underpinnings of IPNB to mindfulness as a universal intervention in a middle school environment. The second chapter includes a comprehensive literature review supporting the study. Chapter three outlines the methodology, variables, and statistical analyses that were used to interpret significant findings of the study. Chapter four details the study results. The final chapter discusses the meaning of results from a practical perspective, including implications for practice and future research, as well as the limitations of the study.

**Definitions of Terms**

**Adequate Yearly Progress (AYP).** Refers to benchmarks schools are expected to meet related to NCLB or face sanctions.

**Amygdala.** The amygdala is the integrative center for emotions and emotional behaviors and plays a key role in motivation, associative and emotional learning. It receives input from all senses and visceral inputs from other parts of the brain including the PFC. When
the amygdala is activated, it causes an intense emotional response such as anger or fear based on primitive emotional memory, which can create automatic, rapid response, rather than the more deliberate processing of the PFC. (Wright, n.d.).

**English as a Second Language (ESL).** While defined more narrowly in school districts to those required to receive additional services, this study examined all students who did not learn English as their primary language.

**Every Student Succeeds Act (ESSA).** Replacing the NCLB law, this law will give more responsibility for curriculum decisions to state departments of education and local school administrators. It retains yearly testing requirements for all students in grades 3-8 and once in high school (USDOE, 2015).

**Executive Functions (EFs).** A related group of mental operations that involve attention, cognitive control, planning, and working memory. Effective EF functioning is related to cognitive, emotional, behavioral, social, and academic competence. EFs are depletable and susceptible to stress. These reduce EF efficiency especially during childhood, which can lead to difficulty regulating emotions, inhibiting emotional expression, and controlling mind wandering and rumination.

**High-Stakes Tests.** High stake tests are test that have important consequences for the test taker based on their results. Within U.S. K-12 public schools, these consequences also apply to teachers and schools, as well, with low test scores leading to negative teacher evaluation and sanctions for schools and school districts.

**Interpersonal Neurobiology (IPNB).** IPNB is a field of neuroscience that uses an interdisciplinary approach to knowing what it means to be human and focuses on the
interrelationship between brain, mind, and relationships that contribute to healthy mental functioning.

**Limbic System.** The limbic system, sometimes referred to as the mammalian brain, is a primitive set of brain structures involved in bodily functions, motor function, sensory perception, sense of smell, memory, and many or our emotions and motivation, especially related to survival.

**Low Socioeconomic Status (SES).** An individual’s or family’s economic and social position in relation to others, often measured as a combination of income, education, and occupation (APA, 2014). For the purpose of this study, the qualification for eligibility for free or reduced lunch will serve as the measure of low-SES.

**Meditation.** Meditation is a form of mindfulness that involves deep reflection. For the purpose of this study, meditation will refer to mindfulness meditation, with the goal of developing the skill of paying attention to inner and outer experiences with acceptance, patience, and compassion.

**Mindful Awareness Skills.** Mindful awareness skills are a set of evidence-based practices that promote paying attention with openness, curiosity, and a willingness to be with what is, inviting people to stop, breathe, observe and connect with their inner experience (marc.ucla.edu, n. d.).

**Mindfulness.** Mindfulness is described as a particular kind of attention characterized by intentionality, focus on the present moment, and non-judgmental observance of the experience (Kabat-Zinn, 1994). This can involve meditation or activities, such as listening, walking or eating, in ways that focus attention. Mindfulness is a quality that
humans possess, but often are unaware of and are untrained about its importance or how to cultivate it.

**Mindfulness-Based Interventions.** Interventions aimed at progressively focusing the participant toward awareness of the connection and synergy between body and mind, including body and mind awareness, breathing, mental imagery, mindful walking or eating etc. (Tang et al., 2012).

**Neuroplasticity.** Refers to the brain’s capacity to change and develop, strengthening or creating new neural pathways, through learning and new experiences.

**Neuroscience.** Neuroscience is the broad study of the nervous system, including the brain and spinal cord. When focused on humans it is sometimes referred to as the science of the mind, delving into the many aspects of the brain that impact the functioning of the mind.

**Neurotypical Adolescent Development.** The normal brain functions and changes associated with social, cognitive, and affective processes that occur during adolescence.

**No Child Left Behind Act (NCLB).** Signed into law in 2001, NCLB put in place a high-stakes, test-based accountability system to measure annual progress toward the goal of all students being proficient in math and language arts by 2014. Schools that do not meet their targets, in every racial ethnic, and disability category, can have strict sanctions imposed including school closings or entire staffs fired. While reauthorization or revamping NCLB is seven years overdue, it is among many other bills that are currently stalled in Congress. In the meantime, high-stakes testing remains in place with states requesting waivers to be able to receive educational funding.
**Noncognitive Factors.** A term used by economists to refer to a set of essential behaviors, skills, attitudes, and strategies, beyond content knowledge and academic skills, that students need to develop that are crucial to academic performance, but are not measured by commonly administered cognitive tests such as IQ or achievement tests. Sometimes referred to as soft skills, they include such items such as motivation, time management, and self-regulation.

**Opt-Out Withdrawal of Consent.** A process that can be used in research deemed to have minimal risk to participants, which notifies participant (or their parent) of the study and provides the opportunity to withdraw consent to participation (Santelli, Smith Rogers, Rosenfeld, DuRant, Dubler et al., 2003).

**Prefrontal Cortex (PFC).** The PFC is the front most section of the brain that spans across the left and right hemispheres. It is primarily responsible for the executive functioning of the brain, in charge of decision-making, organization, problem solving, complex thought, modulating mood and tying past memories to present experiences to make informed choices. This part of the brain does not fully develop until the mid-20s, playing a role in adolescent less rational, risk-taking behavior. It is the primary area affected by Attention Deficit Disorder.

**Self-regulation.** Self-regulation requires the ability to direct behavior, control impulses and emotions, and maintain focus and attention, in order to meet standards or set and achieve goals.
Social-Emotional Learning (SEL). An umbrella term referring to skills designed to build social skills, emotional understanding, self-control, and healthy values that promote positive youth development while preventing mental health problems.

State-Mandated Tests. State-mandated tests are generally high stake tests that have important consequences, based on their results, for the test taker, teachers, schools and school districts. Consequences for students may include remediation classes up through denial of graduation for high school exit exams. Consequences for teachers may include negative teacher evaluations and teacher remediation plans. Consequences for schools and school districts can include sanctions such as decreased funding, ability of students to transfer to other school, and state takeover of the school district.

Student Engagement. Refers to the level of attention, interest, enthusiasm, curiosity, optimism, or motivation students experience when learning or being taught. It may be observable through outward behaviors, such as attending class, listening and participating in discussions, and turning work in on time. Student engagement in school encompasses aspects of intellectual, emotional, behavioral, physical, social, and cultural engagement (Great Schools Partnership, 2013).

Test Anxiety. The development and expression of test anxiety manifests from biopsychosocial responses surrounding the potential consequences of negative evaluation on an upcoming test or exam. These may include some combination of physiological arousal, emotional, cognitive, behavioral factors, and/or sense of social pressure (Lowe & Lee, 2008; Lowe et al., 2008; von der Embse et al., 2013; Zeidner, 1998).
Chapter Two

In his 1890 book, *The Principles of Psychology*, psychologist William James wrote:

> The faculty of voluntarily bringing back a wandering attention, over and over again, is the very root of judgment, character, and will . . . An education which should improve this faculty would be the education par excellence. But it is easier to define this ideal than to give practical directions for bringing it about. (p. 424).

This education of the mind, mindful awareness, is beginning to find a practical application in schools over a century after James (1890) identified its importance. This chapter will discuss factors associated with adolescent development from a neurobiological perspective with a focus on learning and overall well-being. A review of student engagement with school, test anxiety, and mindfulness, and their relevance to adolescents in middle school will follow, highlighting how mindfulness-based interventions are likely to impact student engagement and test anxiety. The chapter will conclude with an overview of a multidisciplinary scientific approach and theory related to adolescent development, highlighting aspects of Interpersonal Neurobiology and theories of well-being specific to positive and healthy adolescent development.

**Adolescence: A Time of Structural Change and Transition**

Adolescence is an adaptive process where the change within the individual leads to adjustments for self, family and other relationships, and even institutions, such as schools. This process can support building knowledge, skills, motivation, and a sense of
agency (Bronfenbrenner & Morris, 2006). Adolescence is a developmental stage primarily identified with the second decade of life (Lerner & Steinberg, 2004), although some researchers use a range of 11-24 years old to reflect brain changes associated with adolescence that can continue into emerging adulthood (Cozolino, 2012; Montgomery, 2013; Siegel, 2013). Adolescence, the process of moving from a child-like to adult-like state, is when the most changes occur simultaneously across biological, cognitive, psychological, and social characteristics of the individual (Lerner, 2005). The capacity for structural brain change and physical growth during adolescence is only surpassed in infancy (Cozolino, 2012; Montgomery, 2013; Sanders, 2013; Siegel, 2013), which has led some researchers to view adolescence as a last best opportunity to strengthen or repair key neural pathways that support healthy brain functioning and well-being across the life course (Sanger & Dorjee, 2015).

While there are principles of adolescent development that apply to all youth, each person goes through these changes independently, at different speeds and with varying outcomes caused by both timing of the changes and the reciprocal influence exerted by both the person and their physiological, psychological, and social factors (Lerner, 2005). While cultural and familial factors influence expression, adolescents as a whole are moving toward autonomy and self-reliance, differentiating themselves from family, and cultivating more complex relationships with peers and adults, such as teachers and school counselors (Cozolino, 2013; Siegel, 2013). As they move toward spending more time with peers, most youth still greatly value their relationships with their parents, tend to
hold the same core values as their parents, and choose friends who share those values (Lerner, 2005).

Adolescence is a time of tremendous opportunity to develop cognitive, emotional, and social assets that can lead to student engagement, a sense of personal accomplishment, self-efficacy, and thriving during this stage and throughout the lifespan (Bronfenbrenner & Morris, 2006; Cozolino, 2013; Siegel, 2013). Thriving or flourishing refers to a state of health, well-being, and prospering (Benson et al., 2006; Seligman, 2011). It is also a time of increased risk that can lead to disengagement and poor outcomes across the lifespan that can be avoided through monitoring and early intervention (Bronfenbrenner & Morris, 2006; Cozolino, 2013; Meschke et al., 2011; Siegel, 2013). While the majority of youth take healthy pathways toward adulthood (Benson et al., 2004; Lerner, 2005), the number of adolescents living in poverty or low-income families had risen to 41% by 2013 (Jiang, Ekono, & Skinner, 2015) and 21% of all adolescents will experience a mental disorder by age 18 (Merikangas, He, Burstein, Swanson, Avenevole, Cui et al., 2010). These youth are significantly more vulnerable to test anxiety (Whitaker-Sena et al., 2007), disengagement and dropping out from school, and poor outcomes across the lifespan (Balfanz et al., 2013; Benson et al, 2004). It is important to address these and other challenges early in order to give students the best chance for thriving (Diamond, 2010; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Weissberg, Kumpfer, & Seligman, 2003).

Within schools, an effective way to do this is through social-emotional learning (SEL) programs, which have been shown to prevent mental health problems while
promoting positive youth development for all students (Diamond, 2010; Durlak et al., 2011; Weissberg et al., 2003). Aspects of social emotional learning (SEL) may include: “bonding; resilience; social, emotional, cognitive, behavioral, and moral competencies; self-determination; spirituality; clear and positive identity; belief in the future; recognition for positive behavior; opportunities for prosocial involvement; and prosocial norms of health standards for behavior” (Greenberg et al., 2003, p. 468). These experiences provide students with opportunities to strengthen or develop self-control, emotional understanding, relationships with peers and teachers, and healthy values (Davidson et al., 2012; Durlak et al., 2011; Greenberg et al., 2003; Weissberg et al., 2003). This can be especially important for the most vulnerable students who tend to show the greatest gains (Benson et al., 2004; Bronfenbrenner & Morris, 2006; Cozolino, 2013; Durlak et al., 2011; Greenberg et al., 2003; Weissberg et al., 2003). Teaching mindful awareness skills can complement and add value to social-emotional interventions by cultivating “positive habits of the mind” (Davidson et al., 2012, p. 150) that are crucial to self-regulated learning and collaboration in the classroom. Some recent research has embraced the term “mindfulness-based social emotional learning”, which incorporates teaching mindful awareness skills that have been linked to strengthening neural connections that support self-regulation and healthy adolescent development (MBSEL; Bokash, Snow, Tobias, Houlihan, & Barbosa-Lieker, 2016; Schonert-Reichl, Oberle, Lawlor, Abbott, Thomson, Oberlander et al., 2015).
Adolescent Neurodevelopment and the Trajectory to Thriving in Adulthood

The adolescent brain looks profoundly different than the brain of a child or of an adult. The developmental period of adolescence (approximately 11-24 years old) significantly alters the structure of the brain, through growth and pruning, while creating and strengthening neural connections through neuroplasticity (Cozolino, 2012; Montgomery, 2013; Siegel, 2013; Sanders, 2013; Steinberg, 2005). Neuroplasticity occurs through learning and new experiences. It occurs rapidly during adolescence and continues throughout adulthood in response to learning, novelty, and exercise (Montgomery, 2013). Adolescence represents a pivotal time to support an already healthy life trajectory or to intervene to change both brain functioning and life experiences that can shift a life course trajectory in a more positive direction (Cozolino, 2012; Lerner, 2005; Siegel, 2013). SEL and teaching positive habits of the mind through mindful awareness practices develop neural fibers and networks that support healthy physical, cognitive, psychological, emotional, and prosocial behaviors that are linked to positive developmental outcomes (Black, 2015; Davidson et al., 2012).

While it is important to understand that the brain is intricately connected to the body through the central nervous system and is integrative in all functions, certain functions tend to be more dominated by particular parts of the brain. The Prefrontal Cortex (PFC) is the part of the brain responsible for analytical thought, decision-making, focusing attention, self-regulating behavior, and is primarily associated with intelligence, consciousness, personality, and morality. It is significant in learning, where its interaction with the hippocampus (for memory) and the amygdala (for motivation), both
parts of the limbic system, is crucial (Cozolino, 2013; Siegel, 2013; Siegel & Bryson, 2011; The Hawn Foundation, 2011). While learning requires a level of cognitive skill, it is ineffective if the information cannot be retrieved when needed or if interest wanes before the student is sufficiently engaged to master the material (Brown Roediger, & McDaniel, 2014). It is in the integration of the PFC with subcortical areas that cognitive control and emotional regulation join to effectively allow for optimal learning (Cozolino, 2013; Siegel, 2013). Practicing mindful awareness can build structural support for cognitive control and emotional regulation at a time when the heightened plasticity of adolescence can rewire these patterns into the restructuring brain (Davidson, 2012; Grecucci, Pappaianni, Siugzdaite, Theuninck, & Job, 2015; Greenberg & Harris, 2012). These self-regulatory processes are requisites for engaged learning (Cozolino, 2013) and a positive trajectory across the lifespan (Lerner, 2005).

Even in a well-integrated brain, certain situations take precedence over others. Danger (sub-cortical) trumps learning (primarily cortical). This is an important evolutionary function for survival of the species. But in our modern world, social threat can elicit the same response as a tiger, inhibiting the PFC, which is necessary for most of the activities of school. This response is heightened in adolescence due to increased importance of peer interactions and brain changes that first affect the amygdala making it more reactive. Students who are very fear-based or have chaotic home lives are likely to experience more reactivity in the amygdala that can inhibit the ability to learn new concepts or store them in memory (Cozolino, 2013; Siegel, 2013; Siegel & Bryson, 2011; The Hawn Foundation, 2011). This process is implicated in anxiety, including test
anxiety, where social humiliation is a salient factor that may manifest as physical symptoms and debilitating thoughts and feelings, or off-task behaviors (Lowe et al., 2008; Whitaker-Sena et al., 2007; von der Embse et al., 2013). Learning mindfulness practices can calm the amygdala and strengthen the neural connection to support effective cognitive control of emotions, which impacts positive mental health (Davidson, 2012; Roaten & Roaten, 2012; Siegel, 2013) and is relevant to test anxiety (Whitaker-Sena et al., 2007).

**The growing brain.** Interpersonal Neurobiology (IPNB) refers to the brain as “the embodied brain” because the central nervous system (CNS) starts in the brain with neurons traveling from the brain stem into the spinal cord (CNS) and then throughout the body through the peripheral nervous system. Signals from body parts and organs continuously send information to the brain and the brain to the body in a unified system. At birth, a child’s nervous system and the neural pathways in the brain are not fully formed. They tend to develop from bottom to top and back to front, then right to left in the cortex, strengthening connections between parts of the brain as the process progresses. This development is shaped through relationships and factors such as adequate nutrition and a safe living environment (Bronfenbrenner & Morris, 2006; Siegel, 2011). Later, during adolescence, a process called myelination occurs making brain circuitry more efficient (Roaten & Roaten, 2012). Myelinated connections in the brain process 3,000 times faster than unmyelinated connections. This process again starts from bottom to top, back to front, and right to left, meaning that the PFC is last to become completely myelinated at around age 24 (Siegel, 2011). During this process the
amygdala reacts much faster than the PFC, which can lead to impulsive decisions based on emotion and instinct. Changes that occur in the limbic area of the brain contribute to significantly heightened reactivity to emotional stimuli (Roaten & Roaten, 2012), which has implications for learning and school engagement. Using novelty, humor, and creative exploration in education can spark adolescents’ positive emotions, cognitive processes, curiosity, and motivation to learn (Cozolino, 2012; Siegel, 2011). The left side of the PFC typically regulates messages from the amygdala, but if its activity is decreased or inhibited, or slower based on myelination, the amygdala has greater control and the right PFC with its predominance to negative emotion can feel overwhelmed. Teens tend to respond from emotion and are more likely to misread social cues (Roaten & Roaten, 2012). Adolescence also marks the age of onset for anxiety, depression, and other psychological disorders (APA, 2014) with 21% of all 13-18 year olds currently or previously having suffered with a mental disorder (Merikangas et al., 2010). The most prevalent current diagnoses are attention deficit hyperactivity disorder (ADHD), anxiety, depression, and behavioral and conduct disorders (NIMH, 2013). Development of healthy brain functioning and well-being during adolescence and across their life trajectory can be supported by programs that build social-emotional skills and positive habit of the mind, which mindful awareness skills have been shown to do (Beauchemin et al., 2008; Black, 2015; Burke, 2010; Davison et al., 2012; Diamond, 2010; Schonert-Reichl et al., 2015).

With each major structural change in the brain, the child or adolescent begins to gain greater functionality and, with a typical developmental trajectory, begins to test out
new skills. Similar to any skill acquisition, it can take considerable time for a child to gain mastery over new capabilities that are developing and performance is likely to be inconsistent and inefficient (Cozolino, 2012; Montgomery, 2013; Siegel, 2013; Vygotsky, 1978). As with all developmental functions, there are significant amounts of variability from child to child (Cozolino, 2012; Montgomery, 2013; Siegel, 2013; Steinberg, 2005). This can contribute to a sense of vulnerability during adolescence, when evaluation of self amongst peers is heightened (Siegel, 2013). An unexpected finding is that adolescents are less likely to activate parts of the PFC than children (Steinberg, 2011), likely due to myelination occurring last in the PFC (Roaten & Roaten, 2012). Adolescents can demonstrate decision-making skills similar to adults in low stress situations, but under high arousal these cognitive processes can be significantly impaired (Steinberg, 2005). During adolescence social interactions with peers can create high arousal conditions. The non-judgmental, present-moment focus of mindful awareness may allow adolescents to acknowledge and address these thoughts and feelings in an open, curiosity-driven way that supports student engagement and motivation in school and changes cognitive control and emotional regulation that can reduce stress and anxiety, including test anxiety (Bostic et al., 2015; Davidson et al., 2012; Greenberg & Harris, 2012). Mindful awareness practices have been shown to improve cognitive control and build the integrative fibers in the PFC that contribute to less emotional reactivity (Davidson et al., 2012; Grecucci et al., 2015).

Young adolescents can have difficulty with language expression, which may explain the propensity of vague mumbling or a “whatever” response (Roaten & Roaten,
2012). Shifts in processing within the PFC throughout adolescence significantly increase adolescent attention to understanding of thoughts, intentions, and emotions (Pfeifer & Blakemore, 2012). While this can lead to better understanding of oneself and others and how to navigate changes to create purposeful lives, it also plays a role in adolescents’ hyper-focus on social interactions, fairness, and perceived injustice that can affect motivation and engagement (Siegel, 2013). These structural changes are significant in the process toward adult mental functioning, but during adolescence the neural networks that lead to this outcome are not fully developed or integrated, which can contribute to heightened anxiety and worry (Clewett et al., 2014). During this confusing time, emerging adolescents may hold beliefs that they are constantly being watched and evaluated (imaginary audience) and conversely, that they are omnipotent and invulnerable (personal fable). Together, structural brain changes, increased impulsivity, novelty-seeking, the need for peer approval and these beliefs can contribute to self-consciousness, adhering to peer group norms, risky behaviors, and addiction at a time when the brain is pruning synapses (Cozolino, 2012; Montgomery, 2013; Sanders, 2013; Siegel, 2013).

During adolescence, groups can be powerful entities that, on either end of a spectrum, can provide an environment for danger or great good. Adolescent groups can support academic goals and community pursuits. But the power of the unsupervised adolescent group can also lead to impulsive, detrimental results, such as serious accidents or violence (Cozolino, 2013; Siegel, 2013). Positive groups can support cognitive and emotional development and increase optimism, self-esteem, self-efficacy, and well-being
and buffer members from the detrimental effects of stress (Cozolino, 2013; Sulkowski et al., 2012). They also meet adolescents’ expanding developmental need for social connectedness with peers, emotional engagement, and desire for novelty and creative ways of thinking and interacting (Siegel, 2013). Universal preventions that harness the power of positive groups support these needs and healthy adolescent development for all students while simultaneously providing interventions for the most vulnerable students which can support school engagement and a healthy life course trajectory for these students (Black, 2015; Durlak et al., 2011; Weissberg et al., 2003).

The importance of self-regulation, attachment, and working memory. Self-regulation is a key developmental skill that affects outcomes related to positive relationships, engagement in school, academic success, educational attainment, employment opportunities, and thriving or well-being across the lifespan (Benson et al., 2006; Davidson et al., 2012; Diamond, 2012; Lerner, 2005; Lerner et al., 2011). Self-regulation has been defined as “the ability to flexibly activate, monitor, inhibit, persevere, and or adapt one’s behavior, attention, emotions, and cognitive strategies in response to direction from internal cues, environmental stimuli, and feedback from others, in an attempt to attain personally-relevant goals” (Moilanen, 2007, p. 835). These dispositions are crucial for navigating adolescent development and the educational environment successfully and can be consciously changed (Diamond, 2012; Dweck, 2006; Lerner et al., 2011). Several aspects of self-regulation can be strengthened through mindful awareness practices; research suggests that the greatest improvements have been reported among clinical populations (Black, 2015; Zoogman et al., 2015). Since the majority of
adolescents who experience clinical symptoms do not seek treatment, teaching mindful awareness skills may strengthen neural connections that support healthier psychological functioning (Merikangas, et al., 2010).

Self-regulation emerges as an adaptive process within the context of the relationships within a child’s social system and environment to modulate behavior, thoughts, emotions, and attention to influence contexts. The process starts with early attachment figures who train the infant about safety and getting one’s needs met. They model soothing behaviors that later get internalized by the infant who learns to self-soothe. This expands to regulating the toddler’s behaviors, first monitored and reinforced by caregivers and later internalized by the child. How the caregiver handles this process is related to parenting style, cultural norms, and other contextual aspects of the child’s world (McClellan & Cameron, 2011). Neuroscience and developmental science research continue to point to the importance of consistent, supportive relationships in the development of secure or “good enough” attachment in the construction of self-regulation. It also points to the ability to change outcomes based on intervention (Diamond, 2012; Liew, 2012).

Early attachment has a significant impact on students’ relationship with school as they enter adolescence. It contributes to curiosity and exploration and enhances components of student engagement, such as persistence, adaptability, motivation, and resilience (Cozolino, 2013; Davidson et al., 2012; Hesse & Main, 2015; Lerner, 2005; Siegel, 2013). Students with secure attachment tend to be confident learners who explore their environment. Students with insecure attachment styles are more likely to struggle
with learning, experience hostile, anti-social or difficult relationships with others, be anxious, have difficulty managing feelings, act out in unhealthy ways, and become disengaged from school (Brotherson, 2005; Hesse & Main, 2015). Prevention science has also noted the significant changes in families over the last century that have created a need for schools to take on new roles in supporting social emotional development, which has shown to improve social emotional skills, attitudes, behaviors, and academic performance (Durlak et al., 2011; Weissberg et al., 2003). Mindful awareness skills appear to decrease rumination and mind wandering, which are underlying components of psychological disorders such as ADHD, depression, and anxiety, including test anxiety (Bostic et al., 2015; Davidson, 2012; Schonert-Reichl et al., 2015), which negatively impact student success and engagement with school.

Self-regulation is a component of mental operations referred to as executive functions (EFs). EFs include attention, cognitive control, planning, and working memory. Effective executive functioning is related to cognitive, emotional, behavioral, social, and academic competence. EFs are depletable, susceptible to psychosocial stressors, and sensitive to intervention, especially during childhood. Lower EF efficiency negatively impacts regulating emotions, inhibiting emotional expression, and controlling mind wandering and rumination. Mind wandering is a form of dysregulation that diminishes the ability to effectively focus attention and contributes to the depletion of working memory. Emotional dysregulation plays an important role in vulnerability to psychopathologies (Davidson et al., 2012), such as ADHD, anxiety, and depression, of which rumination is a component (Bostic et al., 2015). Chronically stressed children can
have deficits in autobiographical memory, as well as working memory (van der Kolk, 2014). All of these can deplete EFs and working memory, inhibiting their proper functioning and the ability to learn. They significantly impact social, emotional, and academic learning and performance (Black, 2015; Cozzolini, 2013; Davidson et al., 2012; van der Kolk, 2014).

According to Diamond (2012), EFs can be improved through concentration, focus, and practice that engages working memory or through quick adaptive responses. These may come about directly or through indirect routes such as increased joy, social belonging and support, building self-efficacy, confidence or pride, or physical activity that leads to improved academic and school success and reduced psychological symptoms. Diamond (2012) notes that the PFC and executive functioning are the first to be diminished when a youth is stressed or has unmet physical, emotional, or social needs. She hypothesizes that interventions that incorporate direct targeting of EFs while increasing aspects of well-being, such as bonding, positive emotions, efficacy and confidence, and/or physical fitness, will be most effective (Diamond, 2012). Classroom-based mindfulness practices can facilitate bonding and well-being that support student engagement with school (Benson et al., 2004). Together bonding experiences and neuroplasticity can support or shift attachment style and the ability to self-regulate (Cozolino, 2013; Siegel, 2013). Mindfulness interventions (MI) have also shown promise for decreasing mind wandering and rumination that deplete working memory and are associated with test anxiety (Hilt & Pollak, 2012; Mrazek et al., 2013). Contemplative science has found that mindfulness training can scaffold the development
of EFs in regulation, empathy and compassion in adolescents (Greenberg & Harris, 2012; Zelazo & Lyons, 2012). Mindfulness will be explored in further detail below.

**Positive emotions, engagement, and meaning.** Emotions affect learning. Strong negative emotions, such as anger, sadness, and anxiety are associated with poor academic performance. They can activate the amygdala and inhibit the PFC and EFs, impairing logical and verbal processing, and the hippocampus impacting working memory (Black, 2015; Cozolino, 2013; Diamond, 2012; Lopez, 2013; Seligman, 2011; Siegel, 2013). To take the risks necessary to learn, youth need to feel safe and valued (Cozolino, 2013; Jensen, 2005; Lopez, 2013; Vygotsky, 1978). Positive emotions, such as joy, hope, humor, and pride are associated with academic interest and achievement. They support integration of the PFC, the logic and language of the left and creativity of the right, effectively engage the hippocampus in memory storage and retrieval, and access the emotional energy of the amygdala for motivation (Black, 2015; Cozolino, 2013; Diamond, 2010; Diamond, 2012; Siegel, 2010a). Mindfulness interventions have shown promise in increasing positive affect, optimism, social emotional competence and a growth mindset (Greenberg & Harris, 2012; Roeser & Peck, 2009; Schonert-Reichl & Lawlor, 2010; Schonert-Reichl et al., 2015), as well as shifting cognitive processing toward greater ability to tolerate negative emotions and discomfort that may arise when approaching new academic material (Broderick & Jennings, 2012; Cozolino, 2013; Davidson et al., 2012; Grecucci et al., 2015; Greenberg & Harris, 2012; Sanger & Dorjee, 2015).
When high standards are communicated to youth along with the belief in their ability to achieve them and are followed up with strategies and support to reach the goals, the negative emotions that trigger the amygdala can be calmed and positive emotions that enhance motivation and curiosity can be engaged (Cozolino, 2013; Wilson & Conyers, 2013). A supportive, engaging environment contributes to development of persistence, adaptability, resilience, and the ability to thrive (Benson et al., 2006; Durlak et al., 2011; Upadyaya & Salmela-Aro, 2013). Accomplishing challenging tasks can lead to feelings of competence and self-efficacy (Bandura, 1997). All of these are correlated with student engagement and positive educational, employment, and life-satisfaction outcomes across the lifespan (Diamond, 2010; Dweck, 2006; Lerner, 2005; Seligman, 2011).

Adolescence, Learning, and the Importance of Achievement

It appears that the circuitry involved in bonding and attachment is the same circuitry that stimulates curiosity and exploration and enhances learning (Cozolino, 2013), which points to the importance of students having a felt sense of belonging and being valued in school (Benson et al., 2004; Cozolino, 2013; Hektner, 2001; Scales, 2010; Upadyaya & Salmela-Aro, 2013). Neuroscience research has illuminated how consistent, supportive relationships and neuroplasticity can change a student’s educational trajectory. Public schools reflect the demographics of the communities that they serve. When students have secure attachments, they usually come to school ready to learn. They are likely to be sufficiently motivated, engaged in learning, and to have high expectations in school and for their trajectory throughout life (Benson et al., 2004; Bronfenbrenner & Morris, 2006; Cozolino, 2013; Lerner et al., 2011).
Students with insecure attachment can also experience an insecure academic trajectory (Benson et al., 2004; Bronfenbrenner & Morris, 2006; Brotherson, 2005; Cozolino, 2013; Hesse & Main, 2015). When the PFC is inhibited, learning becomes challenging or even impossible. It negatively impacts memory formation and retrieval, working memory capacity, and contributes to a predominance of negative emotions (Cozolino, 2013; Siegel, 2013). A continuous state of heightened arousal in the amygdala creates chronic stress and poor health outcomes. Living in poverty as well as trauma early in life can contribute to chronic stress (Bronfenbrenner & Morris, 2006; van der Kolk, 2014). Students may enter middle school with a variety of negative beliefs about their academic and social self-efficacy that may impact their performance, academic trajectory, and engagement with school (Roeser & Peck, 2009; Schnell, Ringeisen, Raufelder, & Rohrmann, 2015). They can contribute to depression and anxiety, including test anxiety that can hinder learning (Davidson et al., 2012; Mrazek et al., 2015).

Schools have the opportunity to provide social and emotional support from within classrooms and the larger school community to ensure that students feel safe, supported, valued, and challenged so that they might reach their full potential regardless of their situation outside of school (Cozolino, 2013; Stickel & Calloway, 2007; Wilson & Conyers, 2013). They can prepare adolescent students for the greater demands and challenges they will face by supporting development of the skills they will need to thrive (Durlak et al., 2011; Greenberg, Weissberg, O’Brien, Zins, Fredericks, Resnik et al.,
2003; Paisley & Milsom, 2007; Sulkowski et al., 2012; Upadyaya & Salmela-Aro, 2013; Weissberg et al., 2003).

Schools are also in a unique position to assess how well students are adapting to developmental changes and transitions to new schools before they become overwhelmed (Sulkowski et al., 2012). In the current high-stakes test environment, assessing students’ level of test anxiety and intervening early can help support student engagement and self-efficacy while reducing negative consequences (Segool et al., 2013). Using mindful awareness training shows potential to reduce mind wandering and support ability to stay on task, as well as better develop and use their cognitive, attentional, and emotional self-regulation skills in high-stakes testing situations (Linden, 1973; Mrazek et al., 2013). Extending training beyond academics to social-emotional learning and to positive habits of the mind can support adaptive brain functioning, positive behavioral experiences, and a shift toward a positive life trajectory (Davidson et al., 2012; Durlak et al., 2011; Greenberg & Harris, 2012; Roeser & Peck, 2009). While there is significant potential for mindfulness interventions to support student development, the reality is that there are few definitive or generalizable findings regarding mindfulness in K-12 schools and even fewer when examining mindfulness and test anxiety or student engagement. There are disparate findings that, when linked together, begin to tell a story. The current study aimed to fill in details by assessing mindfulness, test anxiety and student engagement together with a large enough sample to gain a nuanced understanding of how learning mindful awareness skills impacts each of them.
Prevention and Healthy Adolescent Development

One can argue that, developmentally, adolescents are an at-risk population who need guidance and support to assist them through the various transitions that occur during these formative years. For all students, but especially vulnerable students, it is essential to create a connection to a hopeful future (Cozolino, 2013; Lopez, 2013). Lopez (2013) points out that to build expectations of a hopeful future, students need to be taught specifically how to get there. This starts by helping students develop a sense of belonging in school, by creating meaning through connecting schoolwork to social emotional competencies, and by helping students believe they are prepared to set goals and overcome obstacles that could prevent them from achieving their goals (Lopez, 2013).

Prevention research continues to point out that universal interventions that support and enhance healthy trajectories for all students tend to be the most helpful for vulnerable students, providing an opportunity to learn new attentional skills and social emotional dispositions that can positively alter their life trajectory (Davidson et al. 2012; Durlak et al., 2011; Weissberg et al., 2003). Positive youth development and contemplative science point to the need for developmentally appropriate interventions, since developmental changes that occur during adolescent transitions may impact how to most effectively deliver interventions (Meschke et al., 2011; Roeser & Zelazo, 2012).

Mindfulness-based interventions. Mindfulness is a mental process that helps reduce reactivity to thoughts that may lead to a stress response (Brown, Marquis, & Guiffrida, 2013). Mindfulness interventions (MI) are aimed at progressively helping the
participant notice their internal and external experiences in a non-judgmental, accepting way. They learn to become aware of the connection and synergy between body and mind and may become less reactive and better able to tolerate discomfort and distressing situations. MI may include meditation, body and mind awareness, breathing, mental imagery, or mindful movement among others (Brown et al., 2013; Diamond, 2012; Tang et al., 2012). Studies on MIs have primarily been conducted with adults and have been found to be effective for a variety of physical and mental health concerns (Black, 2015; Brown et al., 2013; Grecucci et al., 2015). There are far fewer studies related to use with adolescents, but preliminary findings show promise for adolescents and in schools (Black, 2015; Grecucci et al., 2015; Schwager et al., 2015; Wisner, 2014; Zoogman, 2014).

Based on developmental stage, mindfulness interventions may have benefits for middle school students related to environmental fit, engagement with school, and anxiety, including test anxiety, all of which tend to increase at the transitions to and from middle school (Benson et al., 2004; Hektner, 2001; Yazzie-Mintz & McCormick, 2012). The current study explored teaching mindful awareness skills to middle school students as a way to impact both student engagement and test anxiety to expand the research base regarding the effectiveness of mindfulness interventions in middle school and its impact on both student engagement with school and test anxiety. Aspects of mindfulness interventions will be explored in more detail later in this chapter and in chapter 3.
School Counseling Through a Multidisciplinary Lens

During the 1990’s, the fields of psychology, developmental science, and neuroscience each broadened their particular lens of discovery, which led to a more multidisciplinary approach with a new focus on a more positive, adaptive lens from which to explore adolescent development (Lerner, 2006; Seligman & Czikszentmihalyi, 2000; Siegel, 2001). Each field continues to have a strong commitment to quality research and evidence-based application and their collaboration has moved each of the fields forward exponentially. This research includes studying both adolescent development and learning through focus on deeper understanding of both the neurobiological and interpersonal contexts (Cozolino, 2012; Davidson et al., 2012; Montgomery, 2013; Siegel, 2013). Over the last decade, the American School Counselor Association has called for the profession to embrace data-driven, evidence-based practice in delivery of quality services in schools (Dahir & Stone, 2007) with much to draw on from the neuroscience, developmental science, and positive psychology literature related to adolescents, learning, and schools. Finally, in this past decade the field of contemplative science has emerged, a transdisciplinary effort to understand the mind/body system based on research related to contemplative practices including mindfulness, yoga, and meditation (Begley, 2007). Contemplative science has interest in development of human potential, positive psychology, neuroscience, and the role of culture, relationships, and learning across the lifespan (Roeser & Zelazo, 2012).

It is from this multidisciplinary, strength-based lens that a school counselor can begin to approach the implications of teaching mindful awareness skills to middle school
students. There is synergy among neuroscience, development science, contemplative science, positive psychology, and school counseling. Together, they contribute to changing the discourse away from simply surviving adolescence and middle school toward goals supporting each adolescent’s potential to create pathways to thriving. A key aspect in each is the relational component and how the individual is influenced by and acts to influence relationships with family, friends and peers, their community, and institutions with which they interact (Davidson et al., 2012; Lerner, 2005; Jayawickreme et al., 2012; Siegel, 2010a). Each is strength-based and person-centered, embraces diversity and the potential for adaption of self and contexts to meet the needs of the youth; to forge a path for healthy adolescent development and a trajectory toward life satisfaction, well-being, and accomplishment in the future (Benson et al., 2006; Lerner, 2006; Lopez, 2013; Jayawickreme et al., 2012; Rathunde, & Csikszentmihalyi, 2006; Siegel, 2013).

For adolescents, who spend a large percentage of their time in schools, a key development has been in the area of positive education, which advocates for teaching students through developmentally appropriate, social emotional learning that builds well-being alongside traditional teaching of academics (Brown et al., 2014; Cozolino, 2013; Meschke et al., 2011; Seligman, 2011). There is a small but growing body of research on the effectiveness of mindfulness interventions (MI) in both clinical (Beauchemin et al., 2008; Semple et al., 2010; Simkin & Black, 2014; Zoogman et al., 2015) and non-clinical settings (Broderick & Jennings, 2012; Schonert-Reichl & Lawlor, 2010) and findings linked to its positive impact on brain functioning related to working memory, self-
regulation, resilience, and prosocial behavior (Mrazek et al., 2013; Zenner, Herrnleben-Kurz & Walach, 2014). While promising, the vast majority of these studies were very small, with few generalizable results. Although robust research directly linked to schools is also sparse, these outcomes appear to indicate that MIs impact healthy adolescent development, well-being, positive school engagement and reduced psychological symptoms, including test anxiety in the present, as well as a trajectory toward life satisfaction for the future. The current study aimed to assess the effects of teaching mindful awareness skills in middle school on school engagement and test anxiety, which both interact with healthy adolescent development outcomes (Benson et al. 2006; Durlak et al., 2011; Schnell et al., 2015; Sulkowski et al., 2012; Tang et al., 2012).

**School Engagement**

In 2011, 5.8 million adolescents and emerging adults, ages 16-24, were disconnected, disengaged youth representing a significant pool of untapped human potential both economically and socially, with high personal cost to the disaffected individuals. Among this disaffected group are a disproportionate number of African Americans, Latinos, and those living in poverty (Bridgeland et al., 2006; Burd-Sharps & Lewis, 2012; Lewis & Burd-Sharps, 2013). Since as early as the 1970s, there has been a pervasive level of youth disconnection in the U.S. (Bridgeland et al., 2006; Heckman & LaFontaine, 2010). The high school dropout rate in the U.S. had steadily risen since around 1970 into the new millennium to over a million students a year (Heckman & LaFontaine, 2010). Interest in researching student engagement with school began in the mid-1980s with interest in student disengagement and lack of motivation (Appleton,
Christenson, & Furlong, 2008). As of 2012, there were as many as 1,100 research articles on PSYCINFO related to student engagement (Upadyaya & Salmela-Aro, 2013).

There are significant intellectual and financial resources that have been gathered to address the flagging graduation rate in recent years. This research sheds light on some of the precursors to dropping out (DePaoli, Fox, Ingram, Maushard, Bridgeland, & Balfanz, 2015). A key finding is that lack of commitment to school and academic failure starting from late elementary school are signs of disengagement and key risk factors of dropping out of school (Wasserman et al., 2003). Levels of student engagement and intrinsic motivation have been shown to decrease from elementary to middle school, and again from middle to high school (Hektner, 2001; Yazzie-Mintz & McCormick, 2012). As students begin to exhibit signs of disengagement, adults in students’ lives, both in and outside of school, can intervene to help the student deal with the emotional or developmental conflict in a way the leads to growth and renewed engagement (Sulkowski et al., 2012). Interventions that address the psychological, social, and emotional needs of adolescents, as well as achievement, may strengthen student engagement with school, as well as reduce negative emotions that contribute to disengagement (Diamond, 2010; Durlak et al., 2011).

To counteract the dropout rate and disengagement with school, education reform has moved to the forefront of U.S. consciousness in recent decades. Most states have adopted the National Governor’s Association’s Core Curriculum State Standards (Curran & Renya, 2010) and have initiatives strengthening academic standards, raising teacher evaluation standards, and using comprehensive testing in mathematics and literacy to
evaluate students, teachers, and schools (Busteed, 2013; Crotty, 2013; von der Embse, & Hasson, 2012). Since 2010, when states were first required to use a standardized reporting system, dropout rates have been steadily declining to under 750,000 in 2012. There are still significant gaps for students with disabilities, English-language learners, African-American and Latino students, and low-SES students, although progress has been made in lowering the gap between the average graduation rate and the rate for Latino and African-American students (DePaoli et al., 2015). These reforms can be important to increasing students’ abilities to be ready to perform in a global world. Yet with this initiative, there is evidence that schools are becoming more narrowly focused, trading relevance for rigor and accountability, impacting curriculum and the ways teachers teach (Lopez, 2013), and limiting opportunities for students to explore a variety of interests and discover meaningful connections between school and their lives (Scales, 2010).

**Student Engagement: State of the Science**

Some research indicates that 40-60% of students are disengaged by the time they reach high school (Sulkowski et al., 2012). Adolescence coincides with the beginning of the disengagement process for most students. Developmentally, there is the need for student-environment fit to avoid alienation and a perception of inadequacy. Adolescence, with its variability and inherit risks and rewards, is a crucial time for supporting strong engagement with school and intervening to encourage reengagement for those students who have started on a downward trajectory. Neurobiological changes during this period can strengthen neurocognitive capacity essential for learning more abstract concepts.
(Cozolino, 2013; Siegel, 2013). Middle school transition coincides with the changes that occur during early adolescence where variability can be most pronounced. Together, these transitions affect how students manage emotions and stress, engage with peers and teachers, and how they learn, all of which influences how their brains develop (Broderick & Jennings, 2012; Siegel, 2013, Vygotsky, 1978).

Based on the developmental diversity and neuroplasticity during adolescence, early adolescence provides a window to support a healthy developmental trajectory or perhaps a last best chance to shift developmental trajectory onto a healthy path (Lerner, 2005; Siegel, 2013). IPNB focuses on how brain structure and mental processes act upon and change one another through the flow of energy and information that happens within the context of relationships (Siegel, 2010a). Recent neuroscience research indicates that neural changes can create shifts in the limbic and cortical areas of the brain that affect self-regulation and bonding (Diamond, 2010), both of which can impact behavioral, cognitive, social-emotional, and motivational aspects of engagement (Benson et al., 2004; Furlong & Christenson, 2008). For most youth, their largest time commitment is to school, where there are key relationships with peers, teachers, and other adults whose actions can support a positive life trajectory and healthy brain development (Benson et al., 2006; Diamond, 2010; Liew, 2012).

**Defining student engagement.** Student engagement refers to the level of attention, interest, enthusiasm, curiosity, optimism, or motivation students experience when learning or being taught. It encompasses aspects of intellectual, emotional, behavioral, physical, social, and cultural engagement (Great Schools Partnership, 2013).
Throughout the research literature there are several terms used to refer to student engagement, including engagement, academic engagement, school engagement, student engagement in/with school, and student school engagement (Appleton et al., 2008; Hazel et al., 2014). While student engagement is an important construct, there is lack of clarity about how to define, operationalize, and measure it. It is multidimensional and complex, integrating students’ thoughts, feeling, and behaviors (Fredricks, Blumenfeld, Friedel, & Paris, 2005; Furlong & Christenson, 2008). Most models of student engagement include behavioral, emotional/affective, and cognitive engagement subtypes. Some include components such as academic engagement, which overlaps with behavioral engagement; motivational engagement, which addresses components of emotional engagement; and/or psychological engagement, which replaces emotional or cognitive engagement, depending on the model (Appleton et al., 2008; Fredricks et al., 2005; Linnenbrink & Pintrich, 2003; Upadyaya & Salmela-Aro, 2013). Based on the lack of clarity and significant overlap of constructs between models used within the research, the researcher uses school engagement, student engagement in or with school, and student school engagement interchangeably according to best contextual fit.

The construct of student engagement also overlaps with other constructs such as class participation, on-task behavior, belonging, and student attitudes (Fredricks et al., 2005). It is highly correlated and reciprocal with self-efficacy and self-regulation (Breso et al., 2011; Liew, 2012; Linnenbrink & Pintrich, 2003; Schnell et al., 2015), with engagement considered a motivational outcome of high self-efficacy (Bandura, 1997). Both engagement and self-efficacy predict more learning and better achievement that in
turn support higher self-efficacy and engagement over time. The ability to self-reflect, self-monitor, and self-regulate are indicators of higher cognitive engagement and higher achievement (Linnenbrink & Pintrich, 2003). Student engagement is malleable, associated with motivation and positive learning outcomes, and can increase in response to intervention (Furlong & Christenson, 2008). Student engagement can precede academic achievement or be an outcome of academic achievement (Reschly & Christenson, 2012), which can make it especially important for vulnerable or struggling students.

In general, behavioral engagement is quantifiable by assessing students’ rate of effort, attendance, attention, persistence, and help-seeking (Linnenbrink & Pintrich, 2003). Cognitive engagement refers to thought process, quality of effort, and the ability to self-monitor and evaluate strategies (Christenson et al., 2012; Fredricks, Blumenfeld, & Paris, 2004; Linnenbrink & Pintrich, 2003). Emotional engagement refers to attachment to teachers and peers, and feelings toward school and academics (Fredricks et al., 2004; Hazel, Vazirabadi, & Gallagher, 2013). Affective engagement refers to sense of belonging and identification with school (Christenson et al., 2012). Motivational engagement encompasses interest, value, and affect, which produce investment in learning. While behavioral engagement is the most outwardly visible and where research has often been focused, on its own it is not a reliable indicator of student engagement (Linnenbrink & Pintrich, 2003). Models of engagement continue to evolve, as do the constructs. A recent model uses aspirations, belonging, and productivity as its domains and focuses on the student’s perception of goodness of fit (Hazel et al., 2013), which is a
concern at the transition to middle school for healthy engagement with school and a positive trajectory through adolescence and into adulthood (Hektner, 2001; Sulkowski et al., 2012; Yazzie-Mintz & McCormick, 2012).

**Student School Engagement Model (SSEM).** Student School Engagement Model (SSEM) revisits the way student engagement is operationalized by moving away from cognitive behavioral constructs and toward a motivational lens. SSEM is focused on students’ perceived needs, motivation and fit within their school environment. The model identifies three domains (aspirations, belonging, and productivity) that represent a student’s internally and externally mediated affiliation with and investment in schooling, which impact student success, persistence in school, and ultimately, academic performance (Hazel et al., 2014; Hazel et al., 2013). “Aspirations” refer to students’ interests and investment in school based on their perception of education as useful and worthwhile for their future. “Belonging” relates to students’ perception of positive relationships at school and identification with school values and norms. “Productivity” encompasses observable behaviors, cognitive strategies related to effort, concentration, attention, persistence and willingness to work on task, as well as utilization of family and community resources (Hazel et al., 2014; Hazel et al., 2013). Students’ aspirations, sense of belonging in school, and productivity are indicators of student engagement, self-efficacy, academic success, and a positive trajectory throughout life (Benson et al., 2004; Cozolino, 2013; Lopez, 2013; Scales, 2010; Siegel, 2013).

Student school engagement is a biopsychosocial phenomenon, occurring in and responding to environmental contexts within a developmental trajectory (Hazel, Wonner,


&Mindful Awareness Skills in Middle School

&Jack, 2008, as cited in Hazel et al., 2013, p. 690). A key premise of SSEM is that student school engagement is plastic and changeable (Hazel et al., 2013). It is aligned with a strengths-based, positive approach to adolescent development along with a relational focus between student and context that undergirds both IPNB, PYD, and positive education. It is also focused on a hopeful future, social-emotional engagement, self-efficacy, and accomplishment that can support well-being during adolescence and across the lifespan (Hazel et al., 2014). Since SSEM assesses students’ perceptions (Hazel et al., 2013) and perceptions have been shown to change through mindfulness interventions (Greenberg & Harris, 2012; Schonert-Reichl & Lawlor, 2010; Schonert-Reichl et al., 2015), teaching mindful awareness skills to middle school students may impact student school engagement.

**Student Engagement with School**

Student engagement with school facilitates academic achievement and well-being (Benson et al., 2004; Hektner, 2001; Klem & Connell, 2004). It is an important predictor of many long-term positive outcomes, such as higher education, rewarding job possibilities, life satisfaction and positive perception of self (Benson et al., 2004; Upadyaya & Salmela-Aro, 2013). Student engagement, academic achievement, and well-being are interrelated and all contribute to student success. Qualities of engaged students include the following: having a positive emotional tone, attending class, being willing to participate in learning and sustaining involvement in the learning activity, initiating action when given the opportunity, following teachers’ instructions, having an attraction to doing work, submitting work, exerting intense effort and concentration, persisting
when work becomes challenging, selecting tasks at the border of competency, and taking delight in accomplishments (Fletcher, 2013).

While there are demographic risk factors of disengagement such as living in low SES, single-parent families or a non-English speaking family, living in a large city or rural area, or being male, African American, Hispanic, or Native American, disengagement is experienced across all demographic groups and is typically the result of complex interactions between academic, behavioral, attitudinal, and attachment components (Balfanz, Herzog, & MacIver, 2007; Ormrod, 2010). While academic failure can contribute to or be the result of disengagement, Bridgeman and colleagues (2006) report that, in a survey of students who dropped out of school, most respondents reported that they were passing their classes when they left school. Disengagement may be displayed as boredom, depression, anxiety, anger, rebelliousness, damaging property, unexcused absences, withdrawing from school, class, or learning, absence of engagement, cheating, being passive, not trying, or giving up easily (Fletcher, 2013). Student disengagement rarely happens as an isolated incident: usually disengagement is a slow progression (Bridgeman et al., 2006). Although, as Upadyaya and Salmela-Aro (2013) point out, boys and students living in low-SES families in particular can experience rapid decreases in engagement and follow unstable school engagement trajectories, which points to the need to intervene early.

Levels of student engagement and intrinsic motivation have been shown to decrease from elementary to middle school, and again from middle to high school (Hektner, 2001; Yazzie-Mintz & McCormick, 2012). This may be partially accounted
for by changes in pedagogy and expanding outside interests, such as work, as students progress through school. It may also be related to some of the transitions that occur during adolescence and emerging adulthood (Yazzie-Mintz & McCormick, 2012).

Benson and colleagues (2004) state that, “Most often, transitions encourage continuity, reinforcing developmental patterns already established in childhood and adolescence” (p. 1). Evidence also suggests that engagement can decrease at times of transition (Yazzie-Mintz & McCormick, 2012). This is often related to fit between the student and the environment or his or her developmental stage and environment.

Educational transitions may happen at times that are not optimal for the developmental needs of adolescents causing an imbalance that may show up in a lack of engagement or motivation. The increased focus on grades and competition, along with the adolescent’s perception of less emotional support from teachers and a decreased sense of belonging in the classroom that can accompany transitions to middle and high school can lead to negative fit that produces cynicism and alienation from school. The student’s experience of disengagement is usually most pronounced right after the transition, although it tends to persist throughout school (Benson et al., 2004). As students begin to exhibit signs of disengagement, early intervention can help the student deal with the emotional or developmental conflict in a way that leads to growth and renewed engagement (Sulkowski et al., 2012).

Transitions can sometimes function as turning points for youth and emerging adults, using these events as opportunities to reassess previous behaviors and make positive changes (Benson et al., 2004; Upadyaya & Salmela-Aro, 2013). Generally,
student engagement tends to be a persistent state of mind (Upadyaya & Salmela-Aro, 2013), though there is evidence that it can vary in intensity and duration, from short-term and situation-specific to long-term and stable (Fredricks et al., 2004). It can be altered positively and negatively through the student’s interactions and relationships to school, learning, peers, and the community as well as by events outside of school. Teachers, school leaders, and parents have the opportunity make a positive impact on student engagement, by supporting students who are already engaged and intervening early for those who show signs of feeling disengaged (Benson et al., 2004; Sulkowski et al., 2012; Balfanz et al., 2013; Upadyaya & Salmela-Aro, 2013; Yazzie-Mintz & McCormick, 2012).

Promoting student engagement leads to better outcomes for students, especially among racial and ethnic minority students, students with immigrant parents, students living in low SES families, and in impoverished communities (Balfanz et al., 2013; Lewis & Burd-Sharp, 2013). For disadvantaged students, caring school communities that create support systems for them and communication with their families can help students develop persistence, adaptability, resilience, and the ability to thrive; social emotional competencies students take with them when they move on to their next transition (Lewis & Burd-Sharp, 2013; Lopez, 2013; Upadyaya & Salmela-Aro, 2013). Schools are in a pivotal position to supply support and encouragement that promotes engagement, academic success, and student well-being, along with goal setting and social emotional competencies that prepare students to step confidently into new phases in their lives (Benson et al., 2004; Klem & Connell, 2004). A challenge for middle school educators is
that middle school students are at various stages of this developmental transition, cognitively, emotionally, physically, and socially, creating an additional set of diverse educational needs within the classroom. If unaddressed, these divergent educational needs can leave students feeling confused or frustrated, acting out or disengaging (Benson et al., 2004; Cozolino, 2013; Klem & Connell, 2004; Siegel, 2013).

Based on adolescent development and neuroplasticity, middle school is a logical place to intervene, as disengagement has not yet become habitualized and structural brain changes allow for a second chance at developing healthy habits and trajectories (Cozolino, 2013; Siegel, 2013). Universal, preventative interventions in middle school can provide support for both continued positive engagement and reengagement, with the possibility for the greatest gains among the most vulnerable students (Black, 2015; Durlak et al., 2011; Weissberg et al., 2003). While student engagement is a goal of recent educational reforms, interventions have often been focused on academic and behavioral skills development, ignoring aspirations and belonging. Yet the most effective interventions integrate interpersonal aspects of school that create bonding with school and address emotional and cognitive skills that support student confidence and motivation (Cozolino, 2013; Diamond, 2010; Durlak et al., 2011; Furlong & Christenson, 2008). SEL programs have been shown to be effective in improving attitudes, behaviors, social and emotional skills, and academic achievement (Durlak et al., 2011). Mindfulness interventions have been shown to enhance and add to their effectiveness by increasing self-regulation and reducing reactivity. Both of these contribute to motivation,
positive emotions, and prosocial behavior that have been linked to student engagement with school (Black, 2015; Davidson et al., 2012; Diamond, 2010).

**Risk and Protective Factors Contributing to Student Engagement**

The Public Health Model uses a theoretical framework of risk reduction and building protective factors to promote healthy lifestyles and help adolescents avoid problem behaviors, including dropping out of high school. Domains that contribute to risk and protective factors are the individuals themselves and their interactions with peers, the community they live in, and the structure and influence of their family and the school they attend (Wasserman et al., 2003). This can be connected with the developmental assets models used by the Search Institute and PYD, which aim to help youth build internal and external assets that together contribute to thriving during adolescence and across the lifespan. Internal assets include positive identity, positive values, commitment to learning, and social competencies. External assets include boundaries and expectations, constructive use of time, empowerment, and support (Benson et al., 2004; Benson, Scales, Hamilton, & Semsa, 2006).

Thriving communities act as a protective factor that strengthens engagement in school, reduces the likelihood of dropping out, and mitigates disconnection of youth (Heckman & LaFontaine, 2010). Students from thriving communities tend to be healthier, gain more life skills, have more civic connections (Benson et al., 2004), have higher expectations for themselves, and are more likely to pursue constructive leisure activities (Hektner, 2001). Their circumstances provide them with opportunities to practice engagement in a variety of ways outside of school as well. Community risk
factors include high poverty, unemployment, substance abuse, crime, and incarceration rates, low marriage and high divorce rates, poor healthcare, and deprivation in childhood. Living in these communities increases students’ likelihood of dropping out of school and becoming disconnected. Fewer engaged role models within the community may lower expectations for oneself early and can lead to self-doubt and hopelessness (Lewis & Burd-Sharps, 2013; Wasserman et al., 2003). Schools that create communities of learning that provide opportunities to bond and engage in open, curious ways support student engagement and growth, especially in impoverished neighborhoods (Diamond, 2010; Durlak, 2011; Sulkowski et al., 2012).

Families in all socio-economic classes have a significant role in creating positive pathways to school engagement (Benson et al., 2004; Hektner, 2001; Scales, 2010; Upadyaya & Salmela-Aro, 2013), which perhaps explains why coming from a poor neighborhood is not necessarily an indicator for dropping out of school (Edweek, 2011). Parental involvement, affection, monitoring, positive support and an authoritative parenting style all contribute to student engagement. They foster healthy school adjustments, and help avoid engagement with problematic peers (Benson et al., 2004). A high level of support and challenge from parents encourages an independent identity and unique and varied interests. A cognitively stimulating home helps develop intrinsic motivation. Parents’ educational aspirations for their child set an expectation. All of these contributed to the student’s academic achievement (Hektner, 2001). Students who have dinner with their families are more likely to be engaged in school (Upadyaya & Salmela-Aro, 2013). Continued parental communication and involvement with school as
students get into middle school and high school is important in dropout prevention (Bridgeland et al., 2006). Students with poor or inadequate family relationships and unclear family expectations feel less engaged in school and are more likely to drop out (Benson et al., 2004), as are students who are maltreated or experience family violence (Wasserman et al., 2003). Students with many siblings or a sibling who dropped out are more likely to drop out as well (Bridgeland et al., 2006; Wasserman et al., 2003). Based on significant changes in families over the last century, schools often need to take on new roles in supporting social emotional development for all students, which supports student school engagement and a positive trajectory into adulthood (Bronfenbrenner & Morris, 2006; Durlak et al., 2011; Weissberg et al., 2003).

The importance of peer relationships grows with adolescence and can strongly influence students’ attitudes and behaviors toward school. These relationships are more significant and complex than for younger students. Highly engaged peer groups, especially among girls, can foster enthusiasm and make schoolwork more enjoyable. Positive peer groups tend to be more stable, predict behavioral and emotional engagement in school, create a higher sense of well-being, and prevent dropping out of school (Benson et al., 2004; Upadyaya & Salmela-Aro, 2013). Conversely, peer groups with low levels of engagement, who are disengaged, or display problematic behaviors, can discourage members from becoming involved in academic activities, because it is labeled “not cool.” They can also play a role in students dropping out of school (Upadyaya & Salmela-Aro, 2013). Peer rejection starting in elementary school is also a risk factor (Wasserman et al., 2003). SEL programs in school can foster opportunities for
healthy peer collaborations that support the potential for healthy relationships that encourage student engagement with school, by providing students with opportunities to work with positive peers and to learn, observe, and try out new behaviors (Diamond, 2010; Durlak et al., 2011). Modeling and promoting prosocial behavior in middle school can create a positive learning environment and mitigate social anxiety that tends to occur during adolescence (Cozolino, 2013; Siegel, 2013).

Individual factors that encourage student engagement include physical and psychological health, well-being, life skills ethical behavior, academic success, and involvement in helping others. These students tend to feel more confident, have a positive self-identity, feel a sense of purpose, and feel more positive than negative emotions. They are becoming increasingly self-reliant, competent in dealing with others, and able to carry out plans and solve problems (Benson et al., 2004). Individual factors that contribute to disengagement include low intelligence, poor cognitive development, hyperactivity, high behavioral activation, low behavioral inhibition, and early antisocial behavior (Wasserman et al., 2003). Poor physical and mental health and disabilities contribute to disengagement, as well as teen pregnancy for young women and incarceration for young men (Lewis & Burd-Sharps, 2013).

Key to the success of engaged, accomplished youth is successfully emerging into young adulthood with the skills and confidence needed to create a promising future. Student engagement, academic achievement, and well-being can mitigate risk factors related to youth disconnection (Benson et al., 2004) and are important for providing hope for those students living in difficult situations (Cozolino, 2013; Lopez, 2013). They are
major contributors to high school graduation and successful transitions to post-secondary education, work, and healthy relationships (Benson et al., 2004).

**School as a protective factor.** Time in school is the largest time commitment in adolescents’ lives. As such, schools have the ability to serve as protective factors in young people’s lives in varied and interconnected ways (Benson et al., 2004; Wasserman et al., 2003). From an instructional standpoint, they provide students with the ability to become competent in both the academic and social emotional competencies they will need to be effective in the world of work. At a time when young people need to differentiate from parents, school can provide structure, support, and a place of belonging (Benson et al., 2004; Hektner, 2001; Scales, 2010; Upadyaya & Salmela-Aro, 2013). Through instruction and modeling, schools can foster the development of healthy, productive relationships with adults and peers, through collaboration in classrooms, within the school, and with the local and global community (Benson et al., 2004; Hektner, 2001; Scales, 2010; Upadyaya & Salmela-Aro, 2013). Focus on mastery reduces competition and increases intrinsic motivation and student self-efficacy. Student self-efficacy, which is highly correlated with student engagement, is based on belief in one’s ability to accomplish specific tasks or manage aspects of one’s life, even more than actual ability to do so (Linnenbrink & Pintrich, 2003). Learning mindful awareness skills can strengthen the neural connections that support student engagement through self-regulation, awareness and attention, prosocial and goal-oriented behaviors, and a mastery mindset (Black, 2015; Davidson et al., 2012).
Throughout the literature on student engagement with school and test anxiety, there are differences in outcomes based on gender, race and culture, and SES, as well as for first-generation students and students with disabilities. Based on this research, special attention to promoting engagement, academic success, student well-being, and social emotional competencies in school, by schools, is crucial for students of color and of immigrant parents, for students living in low SES homes, and in impoverished communities (Balfanz et al., 2013; Bridgeland et al., 2006; Heckman & LaFontaine, 2010; Lewis & Burd-Sharp, 2013). Some of these students may have significantly more risk factors and fewer protective factors and resources, at home and in their communities to build strong expectations of life satisfaction, including high school graduation, post-secondary education, and satisfying work (Lewis & Burd-Sharps, 2013; Wasserman et al., 2003).

For disadvantaged students, schools can support student engagement through social emotional learning and by teaching skills that help students develop persistence, adaptability, resilience, and the ability to thrive that they take with them when they graduate and transition to college and work (Diamond, 2010; Durlak et al., 2011, Lewis & Burd-Sharp, 2013; Lopez, 2013; Upadyaya & Salmela-Aro, 2013). Mindful awareness skills have been linked to adaptability and resilience and shown to complement and enhance social emotional learning (Davidson et al., 2012). Its present-moment, non-judgment focus can allow students to observe maladaptive thoughts, emotions, and beliefs and understand them as transitory and subject to change, rather than a personal defect (Bostic et al., 2015). Mindfulness practice also strengthens brain structure related
to healthy self-regulation which impacts student engagement, by strengthening areas of
the mPFC and its connection with the limbic region that creates greater top-down
cognitive control and bottom-up emotional regulation. This facilitates better use of EFs
in learning through reduced reactivity and negative emotions that allows students to feel
safe and connected at school (Davidson et al., 2012; Diamond, 2010; Roeser & Zelazo,
2012). Research is beginning to show that these same processes can positively impact
the underlying mechanisms of test anxiety that lead to academic improvement (Bellinger,
DeCaro, & Ralston, 2015; Cunha & Paiva, 2012; Mrazek et al., 2015).

**Mindfulness Interventions and Student Engagement**

There is little research on mindfulness-based interventions as a way to support
student engagement with school. Several authors referred to the synergy and
complementary nature of mindfulness and SEL programs in K-12 schools (Davidson et
al., 2012; Diamond, 2010; Schonert-Reichl et al., 2015; Wisner, 2015), which have been
found to support student engagement with school. Wisner (2014) used a mindfulness
intervention in an alternative high school as a universal intervention. All classes and
teachers participated in the intervention. She worked with students to identify cogent
themes based on their experiences and created a concept map. Key findings were that for
students the most important aspects of the program were improved school climate and
stress management along with a felt sense of peace and engagement with school (Wisner,
2015).

The most relevant research to the current study was conducted by Schonert-Reichl
and colleagues (2015). They studied the effectiveness of the MindUp curriculum with
fourth and fifth grades in Canada. MindUp is an SEL program with mindfulness and neuroscience components (The Hawn Foundation, 2011). Teachers taught one 40-50 minute lessons once a week for twelve weeks, plus three 3-minute mindfulness sessions per day for the course of the intervention to two diverse classes of students. The study used a somewhat equivalent control group; these classes received the district’s social responsibility curriculum. A battery of assessments was used including self-report, peer-report, teacher-report, computer-aided EF measuring, and cortisol testing before intervention began and after it was complete.

Results indicated that compared to the control group, the intervention group experienced significant increases in empathy, optimism, perspective taking, mindfulness, school self-concept, social responsibility, and emotional control and a decrease in depressive symptoms. There was also a 15% increase in math scores, a 20% gain in self-reposted well-being and prosociality, a 24% increase in peer-nominated positive social behaviors, and a 24% decrease in peer-reported aggression. The intervention group also outperformed the control group on EF tasks related to working memory, cognitive flexibility, and response inhibition, which are implicated in emotional regulation. Results, while limited due to the size of the sample, are promising for incorporating mindfulness-based SEL programs, with combined effects for academic performance as well as social and emotional engagement (Schonert-Reichl et al., 2015).

Finally, there is one published dissertation that has similarities to this study. Napora (2013) explored mindfulness, cognitive engagement, and academic performance among university students using the Five Factor Mindfulness Questionnaire and the
Cognitive Engagement Scale, as well as grade point average (GPA) in a pre-/post-test, quasi-experimental design. The intervention consisted of a six-minute mindfulness meditation at the start of class each week during the semester. Results among this specific population indicated that mindfulness and cognitive engagement are related; GPA was related to one facet of cognitive engagement, self-regulation and two facets of mindfulness, non-reactivity and acting with awareness; non-reactivity was the best predictor of academic performance, with mindfulness a better predictor than cognitive engagement. Findings suggest that mindfulness may be important in learning (Napora, 2013). While results are promising, since the study was conducted with college students whose brains are more fully developed than young and early adolescents in middle school, it is possible that results would be different based on developmental differences (Meschke et al., 2011; Steinberg, 2005). Based on the correlation between mindfulness and cognitive engagement (Napora, 2013) and the findings regarding significant improvement to EFs related to self-regulation and mindfulness in young adolescents in the MindUp intervention, there is room for optimism (Schonert-Reichl et al., 2015).

Test Anxiety

High-stakes tests are tests that have important consequences for the test taker based on their results. Since the enactment of NCLB legislation, high-stakes testing has become a crucial component in annually assessing U.S. K-12 public schools’, teachers’ and students’ educational competence in grades 3-8 on math and literacy skills (No Child Left Behind Act of 2001). Consequences of performing below proficient on these exams for students include required remedial coursework up through denial of high school
graduation, even if all other requirements for graduation have been met, along with negative physical, psychological, emotional, and social outcomes (Lopez, 2013; Rollin, 2014; Taylor, 2014; von der Embse, & Hasson, 2012). Low test scores lead to negative teacher evaluations and sanctions for schools and school districts including withdrawal of federal funding (Lowe et al., 2008; von der Embse & Hasson, 2012; Whitaker-Sena et al., 2007). The focus on testing often leads to changes in priorities within schools, changes in the way teachers teach, and a sense of urgency around these high-stakes exams (Lopez, 2013; Rollin, 2014; Taylor, 2014; von der Embse, & Hasson, 2012).

Some school counselors note that high-stakes tests along with the typical shift that occurs in the way teachers teach and interact with students from elementary to middle school, and the developmental transitions of students and their peers from childhood to adolescence, contribute to the growth in anxiety and stress among middle school students (Hanie & Stanard, 2009; Thompson, Robertson, Curtis, & Frick, 2013). The most prevalent form of anxiety in schools is test anxiety (Schnell et al., 2015). In a recent study of test anxiety and high-stakes testing in urban and suburban schools, researchers found that between 4-15% of variance in test scores could be attributed to test anxiety which may appear small, but is significant to schools in regard to high-stakes testing. With significant consequences for schools struggling to make annual yearly progress (AYP) and the additional pressure around test performance, schools often focus on remediation of students whose scores are close to proficient (von der Embse & Hasson, 2012). Even a 4% increase in these students’ scores could make a difference in achieving proficiency, removing the student from remediation classes and contributing to a school’s
achievement of AYP. Since academic achievement is associated with student engagement, passing exams and avoiding remediation can have a positive impact on student engagement (Rollins, 2014; Taylor, 2014).

While having high standards that promote quality education for all students is important, the threat of sanctions can be counterproductive in a learning environment. There is evidence that the narrowly focused, accountability-driven movement is losing momentum as student, parent, and educator anxiety and frustration has grown. Many parties advocate for more developmentally appropriate methods of assessing student achievement while encouraging student well-being and engaged learning that leads to healthy outcomes in school and across the lifespan (Bidwell, 2015; Harris, 2015). In the last days of 2015, Congress passed a bill, Every Student Succeeds Act (ESSA), repealing sections of NCLB that gave back control over curriculum, frameworks, standards, and testing decisions to states and local school administrators. Yet the annual testing requirement remains (USDOE, 2015). It remains to be seen how states will move forward with testing, but in the near future students will continue to take high-stakes tests.

Test anxiety has been researched for nearly a century and researchers have found the construct to be complex and multidimensional (Whitaker-Sena et al., 2007; Zeidner, 1998). It is estimated that more than 1/3 of all students in U.S. public schools experience some level of test anxiety. The rate and level of test anxiety is even higher for students who perform below proficient in high stakes tests. Since the passage of NCLB in 2001, evidence suggests that the increased attention on high-stakes testing has led to increased
test anxiety among all students, with an even greater impact on low-SES students, youth in large urban schools, racial and ethnic minorities, girls, students with disabilities, and poor test-takers. Research also suggests that test anxiety gets more severe with age into middle adolescence, increasing during the middle school years (Lowe & Lee, 2008; Lowe et al., 2008; Segool et al., 2013; von der Embse et al., 2013; von der Embse & Hasson, 2012; Whitaker-Sena et al., 2007; Zeidner, 1990).

Students with high levels of test anxiety are more likely to receive lower standardized test scores, have lower grades and poor study skills, experience difficulty concentrating and learning new material in class, avoid setting high goals, put forth less effort, show less persistence on tasks, and have poor motivation and negative self-evaluation. They are more likely to have higher levels of general anxiety, depression, suicide, and feelings of hopelessness, as well as to be retained or drop out of school (Lowe et al., 2008; Schnell et al., 2015; Segool et al., 2013; Szafranski, Barrera, & Norton, 2012; von der Embse et al., 2013; Whitaker-Sena et al., 2007). Test anxiety is negatively associated with academic performance, self-efficacy and self-regulation (Schnell et al., 2015), all of which are positively correlated with student engagement.

Test anxiety includes physiological arousal, emotional, cognitive, behavioral factors, and/or sense of social pressure that may manifest as physical symptoms and debilitating thoughts, feelings, or off-task behaviors that distract or interfere with test anxious students’ ability to process or remember information or instructions in testing situations (Cizak & Burg, 2006; Lowe & Lee, 2008; Lowe et al., 2008; von der Embse et al., 2013; Whitaker-Sena et al., 2007; Zeidner, 1998). Test anxiety tends to be a self-
reinforcing process. The student first perceives the test to be threatening, then experiences debilitating physiological arousal, cognitive behaviors, or social humiliation and performs suboptimally on the exam, which reinforces maladaptive cognitions. With subsequent exams, the process is repeated; test anxiety gets reinforced and tends to get worse (von der Embse et al., 2012; Whitaker-Sena et al., 2007). Test anxiety can contribute to worry, lack of self-confidence, possible lack of self-efficacy, and a sense of social humiliation (Lowe & Lee, 2008; Lowe et al., 2008; von der Embse et al., 2013; Whitaker-Sena et al., 2007).

Test anxiety includes four debilitating and one possible facilitating construct. Physiological hyperarousal, originally termed “emotionality”, produces symptoms such as sweaty palms, rapid heart rate, and shallow breathing (Whitaker-Sena et al., 2007). It is associated with state anxiety that activates worry conditions stored in memory (Zeidner, 1998). Worry includes negative self-talk and negative thoughts that are experienced in relation to testing (Whitaker-Sena et al., 2007). As worry increases in test-anxious students, it interferes with test performance based on the increased effort and working memory capacity required to deal with the anxiety rather than test problems (Zeidner, 1998). Cognitive obstruction refers to the degree to which test anxiety disrupts the ability to organize thoughts and concentrate on the task at hand. During evaluative situations, test-anxious students spend 40% of their time on off-tasks thoughts. Recent studies have implicated depletion of working memory as mediated by mind-wandering that takes the student off-task as a major contributor to test anxiety (Mrazek et al., 2013). Social humiliation refers to the fear of others maligning one’s performance on a test. A
recent study by Cunha and Paiva (2012) showed that test-anxious adolescents scored significantly higher on negative forms of self-criticism and social anxiety, while scoring lower on self-reassurance. While most constructs of test anxiety interfere with test performance, it is important to note that at least one aspect of test anxiety has been shown to enhance test performance: facilitating test anxiety can be experienced as stimulating rather than hindering test performance (Whitaker-Sena et al., 2007). As early as 1908, Yerkes and Dodson found that a moderate amount of arousal tends to predict optimal test performance by providing appropriate motivation and energy to perform the task at hand (Cizek & Berg, 2006). Mindful awareness of one’s physiological arousal in response to testing may allow for reframing of anxiety (Bishop et al., 2004).

Some differences were found based on demographics. There appears to be a difference in test anxiety symptoms based on age with younger students experiencing more physiological symptoms and older students experiencing more cognitive symptoms during adolescence. A learning disability (LD) predicted higher cognitive obstruction/inattention and worry scores, which indicate more time off-task and less available working memory for problem solving. Being female predicted higher total test anxiety, worry, social humiliation, physiological, cognitive obstruction/inattention scores (Whitaker-Sena et al., 2007). Test anxiety among African Americans has been estimated to be as high as 40%. Test anxiety among Latinos is also higher than for Caucasians. Low-SES students are slightly more likely to experience test anxiety (Segool et al., 2013).
Test Anxiety and Student Engagement with School

High test-anxious students are likely to have numerous risk factors for disengagement with school, including placement in special programs, grade retention, likelihood of dropping out of school, decreased effort and motivation to learn, low self-efficacy and poor self-evaluation of ability, a higher propensity to cheat, and an increased likelihood of acting out in response to stress (Cizek & Burg, 2006). Remediation classes in subject area content to improve test scores have been a major focus of school reform since the implementation of NCLB. They have only been partially effective and come at a cost to adolescent students’ psychological, emotional, and social development (Broderick & Jennings, 2012; Taylor, 2014). Students are often pulled out of exploratory courses like art, music, and computers to attend remediation programs, classes students tend to enjoy and that can contribute to student engagement with school (Rollins, 2014; Taylor, 2014). An unintended result of remediation classes can include reinforcing a sense of low academic self-efficacy (Rollins, 2014), which is associated with student disengagement and stereotype bias (Linnenbrink & Pintric, 2003; Wasserman et al., 2003). Test anxiety tends to be negatively correlated with self-efficacy. Students who are confident in their academic abilities tend to feel less test-anxious and students with high test anxiety tend to lack confidence in their academic ability (Onyeizugbo, 2010). One recent study assessing the effects of an intervention for self-efficacy on burnout and student engagement used a cognitive behavioral protocol for anxiety where they focused on the cognitive and emotional components of test anxiety. The goal was to improve their psychological state and build emotional competence, counter self-defeating beliefs,
and increase positive thinking to cope with testing. Six months after four 2-hour sessions students had increases in self-efficacy and student engagement and decreased exhaustion and cynicism (Breso et al., 2011), which suggests that an intervention that addresses test anxiety also positively impacts self-efficacy and student engagement. Since mindfulness has been reported to strengthen cognitive control and emotional regulation that support on-task behavior, cognitive functioning, and improved emotional response, the intervention in this study appears to have the potential to both decrease test anxiety and improve self-efficacy, student engagement, and academic achievement.

**Test Anxiety Interventions**

While test anxiety has been rising and beginning to gain more attention, test anxiety research, especially in the U.S., has declined. A significant majority of test anxiety research is conducted with university students and outside the U.S. There is a particular lack of research regarding interventions to address test anxiety within K-12 schools (von der Embse et al., 2012). Since test anxiety most affects students with average academic achievement (Yeo, Goh, & Liem, 2016), rises during middle school, and is negatively correlated with academic achievement and student engagement, effectively intervening to reduce test anxiety during middle school before students become chronically disengaged seems to also support student engagement and academic achievement.

von der Embse and colleagues (2012) conducted a review of test anxiety interventions in K-12 schools between 2000-2010. Of the 10 studies identified, the majority were conducted with high school students and outside of the U.S. The review
did identify promising strategies using cognitive, behavioral, cognitive-behavioral, academic skill-building strategies, and biofeedback. A few of the interventions employed relaxation techniques in addition to the primary intervention. The biofeedback study taught students how to self-activate psychophysiological coherence, a state that improves cognitive performance, emotional stability, and nervous system function, which they could apply to life situations after the intervention. Results showed lower test anxiety, lower negative affect, better ability to self-regulate emotions, and the ability to enter the state when under stress (Bradley, McCraty, Atkinson, Tomasino, Daugherty, & Arguelles, 2010).

Cizek and Burg (2006) suggest that since test anxiety is multifaceted, reducing it requires a multifaceted approach, with the most effective interventions combining cognitive, behavioral, and skills-focused approaches. Two recent studies that addressed K-12 students found that most students can gain some benefits from cognitive behavioral therapy (CBT) interventions targeting test anxiety and highly test-anxious students can experience significant decreases. Putwain, Chamberlain, Daly, and Sadreddini (2014) conducted a study in England with 3,200 ninth through eleventh grade students from four schools. Using a pre- post-test design, students were assessed for test-anxiety. Based on pre-test results, they were assigned to high, medium, and low test-anxious groups. Schools were offered two options for delivery of an intervention that consisted of six 40-minute sessions, in-class or as homework. Most of the students participated through the homework option, with an overwhelming number of students either not starting or not completing the intervention. Only 14% (217) of students completed the intervention.
Results showed that for the low and medium groups, the intervention might be effective. For the high test-anxious students, the intervention was found to produce a moderate to large decline in worry and tension at post-test. The low completion rate might suggest that intervention delivery within the course of the normal school day is more likely to be effective, which is in line with this study.

A recent study by Yeo and colleagues (2016), conducted in China with 9-12-year-olds in fourth grade, assessed students’ test anxiety levels prior to, immediately after the intervention, and two months later. Students were assigned to the intervention or control group based on their classroom. Using students’ academic performance from third grade, students were banded into high, average, and low performance. The intervention group received four 30-minute lessons based on CBT over four weeks. While the control group did not receive the intervention, their untreated test anxiety was monitored, which found that average academic students had the highest increase in test anxiety over time. Within the intervention groups, there was an overall decline in test anxiety that was significant at post-test and significantly grew over the two months until follow-up, with the greatest effect for high test-anxious students. This study points to the usefulness of test anxiety interventions among students with average academic ability who are most likely to experience test anxiety during middle school and points to a possible lasting or increasing effect of test anxiety interventions over time.

**Mindfulness Interventions and Test Anxiety**

Although several interventions with university students did not directly refer to mindfulness, their interventions employed aspects of mindfulness training. Yeo and
colleagues’ (2016) intervention taught pre- and early adolescents cognitive and behavioral techniques including breathing, focused attention, noticing body sensations, and self-compassion. Putwain and colleagues’ (2014) intervention for high school students employed a combination of cognitive, meta-cognitive, breathing and muscle relaxation in a 6-session intervention. Other researchers employed breathing or progressive relaxation techniques (Zargarzadeh & Shirazi, 2014) or biofeedback (Bradley et al., 2010), both of which train the body or mind and the other responds as well. These overlap with aspects of mindfulness in that the participant learns to focus attention in a non-judgmental way that allows for change (Davidson et al., 2012; Kabat-Zinn et al., 2003).

As early as 1973, Linden found that teaching meditation to low-SES African American and Latino third grade students could reduce test anxiety and increase students’ ability to focus attention and relax (Linden, 1973), but until recently there has been little interest in mindfulness as an intervention in schools. Napoli, Krech, and Holley (2005) assessed the impact of a mindfulness program on attention and test anxiety. With 194 first through third grade students as participants, students were randomly assigned to the intervention group or the control group. The intervention groups received 24 weeks of mindfulness training including breath work, physical and sensory activities. Results indicated a significant increase in attention and decrease in anxiety (Napoli et al., 2005). Carsley, Heath, and Fajnerova (2015) used a mindful coloring activity before a spelling test with 52 students in grades four through six, which indicated reduction of anxiety after the activity. In a study with university students related to test anxiety, Brunye,
Mahoney, Giles, Rapp, Taylor and Kanarek (2013) found that a focused breathing intervention reduced math anxiety and negative affect around math and improved performance on a timed test, which seems to support mindful awareness interventions for test anxiety.

Three additional studies were identified, each of which explored how one’s level of dispositional mindfulness was related to test anxiety. Cunha and Paiva (2012) showed that test-anxious high school adolescents in Portugal scored significantly higher on negative forms of self-criticism and social anxiety, while scoring lower on self-reassurance. Bellinger and colleagues (2015) assessed whether trait mindfulness improved performance on high-stakes mathematics exams among university students. They found that mindfulness indirectly affected test scores through cognitive test anxiety, but only on high-demand problems that taxed working memory. Research by Mrazek and colleagues (2013) with university students implicated depletion of working memory as mediated by mind-wandering that takes the student off-task as a major contributor to test anxiety. With greater dispositional mindfulness predicting decreased test anxiety and social anxiety (Cunha & Paiva, 2012) and better ability to focus attention and filter out distractions that can lead to off-task use of working memory (Bellinger et al., 2015; Mrazek et al., 2013), research suggests that interventions focused on increasing mindfulness may support both academic achievement and student school engagement.

While there are a few studies that indicate that learning mindful awareness skills may be effective as an intervention for test anxiety, there are significant gaps in the research especially regarding middle school students. From a developmental perspective
young adolescents are at increased risk for onset of anxiety, including test anxiety and for becoming disengaged in school. Preliminary evidence suggests the effectiveness of mindfulness-based interventions to reduce anxiety and test anxiety, to increase attention and ability to stay on task, and to enhance prosocial behavior and self-compassion, all of which can enhance learning and engagement in middle school. This study aims to expand the mindfulness research specific to test anxiety and student engagement during middle school, when these issues tend to materialize but are not yet habitualized and hardwired into one’s brain.

**Mindfulness**

The term mindfulness is derived from the Pali language from two words meaning “awareness” and “clear comprehension” (Grecucci et al., 2015). Mindfulness is the mental state of being aware in the present moment that is maintained by a practice that is also referred to as mindfulness. As a practice, mindfulness focuses one’s attention on the present moment, experiencing thoughts, feeling, and sensations without judging them (dictionary.com, n.d.). There have been many definitions of the practice of mindfulness, which is also referred to as meditation or contemplative practices in the literature. Among the most commonly used definitions is Jon Kabat-Zinn’s (2003) “the awareness that emerges from paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding experience moment by moment” (p. 145). A consensus definition of mindfulness developed by researchers and theorists includes two primary components, “self-regulation of attention so that it is maintained on immediate experience” and “adopting a particular orientation toward one’s experience in the present
moment . . . characterized by curiosity, openness, and acceptance” (Bishop et al., 2004, p. 232). For this study, both present moment orientation and self-regulation of attention address concepts key to adolescent development and skills necessary for learning.

Langer (2000) points out that “being mindful is the simple act of drawing novel distinctions. It leads us to greater sensitivity to context and perspective, and ultimately to greater control over our lives. When we engage in mindful learning, we avoid forming mindsets that unnecessarily limit us” (p. 220). In contrast, mindlessness is past-driven, rule governed, with a single, rigid perspective that is oblivious to alternatives. Since mindlessness cannot be a felt experience, most people think they are mindful. Practicing mindfulness has been shown to increase competence, creativity, positive affect, memory, health, well-being, and longevity (Langer, 2000). While there is a perception that mindfulness requires long periods of meditation, the aim of mindfulness is to be present, moment-to-moment in one’s everyday life. At its essence, mindfulness is about noticing and tuning into what one is actually experiencing, rather than being hijacked by our habitual thoughts (Kabat-Zinn, 1990; Langer, 2000).

Research has indicated that mindfulness practices can increase awareness of one’s thoughts, feelings, and actions, and improve attention, cognitive control and emotional regulation. Mindfulness can also relieve stress, lower anxiety and depression, improve positive mood, reduce negative mood, and enhance social, emotional, behavioral, and physical health outcomes (Davidson & Begley, 2012; Kabat-Zinn et al., 1992; Langer, 2000; Linden, 1973; Siegel, 2010a). The outcomes of mindfulness are many of the attributes associated with positive youth development and being engaged (Cozolino,
According to Roeser and Peck (2009), most people do not develop the potential for mindfulness and concentration without some type of formal training. Zelazo and Carlson (2012) suggests that the transition to adolescence may be an optimal age to learn mindful awareness skills due to the ability for cognitive functioning equivalent to adults and the plasticity of the brain during adolescent stage. The self-regulation benefits gained through mindfulness can address some of the risks and impulsivity associated with adolescent development as well as expand the capacity to focus attention and stay on task (Diamond, 2012). The non-judgmental present moment orientation can help adolescents tolerate and accept thoughts and feelings within themselves and others that contribute to self-compassion and prosocial behavior (Neff, 2003). Developing these mindful awareness skills support learning, student engagement, healthy adolescent development, and a positive trajectory into adulthood (Davidson et al., 2012; Langer, 2000; Roeser & Peck, 2009).

From an IPNB perspective, mindful awareness is a key vehicle to strengthen and restructure the brain in a way that supports the healthy cognitive, emotional, and interpersonal functioning and growth necessary to develop what Siegel (2013) refers to as key characteristics of adolescence: emotional spark, social engagement, novelty seeking, and creativity. When successfully cultivated, they lead to flexible thinking, active engagement, sense of competence, and a healthy lifespan trajectory (Siegel, 2013), which are linked to positive self-efficacy and student engagement (Diamond, 2010; Linnenbrink & Pintrich, 2003). Mindful awareness training enhances SEL, which has been shown to engage students on multiple levels (Diamond, 2010; Durlak et al., 2011), by purposefully
teaching students how to cultivate mindful and intentional ways of living and learning (Bokash et al., 2016; Roeser & Peck, 2009).

In recent years mindfulness has been researched from childhood through old age (Kabat-Zinn, 2003; Siegel, 2010a; Siegel, 2013; Zelazo & Lyons, 2012). Since 2005 there have been nearly 3,000 articles published about mindfulness (Black, 2015). Researchers have a long history of showing the benefits of mindfulness practices related to psychological, social, emotional, and physical health and overall well-being (Kabat-Zinn, 2003; Linden, 1973; Rempel, 2012; Siegel, 2013; Siegel & Bryson, 2011; Shonin et al., 2012; Tang et al., 2012; The Hawn Foundation, 2011). Overwhelmingly, mindfulness research has been focused on adults and associated with medical and clinical mental health, yet many outcomes have useful applications for everyday life and researchers are beginning to more frequently apply them to school (Felver et al., 2013; Rempel, 2012; Shonin et al., 2012; Siegel, 2013; Tang et al., 2012; The Hawn Foundation, 2011).

Some studies have identified the need to make adjustments to better suit the needs of children and adolescents, such as the way homework is used and the inclusion of more movement (Black, 2015; Mendelson, Greenberg, Dariotis, Gould, Rhoades, & Leaf, 2010; Napoli et al., 2005; Rempel, 2012). Some indicate that perhaps some mechanisms of mindfulness may work differently with youth than adults and should be adjusted to meet developmental needs (Black, 2015; Zoogman et al., 2015). Others point to the lack of consistent standards in research design and reporting of procedures and results that makes it difficult to replicate results (Black, 2015; Zoogman et al., 2015). Yet the most
recent literature review found that several mindfulness interventions show little risk of harm and are “probably efficacious” for use with youth populations (Black, 2015, p. 301). The present study aims to begin to fill a void in the research regarding the use of mindfulness as an intervention particularly focusing on test anxiety (which tends to increase) and student engagement (which tends to decrease) among middle school students.

**Mindfulness Practice**

According to Felver and colleagues (2013) mindfulness-based practices create a shift in awareness from experiencing to the objective observation of experience. Mindfulness practices facilitate the capacity for objectivity, empathy, and tolerance without reactivity to challenging physical and emotional states. They foster self-regulation, self-management, values clarification, and flexibility of cognitions, emotions, and behaviors (Black, 2015; Davidson et al., 2012; Wisner, 2014). Mindfulness practice is shown to structurally change the brain in ways that improve attentional capacity, body awareness, and emotional regulation, and that engage cognitive and perceptual control processes (Grecucci et al., 2015). Mindfulness is a quality that humans possess, but often are unaware of. They are untrained about its importance or how to cultivate it (Bishop et al., 2004; Roeser & Peck, 2009). While experienced meditators showed significant neural changes that lead to flexibility of response, benefits have been identified even in beginner practitioners. An early outcome of mindfulness practice appears to be greater cognitive control and reduction of symptoms associated with mental disorders (Bostic et al., 2015; Grecucci et al., 2015; Hilt & Pollak, 2012). Even short bursts of mindful
awareness practice throughout the day can calm the amygdala in the moment and rewire neural circuitry over time, making the amygdala less reactive to minor disturbances (Sanger & Dorjee, 2015; Siegel, 2013; The Hawn Foundation, 2011).

The deliberate practice of bringing attention back to the present moment again and again engages the process of neuroplasticity and may weaken automatic habitualized responses by creating a space between stimulus and response that allows one to choose how to respond (Grecucci et al., 2015). This spaciousness is a byproduct of self-regulation and healthy executive functioning that allows for flexibility of response (Roeser & Peck, 2009). Non-judgmental, moment-to-moment, intentional awareness, referred to as “reperceiving” by Shapiro and colleagues (2006), shifts perception by de-identifying from thoughts and feeling that arise in awareness and observing them with greater clarity and objectivity. This capacity that allows for gathering more information and formulating different interpretations which are necessary attributes of self-compassion, empathy, and prosocial behavior (Roeser & Peck, 2009).

Developing self-compassion is both a component and an outcome of mindfulness practice. It is a way of “reperceiving” one’s situation by: 1) taking a kind, understanding, non-judgmental attitude toward oneself, rather than being self-critical; 2) observing and being open to one’s difficult or painful thoughts, feelings, or experiences without fixating on or over-identifying with them; and 3) taking a more global view of one’s pain in context of shared human experience (Neff, 2003). Self-compassion supports the ability to face failure or adversity by actively shifting and sustaining attention away from rumination and toward coping skills such as applying effort or seeking support (Dweck,
It is positively associated with mastery goals and pursuit of perceived competence and negatively associated with fear of failure (Neff, 2003; Neff et al., 2005). Self-compassion appears to support student engagement through the development of a more accepting, optimistic, and flexible mindset.

Kabat-Zinn (1990) suggests attitudes and behaviors that help develop being mindful in everyday life:

1. nonjudging: being an impartial witness to your own experiences without premature conclusions;
2. patience: letting things unfold in their own time;
3. beginner’s mind: being receptive to new possibilities and not getting stuck in a rut of your own expertise;
4. trust: developing a basic trust in yourself and your feelings;
5. not striving: paying attention to how you are right now, however that is;
6. accepting: seeing things as they actually are in the present;
7. letting go: a way of letting things be, of accepting things as they are.

Together, these attributes contribute to a flexible mindset that can be transferred to other aspects of one’s life, such as estimating one’s abilities, belief in malleable intelligence, a growth mindset and one’s ability to cope with setbacks that are inevitable in new learning and in attempting challenges (Dweck, 2006; Roeser & Peck, 2009).

There are qualities of youth including being open, ready to learn, and creative that lend themselves to cultivating mindfulness (Sanno et al., 2014; Siegel, 2013). There are
qualities of mindfulness that can be particularly beneficial for adolescents based on psychological characteristics that manifest during this developmental period (Cozolino, 2013; Siegel, 2013). Mindfulness research suggests that its practice increases intentional self-regulation (Roeser & Peck, 2009), which is associated with thriving in adolescence and throughout life (Lerner et al., 2011). Based on the neurobiological propensity during adolescence for rumination, for cognitive control to lag behind emotional reactivity, and the onset of anxiety and depression, developing the neural structure and connections that strengthen EFs and self-regulation during adolescence decreases impulsivity and supports prosocial behavior (Davidson et al., 2012; Diamond, 2012; Zelazo & Carlson, 2012).

While limited in scope, research suggests that teaching mindfulness practices to youth is linked to improved attention, cognitive control and emotional regulation, decreased stress, anxiety, rumination, and negative mood, and enhanced social, emotional, behavioral, and physical health outcomes in children and adolescents (Bokash et al., 2016; Broderick & Jennings, 2012; Rempel, 2012; Schonert-Reichl et al., 2015; Tang et al., 2012; Wisner, 2014). Some mindfulness researchers have looked to address childhood and adolescent anxiety (Semple et al., 2010), to build social-emotional skills to promote resiliency (Bokash et al., 2016; Schonert-Reichl et al., 2015; Semple et al., 2005) and to address special needs, such as Autism, ADHD and the effects of living in poverty (Beauchemin et al., 2008; Bostic et al., 2015; McCloskey, 2015; Reid, 2009). Several researchers have looked at mindfulness with a physical component, such as yoga and tai chi, since children and adolescents often respond to movement (Black, 2015; Gould, Dariotis, Mendelson, & Greenberg, 2012; Mendelson et al., 2010; Napoli et al.,
In the last decade there has been a burgeoning interest in the usefulness of mindfulness as potential treatments and in prevention efforts (Black, 2015). Research indicates that all students can benefit from mindful awareness skills, with greater results for the most vulnerable youth (Durlak et al., 2011; Weissberg, 2003; Zoogman et al., 2015). An aim of the present study was to assess effectiveness of teaching mindful awareness skills to meet universal developmental needs of all adolescents, while addressing variability among all adolescents and deficits that vulnerable students experience to support student school engagement and reduce test anxiety among middle school students.

**Mindfulness in School**

Education that helps students develop healthy mindsets (related to motivation) and executive control (self-regulation) can promote positive development and prevent emotional and behavioral difficulties, both of which are positively associated with student engagement and a healthy lifespan trajectory (Greenburg et al., 2003; Linnenbrinck & Pintrich, 2003; Roeser & Peck, 2009). Motivation and self-regulated learning are central tenets of teaching mindfulness practices in school. Increased present-moment self-awareness has shown promise for decreasing mind wandering and rumination (Hilt & Pollak, 2012; Mrazek et al., 2013) and increased academic motivation and learning through practices that cultivate positive habits of the mind and mastery learning (Davidson et al., 2012; Roeser & Peck, 2009). Sustained attention helps stabilize information in memory, necessary for deep learning (Roeser & Peck, 2009). Non-judgmental, present-moment awareness of thoughts and emotions shows promise for
shifting cognitive processing toward self-acceptance and greater ability to tolerate negative emotions and discomfort that may arise at educational transitions or when approaching new academic material. This stance can support a growth mindset and student engagement with school (Broderick & Jennings, 2012; Cozolino, 2013; Davidson et al., 2012; Grecucci et al., 2015; Greenberg & Harris, 2012; Sanger & Dorjee, 2015).

As evidence mounts on the many benefits of mindfulness as studied in adults and with youth in clinical settings (Black, 2015; Burke, 2010; Davidson & Begley, 2012; Felver et al., 2013; Kabat-Zinn et al., 1993; Tang et al., 2012) and a significant number of students experiencing psychopathological symptoms in school (Greenburg et al., 2003; Hanie & Stanard, 2009; Thompson et al., 2013), there has been a renewed interest in bringing this inexpensive, beneficial intervention into schools (Broderick & Jennings, 2012; Fisher, 2006; Rempel, 2012; Schonert-Reichl et al., 2015; The Hawn Foundation, 2011; Wisner, 2015). The positive outcomes of mindfulness with youth appear to address salient aspects of anxiety, test anxiety, academic and social self-efficacy, learning disabilities, and student engagement (Beauchemin et al., 2008; Bellinger et al., 2015; Black, 2015; Burke, 2010; Greenberg & Harris, 2012; Weijer-Bergsma, Langenberg, Brandsma, Oort, & Bogels, 2014). Based on the risks and opportunities that accompany the convergence of adolescence and middle school, it may be a relevant prevention or intervention strategy for middle school students. Sanger and Dorjee (2015) have suggested based on the plasticity of adolescent brains that it may provide a late opportunity for neurocognitive interventions to shift life trajectory toward positive outcomes.
Since practicing mindfulness supports healthy functioning and appears to change brain structures towards healthy functioning, teaching mindful awareness skills can support all students (Diamond, 2012; Siegel, 2013; Zelazo & Carlson, 2012). Recent research suggests that it makes the greatest impact on the most vulnerable students (Zoogman et al., 2015). It appears that mindfulness practice supports a healthy lifespan trajectory (Diamond, 2010; Davidson et al., 2012; Schonert-Reichl et al., 2015).

Mindfulness has been implicated in improving self-regulation (Diamond, 2012; Davidson et al., 2012; Grecucci et al., 2015; Roeser & Peck, 2009), which is strongly correlated with school engagement and recently linked to decreases in test anxiety (Mrazek et al., 2013). Recently there have been suggestions that mindful awareness skills can be taught in school as a universal program aimed at prevention since they benefit all students by lessening anxiety, promoting social skills, and have been linked to improving academic performance, which can improve self-efficacy, build resilience, and increase student engagement in class (Beauchemin et al., 2008; Felver et al., 2013; Sanno et al., 2014; Schonert-Reichl et al., 2015; Wisner, 2015; Zenner et al., 2014). While there have been suggestions, there has been very little research of mindfulness interventions in K-12 schools, particularly middle school. While disengagement and test anxiety are acknowledged as significant threats to healthy adolescent development and student achievement in school and across the lifespan, there is limited research regarding effective interventions, especially related to mindfulness. Since middle school is noted as a transitional point where test anxiety rises and student engagement declines, this study explored teaching mindful awareness skills to middle school students and its relationship
to student school engagement and to test anxiety. Assessing this relationship adds to a limited body of research regarding mindfulness-based interventions and their usefulness as among middle school students.

**Mindfulness Interventions**

Three primary interventions that incorporate mindfulness that have been well researched and effective with adults have been the focus for use or adaptation for use with adolescents. Mindfulness Based Stress Reduction (MBSR), which was originally designed to address health concerns related to stress, has been adapted for use with youth sometimes rather loosely (Wisner, 2014). Mindfulness Based Cognitive Therapy (MBCT) and Dialectical Behavior Therapy (DBT) include mindfulness as one component of treatment. They have been used to treat both severe and less severe mental disorders and with adolescents populations (Grecucci et al., 2015; Wisner, 2014).

Overall, with adult populations MBSR and MBCT have a moderate mean effect size with both clinical and non-clinical populations. Therapeutic mindfulness studies over time have shown positive effects in treatment of anxiety, depression, personality disorders, substance abuse, eating disorders, and post-traumatic stress disorder. Neuroimaging studies have indicated changes in key areas of the brain regulating attention and negative emotions. In a study of patients with a history of suicidal depression, after a course of MCBT patients showed stable neural functioning in the left PFC and maintenance of achieved positive affect compared with treatment as usual (Grecucci et al., 2015)
**Mindfulness interventions and youth.** With more than 20% of all 13-18 year-olds currently or previously having suffered with a mental disorder and the majority going untreated (Merikangas et al., 2010), mindfulness interventions may provide benefits for these youth. One recent meta-analysis of mindfulness with youth found it was a promising intervention for all youth, especially for those with clinical symptoms, since it found a significantly higher effect size for clinical over non-clinical populations (Zoogman et al., 2015). Since youth with mental disorders have more risk factors, addressing them early while the brain is restructuring may support a healthier developmental trajectory (Zelazo & Carlson, 2012). Mindfulness practices have been shown to restructure neural connections in ways that support cognitive control, emotional regulation and reductions in mind-wandering, rumination, anxiety, and depression (Bostic et al., 2015; Grecucci et al., 2015; Mrazek et al., 2015).

In a recent meta-analysis of peer-reviewed research articles on mindfulness interventions with youth conducted between 2004 and 2011, Zoogman and colleagues (2015) found that the majority of research has occurred with non-clinical populations recruited from schools and employed very small sample sizes. The few clinical studies tended to be more rigorous in nature. A significantly larger effect size was found on psychological symptoms (.37) compared to other dependent variables (.21) and among clinical samples (.50) compared to non-clinical samples (.20). Yet overall, mindfulness interventions with youth were found to be helpful and a promising intervention for youth that warrants further research, especially for youth with high levels of symptoms of psychopathology (Zoogman et al., 2015).
Zoogman and colleagues (2015) point out the effect size, particularly among the non-clinical population, was smaller than that reported for adults, which are generally found in the moderate range. This could partially be explained by the use of conservative assumptions of effect size among the non-clinical studies when a control group was not used or clarifying data was not available from the original study authors. Looking closer at the clinical differences, authors noted that 1) it is likely that clinical samples have more space for significant improvement than non-clinical samples; 2) the large clinical studies were conducted with adolescent participants who developmentally are more likely to have stronger meta-cognitive and abstract thinking skills, which may allow them to benefit more than younger children from mindfulness interventions; and 3) mindfulness teaches less pathological use of attention. Mindfulness interventions tend to break ruminative attentional patterns, replacing them with more reflective, open-minded, and experiential attention (Baer, 2009).

Zenner and colleagues (2014) conducted a meta-analysis of mindfulness-based interventions in school for studies through 2012. They identified 24 studies of which 19 reported using a control group; 13 were unpublished. They reported an overall medium effect size more in line with adult and clinical populations (.40). They also reported significant results between groups for cognitive performance (.80), stress (.39) and resilience (.36), which suggest promising results for teaching mindful awareness skills in school. They also noted the difficulty of the process due to the diversity of study samples with many studies underpowered, and varied implementations and measurement tools (Zenner et al., 2014).
Among the earliest mindfulness studies with youth was conducted by Linden (1973), who worked with low-SES, African American and Latino third grade students. He found a link between teaching meditation practices in schools and an increased ability of students to focus attention and stay on task, as well as decreased test anxiety. Mindfulness did not find a place in mainstream education then, perhaps because of its perceived connection to eastern religions. Fisher’s (2006) work with meditation in schools found that it facilitates creativity, helps students overcome blocks to learning, and provides optimum conditions for reflection and generative thinking, all of which are associated with student engagement. Mrazek and colleagues (2013) found that a two-week mindfulness intervention improved working memory and increased academic performance in undergraduate students by reducing mind wandering for students prone to it. Schwager and colleagues (2015) found that mindfulness through the moderating role of the personality dimensions of conscientiousness and honesty-humility showed a negative relationship to counterproductive academic behaviors, which suggests that mindful awareness practice may support school engagement by decreasing behaviors associated with disengagement. Wisner’s (2014) work with students in an alternative high school, which students often attend due to behavioral or academic disengagement, found that what students most appreciated about their mindfulness experience were a perceived reduction in stress, a more peaceful school climate, and an enhanced sense of engagement. These studies appear to indicate that mindfulness interventions facilitate student engagement while reducing factors that related to disengagement.
Teaching mindful awareness skills can help youth strengthen present moment orientation and self-regulation of attention (Burke, 2010; Fisher, 2006; Linden, 1973; Siegel, 2010a), both of which can benefit classroom learning (Langer, 2000; Lerner, 2005). Teaching mindful awareness skills may take on a variety of forms. Among the most common is mindful breathing, where the learner is instructed to focus on the breath and gently and non-judgmentally return to the breath whenever the mind wanders. There are variations of this focused attention that may anchor on sound or sensations. Mindful movement, such as yoga and martial arts have also been taught. Beauchemin and colleagues (2008) researched mindfulness practices with adolescent students with learning disabilities and found that students who completed a 5-week mindfulness program, demonstrated decreased state and trait anxiety, improved academic performance, and enhanced social skills. These various factors could prove beneficial to students in test-taking environments, for students’ academic and social self-efficacy, engagement and motivation in learning in the classroom and for interacting in the school community and for overall student resilience and well-being (Lawlor, 2014).

**Mindfulness and social-emotional learning.** Daniel Goleman points out that skills in emotional intelligence and management of self and relationships have always been transferred through face-to-face interaction. In this digital age, where students often text rather than communicate face to face, the social part of the brain is not engaged, so the skillset is not being learned as thoroughly as in the past (Raz, 2014). Mindfulness-based social emotional learning (MBSEL) shows potential to engage students in ways
that can address this deficit (Schonert-Reichl et al., 2015; Waters, Barsky, Ridd, & Allen, 2015).

Mindfulness interventions and SEL programs have some overlapping goals and beneficial outcomes that appear to complement each other, but they are not interchangeable. SEL is an outside-in process of teaching students self-awareness, self-management, social awareness, and relationship and decision-making skills to enhance goal-oriented behaviors. In contrast, mindfulness is an inside-out process that teaches self-awareness, attentional control, and emotional regulation. It is more focused on experience, understanding of one’s internal life, and guided practice that develops positive emotional states, impulse regulation, and a greater sense of ease, stability and wisdom (Brensilver, 2016; Lantieri & Zakrzewski, 2015). SEL programs directly teach social awareness and relationship skills, where mindfulness views these as innate capacities that emerge through experiences of self-compassion, empathy, and kindness (Lantieri & Zakrzewski, 2015).

Alone, each intervention has gaps that can be addressed by the other. For instance, while SEL teaches social skills, those skills may not be accessible by a student who has been triggered by strong emotions. Conversely, a student who is aware of her emotions in a challenging situation, may still need a plan for how to proceed. Inside-out processes build the cognitive control and emotional regulation necessary to apply SEL skills in challenging situations and outside-in skill development provide strategies to apply mindful awareness to practical situations (Lantieri & Zakrzewski, 2015).
Two recent studies used mindfulness as part of SEL programs in school (Bokash et al., 2016; Schonert-Reichl et al., 2015). Bokash and colleagues (2016) assessed the effectiveness of an 8-week prerecorded, daily, 10-minute MBSEL program on students’ quarterly grades and classroom behavior among third grade students. Results showed significant decrease in behavioral incidents and increases in reading and science scores compares to a control group (Bokash et al., 2016). Schonert-Reichl and colleagues (2015) used the MindUp program (The Hawn Foundation, 2011) with fourth and fifth grade students. MindUp includes SEL, neuroscience and mindfulness. MindUp uses a combination of mindfulness skills such as mindful breathing, listening, and eating to help focus attention. It also teaches prosocial behaviors, meta-cognition, and about how the brain works (The Hawn Foundation, 2011). Significant increases were reported in empathy, optimism, perspective taking, mindfulness, school self-concept, social responsibility, and emotional control and a decrease in depressive symptoms, which have all been positively linked to student engagement (Schonert-Reichl et al., 2015).

While the author has taught the MindUp curriculum to middle school students, the study was more directly focused on mindful awareness skills to avoid confounding variables based on the overlapping constructs related to teaching lessons in mindfulness and neuroscience. Lessons in this study were based on Mindful Schools (2013), Mindfulness Curriculum for Adolescents. Each lesson teaches one mindfulness application and reinforces a few core skills throughout the program to “build the mindfulness muscle” (Cowen, 2013, p. 71). All but the first lesson can be taught in less than fifteen minutes. The author was trained to teach the curriculum by Mindful Schools.
in 2014. According to their website, Mindful Schools trained educators have impacted more than 300,000 students, since 2007 (http://www.mindfulschools.org/, 2016). The lessons used in the current study will be described in chapter 3 and detailed lesson plans are included in the appendix.

**Need for Further Research**

While mindfulness research is plentiful, the research focused on children and adolescents is still limited. It appears to be changing with increased interest in mindfulness interventions in education. Yet a recent search of mindfulness and schools by the author revealed that research conducted in K-12 schools is limited and studies focused on middle school students and special populations within middle school are particularly scant. The majority of literature is focused at the university level, many with graduate students. While results are promising, interventions tailored to late adolescents/early adults are not necessarily developmentally appropriate for middle school students (Meschke et al., 2011), where young and early adolescents have less developed cognitive and regulatory competence and greater tendencies toward emotional arousal, a reward orientation, and sensation seeking. Some middle school students are still transitioning from concrete to abstract thinking. Their brains are undergoing rapid changes and their preferred mode of learning is different from that of late adolescents (Steinberg, 2005). Developmentally appropriate interventions for middle school students need to reflect these differences (Meschke et al., 2011).

Among studies in K-12 schools, most used very small samples, with few generalizable outcomes (Black, 2015; Burke, 2010; Rempel, 2012). There is little
consistency on how findings are reported and few specific details about the interventions employed (Black, 2015; Zoogman, 2014). Researchers have all noted the need for further research including well-designed, well-controlled, replicable studies with sizable populations, with clearly defined interventions to expand the research base around mindfulness in schools and with youth in general (Black, 2015; Broderick & Jennings, 2012; Felver, 2013; Rempel, 2012; Tang et al., 2012; Zoogman, 2014). The goal of this study is to use the guidelines above to add to the limited research that currently exists regarding mindfulness and test anxiety and mindfulness and student engagement.

**Theoretical Lens**

From a neurobiological perspective, the integration of brain, mind, and relationships facilitates psychological resilience, emotional well-being, and secure attachment (Siegel, 2001). Each is a necessary component of thriving in adolescence, succeeding in school and a positive trajectory through adolescence and across the lifespan (Benson et al., 2006; Cozolino, 2012; Montgomery, 2013; Siegel, 2013). Interpersonal Neurobiology posits that the integration of brain, mind, and relationships leads to well-being or thriving (Siegel, 2010a). From a positive youth development perspective, there are characteristics of thriving (competence, confidence, connection, character, caring, and contribution) that when nurtured in youth lead to well-being during adolescence and throughout adulthood (Lerner, 2005). When students experience or have the opportunity to demonstrate these characteristics in school, they are more likely to be engaged (Benson, 2004). Through a positive psychology lens, which neuroscience research has borne out, well-being is fostered through engagement, relationships, accomplishment,
meaning, and positive emotions. These qualities define positive education (Seligman, 2011) and appear to be outcomes of mindfulness practice (Siegel, 2010a). It is through this multidisciplinary lens that this study is informed and framed.

**Interpersonal Neurobiology (IPNB)**

The specific field of neuroscience working to develop an integrated framework for understanding human development within the social relationships that shape both the structural development of the brain and the mental processes of the mind is called Interpersonal Neurobiology (IPNB; Siegel, 2010a). The primary goal of IPNB is integration of body, mind, and relationships, which produces physical, psychological, emotional, and relational well-being and health. As such, IPNB is a theory that is aligned with the goals of counseling (Badenoch, 2008) and of education (Cozolino, 2013).

IPNB is concerned with the brain as a structure, the mind as the regulator for modulating and modifying the flow of energy and information through the brain, and relationships as the way energy and information is shared with one another. Siegel (2010a) calls this model the Triangle of Integration (or Well-being). There is a clear connection between the tenets of IPNB and the tenets of schools, with classrooms as hubs of relational learning that happens best among teachers (school counselors) and students who can stay regulated and engaged in the learning process (Cozolino, 2013). This approach is in line with American School Counselor Association’s ASCA Mindsets and Behaviors for Student Success (2014), in that it looks to develop healthy students with physical, psychological, and social-emotional well-being, self-confidence in one’s ability to succeed, a sense of belonging in school, and a positive attitude toward learning.
is also multicultural in nature, in that it looks first to honor differences and then create empathic linkages (Siegel, 2010a).

Key concepts integral to IPNB include: 1) the distinct, yet integrated roles of the mind, the brain, and relationships, 2) the impact of human development and attachment experience on integration, 3) domains of integration and how they influence mental health and well-being, and 4) social justice through the cultivation of compassionate change, person-to-person, within local communities (like classrooms and schools) and at a global level. Hope is central to IPNB in its understanding of the ability to create new patterns and change established ones through the brain’s neuroplasticity and the process of integration, which can happen throughout the lifespan, but is particularly malleable during childhood and adolescence (Siegel, 2010a). Mindfulness is a key intervention in IPNB, based on its ability to integrate neural connections that have been shown to increase well-being, attentiveness, bodily regulation, attuned communication, emotional balance, fear extinction, flexibility, insight, empathy, morality, and intuition (Siegel, 2010a); attributes of healthy adolescent physiological, cognitive, psychological, emotional, and social development.

Adolescent Development, Well-Being, and Thriving

Positive Youth Development (PYD) is a set of ideals that emphasizes the importance of biopsychosocial development and life course theory in healthy outcomes for youth (Bronfenbrenner & Morris, 2006; Lerner et al., 2005; Meschke et al., 2011). From a PYD perspective, adolescent development is an adaptive, reciprocal process between individual and context that requires strategic thinking, executive functioning,
and taking action to turn goals into reality (Lerner et al., 2005; Lerner et al., 2011).
Within this context, there is growing recognition of the importance of self-regulation of attention and inhibitory control for early success in school, physical health, educational attainment, job success, and avoidance of negative outcomes later in life (Benson et al., 2006; Bronfenbrenner & Morris, 2006; Davidson et al., 2012; Lerner et al., 2011; McClellan & Cameron, 2011; Roeser & Peck, 2009), all of which are related to self-efficacy, student engagement, and thriving during adolescence and into adulthood (Lerner, 2005; Schnell et al., 2015; Sulkowski et al., 2012).

According to PYD, characteristics of thriving include competence, confidence, connection, character, caring, and contribution (6 C’s; Lerner et al., 2005; Benson & Scales, 2011), which have been identified as aspects of engaged youth and well-being (Cozolino, 2013; Linnenbrink & Pintrich, 2003; Lopez, 2013; Seligman, 2012). Building developmental assets have been correlated with student achievement regardless of gender, race and ethnicity, and SES (Scales & Roehlkepartain, 2003). Cultivating the 6 C’s and building developmental assets are linked to increasing protective factor and reducing risk factors that contribute to youth thriving, including student engagement in school (Benson et al., 2004).

Well-Being Theory (Seligman, 2011) also defines aspects of well-being that when combined lead to thriving or flourishing in life: positive affect, engagement, relationships, meaning, and accomplishment. Cozolino (2013) addresses the importance of positive emotions and relationships to support the capacity to learn, adolescent motivation and engagement with school in his book, The Social Neuroscience of
In *Brainstorm: The Power and Purpose of the Teenage Brain*, Siegel (2013) lays out four key characteristics of adolescent development based on neuroscience research: emotional spark, social engagement, novelty seeking, and creativity. These characteristics emerge with risks and opportunities, challenges and strengths, and mental confusion and excitement that typify the adolescent experience. When channeled, these characteristics can support successful transitions for adolescents (Siegel, 2013).

While using somewhat different terms, all of these theories have a common goal to help adolescents successfully cultivate both internal and external resources that will set them on a positive trajectory toward well-being in adulthood, while they navigate the various transitions that occur during this developmental stage (Cozolino, 2013; Lerner et al., 2005, Seligman, 2011; Siegel, 2013). A wellness framework of school-based mindfulness programs has also been proposed, focused on the ability of mindfulness practices to influence students’ ability to learn and well-being by targeting physical, emotional, cognitive, social, and spiritual aspects of the learner (Albrecht, 2014). Within each of the disciplines, the concept of wellness or well-being is central to the ability to learn and to thrive in adolescence and across the lifespan. As adolescents transition from childhood toward adulthood, with greater expectations and demands placed upon them. Teaching MBSEL skills can help adolescents develop positive habits of the mind that support self-regulation, healthy relationships, and prosocial behavior that can lead to thriving (Davidson, 2012; Greenberg & Harris, 2012). An aim of this study was to understand how teaching mindful awareness skills to middle school students and its
relationship to student engagement with school and test anxiety, so as to be able to better design future interventions that support adolescent development, engagement with school, test anxiety, and a healthy trajectory into adulthood.

Summary

Perhaps due to the synergy between mindful awareness skills and social emotional learning, the interest in mindfulness research in K-12 education has grown substantially over the last decade (Diamond, 2010; Schonert-Reichl, 2015). Most studies have been small and often addressed students in special populations. Almost no research exists regarding either student engagement or test anxiety and mindfulness. Yet there is some discussion within reviews of literature that has mentioned the complimentary goals of SEL and mindfulness (Davidson et al., 2012; Diamond, 2010). There is research regarding the effectiveness of MI and anxiety in general (Semple et al., 2005), of which test anxiety is a more narrowly defined form (Whitaker-Sena et al., 2007). Based on the research this study appears to be well situated to add to the literature on mindfulness in schools and, more specifically, to start a dialogue about the usefulness of MI regarding both student school engagement and test anxiety.

Adolescence is a crucial developmental period that transitions youth from childhood to adulthood with significant physiological changes that affect all aspects of the person’s bioecological system and set a trajectory across the lifespan (Bronfenbrenner & Morris, 2006; Lerner, 2005; Steinberg, 2005). It is a time of great neurological restructuring that creates the potential for tremendous growth and learning that can lead to a state of accomplishment, academic, social, and emotional self-efficacy, and well-
being; thriving (Siegel, 2013). Untapped potential leads to risks of underachievement, disengagement, and poorer outcomes across one’s life course (Benson et al., 2004; Wasserman et al., 2003). Middle school represents an educational transition where student engagement tends to wane (Hektner, 2001; Yazzie-Mintz & McCormick, 2012), but school communities have the ability to support healthy development and a positive lifespan trajectory through teaching and counseling that addresses the cognitive, social, and emotional needs of students along with academics (Cozolino, 2013; Langer, 2000; Lopez, 2013; Roeser & Peck, 2009).

Interpersonal Neurobiolgy along with the fields of developmental science, positive psychology, and contemplative education have each approached the developmental process from different perspectives that have led to a convergence of ideas that embrace a positive systems approach to youth development with a focus on building assets that support positive outcomes and thriving during youth and into adulthood. Self-regulation and cognitive, social, and emotional health and well-being are central to these disciplines as well as to school counseling (ASCA, 2014; Lerner, 2005; Roeser & Peck, 2009; Seligman & Csikszentmihalyi, 2000; Siegel, 2010a). Mindful awareness is becoming recognized as a fundamental skill for healthy biopsychosocial development as well as for learning that can shift the developmental trajectory in a more positive direction (Bokash et al., 2016; Davidson, 2012; Langer, 2000; Roeser & Peck, 2009).

Student engagement with school is a key indicator of a youth’s lifespan trajectory and is a developmental protective factor (Hektner, 2001; Benson et al., 2004; Klem & Connell, 2004; Upadyaya & Salmela-Aro, 2013). Test anxiety is a developmental risk
factor and is negatively correlated with student engagement (Onyeizugbo, 2010). Left unaddressed, test anxiety can contribute to student disengagement (Schnell et al., 2015). Early adolescence coincides with entrance into middle school, where student engagement has been shown to drop, test anxiety has been shown to rise, and school expectations may not support the developmental needs of adolescents (Whitaker-Sena et al., 2007; Zeidner, 1990). Research indicates that adolescents who thrive in middle school are on a trajectory toward a satisfying adulthood, while those who struggle or become disengaged are likely to continue the pattern throughout life (Benson et al., 2004). Middle school counselors are in a central position to support healthy development of adolescents and to assess and intervene early in the process of disengagement for students who are struggling, to change student outcomes toward a positive lifespan trajectory (Benson et al., 2004; Sulkowski et al., 2012; Upadyaya & Salmela-Aro, 2013). In fact, some researchers refer to this stage as the last, best chance (Sanger & Dorjee, 2015).

Mindful awareness interventions have shown potential for strengthening EFs that support self-regulation, motivation, prosocial behavior, cognitive clarity, and emotional stability that underlie student engagement with school and can positively impact test anxiety (Davidson, 2012; Diamond, 2012). Preliminary research on MBSEL programs indicates that they are effective in increasing self-regulation, positive emotions, prosocial behavior and student grades and decreasing negative emotions and anxiety (Bokash et al., 2016; Schonert-Reichl et al., 2015). These outcomes support a healthy lifespan trajectory and narrow the skills gap for vulnerable students, suggesting they are prime for universal prevention programs (Diamond, 2012; Durlak et al. 2011). While these outcomes can be
associated with increased student engagement and decreased test anxiety, research assessing the link between mindful awareness skills and either student engagement or test anxiety has been lacking, particularly within K-12 schools. Identifying the relationship between mindful awareness skills and each of these can inform program development and prevention efforts. In chapter 3, the author will outline the methodology and procedures used to understand the relationship between teaching mindful awareness skills to middle school students and its impact on student engagement and student test anxiety.
Chapter Three

The purpose of this study was to examine the relationship between teaching mindful awareness skills to middle school students and student engagement with school and student test anxiety. An overview of this study’s research methodology is included in this chapter, with an emphasis on research design, research context, sample, data collection, and data analysis.

The research questions for this study were drawn from the literature related to the impact of high stakes testing on student test anxiety, particularly students who already have other challenges; on student engagement, which begins to wane in middle school; and on the neuroscience of adolescent development, which indicates distinct changes that occur during the middle school years. Additionally, the research questions were derived from the literature on mindfulness and its potential to help adolescents develop skills to better manage stress and related test anxiety, to increase executive functions such as attention, cognitive and emotional self-regulation, and enhance social, emotional, behavioral and physical health outcomes. The primary research questions for this study were:

(1) To what extent does teaching mindful awareness skills to middle school students predict change in students’ engagement in school? and

(2) To what extent does teaching mindful awareness skills to middle school students predict change in students’ level of test anxiety?

The secondary questions are:
(1A) To what extent do characteristics of gender, race, ethnicity, SES, ESL, and disability status moderate the relationship between teaching mindful awareness skills to middle school students and change in students’ engagement in school? and

(2A) To what extent do characteristics of gender, race, ethnicity, SES, ESL, and disability status moderate the relationship between teaching mindful awareness skills to middle school students and change in students’ level of test anxiety?

**Research Hypotheses**

Using these questions the following hypotheses were tested:

**Hypothesis 1.** Teaching mindful awareness skills to middle school students will significantly predict change in student engagement with school.

**Hypothesis 1A.** The variables of gender, race, ethnicity, low-SES, ESL, and disability status will moderate the relationship between teaching mindful awareness skills to middle school students and change in student engagement for middle school students.

**Hypothesis 2.** Teaching mindful awareness skills to middle school students will significantly predict student test anxiety.

**Hypothesis 2A.** The variables of gender, race, ethnicity, low-SES, ESL, and disability status will moderate the relationship between teaching mindful awareness skills to middle school students and change in test anxiety for middle school students.

**Method**

This study employed a quasi-experimental pre- and post-test, correlational research design with a non-equivalent control group. I investigated the relationship between teaching mindful awareness skills to middle school students and student
MINDFUL AWARENESS SKILLS IN MIDDLE SCHOOL

engagement with school and to student test anxiety. Of particular interest were student populations for whom research indicates a tendency to score lower on high-stakes exams and to have higher rates of disengagement, such as students with disabilities, English language learners, and low-SES students (DePaoli et al., 2015). To assess this, I analyzed data directly and as moderated by gender, age, race and ethnicity, language spoken at home, and SES and disability status among middle school students using descriptive statistics, independent t-tests, ANOVAs, paired t-tests, and hierarchical multiple linear regression analysis. For this dissertation, a quasi-experimental design was chosen because it meets all the criteria for a true experiment with the exception of a randomized control group. This design is commonly used within school settings where artificial creation of groups is impossible or disruptive to the educational environment (Creswell, 2005).

Participants

The sample for this study consisted of 363 students at a suburban middle school in New Jersey. The school is a diverse sixth through eighth grade school with a student population of approximately 1,000 students. Gender is nearly 50% female and male. Student racial population is approximately 58% white, 20% Asian, 13% Hispanic, and 10% African American. Approximately 21% of students are enrolled in special education and 25% receive free or reduced lunch.

The sample was selected from the general middle school population based on students’ scheduled Health Education cycle. To accommodate the school’s existing schedule and the researcher’s desire to teach students in their regular classroom
environment rather than in pullout groups, the sample was a cluster sample chosen by convenience rather than randomly. Cluster samples are commonly used in schools where students are grouped by classrooms (Wang & Fan, 1997). Another issue related to research with adolescents is the possibility of physiological or psychological growth or maturation between pre- and post-testing that could convolute the results (Privitera, 2014). A possible issue with cluster groups is that often people within a cluster tend to have more common attitudes and opinions with one another than between groups (Wang & Fan, 1997). To account for each of these items, a control group who has received the health curriculum but not the mindful awareness skills lessons was used. While the sample could not be randomly selected, I aimed to make the intervention and control groups as similar as possible. Students in six Health Education classes during the fourth marking period participated in the mindful awareness curriculum. The six classes who had just completed Health Education with the same teachers participated as the control group.

Within both the intervention and control groups, there were three classes each of sixth \((n = 179)\) and eighth grade \((n = 184)\) students. While only 1% of students are enrolled in the English-language learning program in school, this study used student self-report of first language learned which indicated that approximately 21% of students spoke English as a second language. Two other demographics that stood out within the sample are that students who received special education services represented approximately 15% of the sample which was lower than the general population and
African American students represented 21% of the sample which was more than double the general population. Descriptive statistics for this study’s population can be found in Table 1:

**Table 1:**

*Demographic Characteristics of the Sample (N = 363)*

<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>Intervention N</th>
<th>Control N</th>
<th>Overall N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible Participants</td>
<td>171</td>
<td>192</td>
<td>363</td>
<td>100</td>
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<tr>
<td>Grade</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>6</td>
<td>84</td>
<td>95</td>
<td>179</td>
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<tr>
<td>8</td>
<td>87</td>
<td>97</td>
<td>184</td>
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<tr>
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<td>15</td>
<td>3</td>
<td>5</td>
<td>8</td>
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<tr>
<td>Gender</td>
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<tr>
<td>Female</td>
<td>84</td>
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<tr>
<td>Male</td>
<td>87</td>
<td>105</td>
<td>192</td>
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<tr>
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<td>121</td>
<td>153</td>
<td>274</td>
<td>75.5</td>
</tr>
</tbody>
</table>
Instrumentation

For the pre-test, a 62-item survey was employed, which included six demographic questions, the 10-item *Child and Adolescent Mindfulness Measure* (CAMM; Greco, Baer, & Smith, 2011), the 12-item *Healthy Self-Regulation Scale* (HSR; West, 2008), the 22-item *Student School Engagement Measure* (SSEM; Hazel, et al., 2013), and the 12-item *brief version of the FRIEDBEN Test Anxiety Scale* (B-FTAS; von der Embse, Kilgus, Segool, & Putwain 2013). These measures were chosen in part based on length, taking into consideration the age and attention span of middle school students. The specific demographic information collected from students included grade, age, gender, race and ethnicity, and whether English was the first language learned, along with information about whether the student had previously learned mindful awareness skills. Students entered their lunch code, which was used as a linking code to gather disability status and free/reduced lunch status data that was provided by the principal. The principal chose the students’ lunch code as the linking code since the students use it every day, it is an internally generated number, and only the principal and her administrative staff had information linking it to particular students. The linking code was also used to pair students’ pre- and post-test results, which allowed for more nuanced analysis of the survey results.

The post-test consists of a 57-item survey for the control group and a 63-item survey for the intervention group. All students in attendance entered their student lunch code and took or retook the CAMM, HSR, SSEM, and B-FTAS. Additionally, the intervention group answered qualitative questions regarding students’ perceptions about
learning mindful awareness skills, as well as if and how they applied them outside of class. All assessments items can be found in Appendix A.

**Child and Adolescent Mindfulness Measure.** The *Child and Adolescent Mindfulness Measure* (CAMM; Greco et al., 2011) was developed to measure mindfulness for school-aged children and adolescents, ages 9-17. The CAMM is a ten-item, self-report measure that uses a five-point Likert-type scale of mindfulness specifically focusing on lack of present-moment awareness and judging or non-accepting responses to thoughts and feelings (e.g., “At school, I walk from class to class without knowing what I am doing.”, “I push away thoughts I don’t like.”, “I think some of my feelings are bad and that I shouldn’t have them.”). All items are reverse scored with a low score of 0 and a high score of 40. Based on the two-component view of mindfulness (Bishop et al., 2004), these items appear to specifically measure components of mindfulness related to an orientation toward present moment, curiosity, openness, and acceptance. CAMM scores are positively correlated with academic competence, social skills, and quality of life and negatively correlated with observable behavioral problems, internalizing symptoms, and somatic complaints (Greco, et al., 2011).

**Reliability and validity.** The CAMM is a new measure in a relatively new area of research. This is the first published instrument specifically developed for use with children and adolescents. The authors conducted a four-phase assessment of the scale, starting with adult assessments that had been previously validated (Greco et al., 2011). Validity was assessed at each stage. The initial assessment contained 25 items, measuring three factors of mindfulness. The final version contains ten items and a single
factor of mindfulness that includes judging and non-accepting responses to thoughts and feelings, as well as lack of present-moment awareness. Internal consistency (coefficient alpha) was .80 and on several measures of fit, the single factor structure of the CAMM showed good fit (Greco et al., 2011).

**Healthy Self-Regulation Scale.** The *Healthy Self-Regulation Scale* (HSR) was originally developed as a subscale of the Mindfulness Thinking and Acting Scale for Adolescence (MTASA; West, 2008), an instrument specifically designed to measure mindfulness in adolescents. The HSR is a 12-item self-report instrument that uses a 6-point Likert-type scale, focusing specifically on an adolescent’s ability to self-regulate emotional responses (e.g., “I can stop myself from saying mean things”, “My anger comes on too fast for me to stay in control”). Three of the twelve items (#3, #6, and #10) are reverse scored with a low score of 12 and a high score of 72. Higher scores indicate a stronger ability to self-regulate (Barnert, Himelstein, Herbert, Garcia-Romeu, & Chamberlain, 2013) of which self-regulation of attention is identified as a key component of mindfulness (Barnert et al., 2013; Bishop et al., 2004; West, 2008) and is positively correlated with student engagement (Linnenbrink & Pintrich, 2003). HSR is positively correlated with wellness indicators, such as positive affect, happiness, and life satisfaction and negatively correlated with negative affect, use of substances to cope, and feelings of unwellness (West, 2008), which are linked to student engagement with school (Benson et al., 2004).

**Reliability and validity.** The HSR has shown promise in studies measuring adolescent mindfulness (Barnert et al., 2013; West, 2008). In an analysis of mindfulness
measures for adults, the HSR was significantly correlated with the Mindful Attention and Awareness Scale (MAAS; Brown & Ryan, 2003), and consistently showed positive relationships with the Five Factor Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) and Kentucky Inventory of Mindfulness Skills (KIMS; Baer Smith, & Allen, 2004). The instrument demonstrates strong internal consistency and has strong test-retest reliability (a = .84; West, 2008) and in a recent study with incarcerated youth has been proven to be sensitive to change in a pre-/post-test design study when used with mindfulness meditation training (Barnert et al., 2013).

**Student School Engagement Measure.** The *Student School Engagement Measure* (SSEM; Hazel et al., 2013) was developed to measure student school engagement through students’ self-appraisal of fit with their school environment related to their aspirations (4 items; 5, 12, 16, and 17), belonging (6 items; 2, 7, 13, 19, 20, and 22), and productivity (12 items; 1, 3, 4, 6, 8, 9, 10, 11, 14, 15, 18, and 21). Aspirations are associated with students’ appraisal of the worthwhileness of education to their future. Belonging pertains to sense of belonging to school community and commitment to school rules. Productivity encompasses cognitive strategies, such as persistence, concentration, and willingness to work on academics. The SSEM is a multi-dimensional, 22 item self-report measure that uses a 10-point scale of agreeableness, with a low score of 22 and a high of 220. Sample questions include “Being successful in school will help me in the future.” (Aspirations), “Most days I look forward to going to school.” (Belonging), and “My school work is important to me.” (Productivity). The SSEM was positively correlated with outcomes on state achievement exams and to protect against
disengagement risks such as suspensions, poor attendance, and failure in math or language arts (Hazel et al., 2013).

**Reliability and validity.** The instrument authors correlated the SSEM with the School Engagement Inventory (SEI; Appleton, Christenson, Kim, & Reschly, 2006) and the Student Engagement Scale (SES; Fredricks et al., 2005) and a strong correlation was found with both (.80), Chronbach alpha = .93 (Hazel et al., 2014). All subscales were found to be significantly and positively correlated, within and between instruments. These studies were conducted with a mostly Hispanic and low-income population in an urban school district and was administered in both English and Spanish; it was unclear how well the instrument would generalize to a suburban, more heterogeneous school population. Since it measures students’ perceptions of fit (Hazel et al., 2014; Hazel et al., 2013), it was expected to detect changes in students’ perceptions based on learning mindful awareness skills, which can improve concentration, openness, non-judging, and acceptance.

**Brief Version of the FRIEBEN Test Anxiety Scale.** The brief version of the FRIEBEN Test Anxiety Scale (B-FTAS; von der Embse et al., 2013b) was developed as a multidimensional measure of test anxiety among middle and high school students, grades four through twelve. The B-FTAS is a three-factor, 12-item subset of the 23-item FRIEBEN Test Anxiety Scale (FTAS). It measures social derogation (worries related to social embarrassment based on poor test scores; items 1-5), cognitive obstruction (issues with concentration, recall, or effective problem solving; items 6-9, reverse scored), and physiological tenseness (bodily and emotional discomfort; items 10-12; Friedman &
Bendas-Jacob, 1997). The B-FTAS was chosen based on its suggested age range (middle and high school students) and its social, cognitive, and physiological constructs of test anxiety (von der Embse et al., 2013b) constructs that can be affected by mindfulness practice. The B-FTAS is a self-report measure that uses a 6-point Likert-type scale ranging from 1 (does not characterize me at all) to 6 (characterizes me perfectly), with a Total Test Anxiety low score of 12 and high of 72 (von der Embse et al., 2013b). Sample questions include “If I fail the test I am afraid that people will consider me worthless” (Social Derogation), “I am very tense before taking a test even if I am well prepared” (Physiological Tenseness), and “I feel my chances are good to think and perform well on a test” (Cognitive Obstruction).

**Reliability and validity.** The FTAS’s internal consistency estimates of reliability were .91 for the total score and .88 (SD), .87 (CO), and .83 (PT) for each of the subscales (Cizek & Borg, 2006). The B-FTAS’s internal consistency estimate of reliability for each of the subscales were .88 (SD), .87 (CO), and .83 (PT) showing strong consistency between the 12-item scale with the original 23-item scale. Coefficient alphas were computed for the 3 factors and a Total Test Anxiety factor. The reliability estimates ranged from .77 to .90 (von der Embse et al., 2013b).

**Procedures**

After the principal of the participating school expressed interest in the study, the principal and the researcher gained approval from the superintendent to proceed with the study. The principal then met with the Physical Education Department to determine the grade levels that would participate. It was agreed that the mindfulness curriculum would
be taught for 15 minutes twice a week in the sixth and eighth grade health classes for five weeks during the fourth marking period with 30 minutes allotted for the first lesson. Two additional class periods were scheduled for pre- and post-testing. The researcher met with the teachers, whose classes would participate in the intervention group, to plan how to minimize disruption and best support their curricular needs.

When working with adolescents there is a need for both parental consent and student assent. After obtaining Montclair State University’s Institutional Review Board approval, parents of possible participants were notified of the study electronically through the normal, established school channel for parent notification. This correspondence included a flyer, informal letter, and formal consent form describing the study and instructions on how to contact the researcher for more information or to opt out of the study. Using an opt-out withdrawal of consent is permitted when research is not funded by the U.S. Department of Education and does not involve greater than minimal risk is through opt-out. It is commonly used in school-based research (Santelli et al., 2003). The correspondence also specifically described a linking procedure used to ensure the confidentiality of student information and to convey that individual level student assessment data would not be made available to any school personnel. The recruitment and opt-out materials can be found in Appendix B. Student assent that was included in the online survey can be found in Appendix C.

All students in the assigned health classes took the pre- and post-tests if they were in class on the scheduled day of assessments. Students in the control group had moved from health class back into physical education class. Only the intervention group
received the curriculum as part of their health curriculum. Students in both groups who opted out of the study had their assessments discarded prior to analyzing any results. The researcher developed an online version of the pre-/post-test survey that students took during their regular class time in one of the school’s computer labs. Pre- and post-testing were conducted electronically during health or physical education class. All students in health class during the third and fourth marking periods took the pre- and post-test survey. The survey began with a description of the study and the researcher briefly explained the purpose of the research and students right to opt-out. Students either assented or opted not to have their data used. Due to a glitch in the state-mandated testing software, the start of pre-testing had to be rescheduled and split up. The intervention group completed the survey one to two days after the last day of state testing, with the intervention lessons starting within a few days of administration. The entire control group completed the survey 12 days after state testing was complete.

After pre-testing, students scheduled to attend health class in marking period 4 became the intervention group. Students in marking period 3 health classes acted as the control group, since both groups received the same health curriculum. Participants assigned to the intervention group, who received mindful awareness skills curriculum, were encouraged to actively participate in each lesson and to use mindful awareness outside of class. At the end of the program, all students in the intervention group and control group who were present on the days scheduled in collaboration with the principal were retested using the same instruments administered in the pre-test. Survey data has
been kept confidential through the password protected website, the researcher’s password protected computer, and purposefully not collecting individually identifying information.

**Data Collection**

A computer-based version of the assessment was used to gather pre- and post-test data. The researcher met students in a computer lab and began by helping students log on to computers and to the assessment webpage. She then explained the purpose of the research, the layout of the survey, and students’ rights to assent or decline to have their results included in the study. Students entered their lunch code as part of the demographic section of the survey, which was used to match pre- and post-test data, demographics provided by the principal, and any data to be destroyed rather than analyzed based on parental or student refusal to participate.

Since all students within assigned classrooms received instruction on mindful awareness skills, they were all treated the same throughout the study. At the first administration of the survey, all students who were present completed the 63-item pre-test described in the instrumentation section above \( (n = 306) \). After the last intervention lesson was taught, all students who were present on the second assessment day retook the same survey as a post-test \( (n = 306) \). Although 306 students took both the pre- and post-test, there were differences in the groups. Sixty-nine students were in attendance for the pre-test only and 57 students were in attendance for the post-test only. Additionally, students opted-out of the study at the pre-test \( (n = 25, 8.2\%) \) and post-test \( (n = 67, 17.6\%) \).

During the post-test survey, students in the intervention group were asked to answer seven additional questions regarding their perceptions about the experience of
learning mindful awareness skills. One question asked students to rate their experience of learning mindful awareness skills. Another asked whether they used mindful awareness skills outside of class with a forced yes/no answer. The other questions were open-ended and asked about what students liked, disliked or found challenging about learning mindful awareness skills and how they had used any of the mindfulness skills outside of class.

**Mindfulness Intervention**

To gain entry into the classrooms where the researcher taught the mindful awareness lessons, the researcher obtained approval from the principal, superintendent, and classroom teachers. By design, the researcher taught all lessons with the health teacher remaining in the classroom. This allowed the teachers to gain knowledge of mindfulness, along with their students. Each lesson incorporated Socratic Inquiry, linking students’ prior knowledge, and experiential learning to engage students in the mindful awareness lessons. The intervention consisted of one initial 30-minute lesson followed by eight additional lessons. These lessons were approximately 15 minutes each, twice a week. One key application of mindfulness was taught in each lesson and core mindfulness concepts and techniques were reinforced regularly to build students’ capacity to be mindful, specifically the ability to focus and redirect attention back to the object of mindfulness and to notice thoughts, feelings, and sensations without judgment.

Each lesson blended discussion, direct instruction, and experiential learning. After the first lesson, each lesson began with practicing mindful breathing, expanding students’ ability to sit in silence. Lessons included: 1) looking at a concept relevant to
teens through different lenses (to encourage students to curiously observe their surroundings or themselves), 2) discussion about what they noticed, 3) a new or expanded mindfulness practice, and 4) discussion about ways they might apply what they learned outside the classroom. Lessons were developed based on Mindful Schools' *Mindfulness Curriculum for Adolescents*. The curriculum guide contains nineteen developmentally appropriate, customizable lessons with additional resources to support teaching mindfulness in a school setting. Lessons taught within the study specifically included learning about:

1. developing mindful observation, listening, breathing, and test-taking;
2. developing awareness and ability to be responsive rather than reactive;
3. developing awareness of one’s body, sensations, thoughts, and emotions;
4. noticing without judging pleasant and unpleasant thoughts and emotions;
5. awareness of past, present, and future time orientation and strengthening present moment orientation;
6. developing connections with and empathy for self and others; and
7. noticing opportunities for and development of gratitude and appreciation.

Specific lesson plans are included in Appendix D.

While working for a prevention agency, the researcher had previously facilitated more than 20 social emotional learning groups in school settings that contributed to significant growth outcomes for students. The researcher is certified as a school counselor, prevention specialist and educator with many years of experience working with adolescents. She has used aspects of mindfulness with students for 10 years,
trained to teach the Mindful Schools curriculum in 2014, and continues to integrate mindfulness into regular personal practice.

**Data Analysis**

**Data screening.** Before importing the raw data into a data analysis software program, all data related to students who opted out of the study was discarded. Following this procedure all remaining data was entered into SPSS 24.0. Pre- and post-test records were matched using each student’s linking code. The use of a matched dataset allows for direct comparison of pre- and post-test data for each student and to use the pre-test data as predictors of post-test results. A total of 191 students (intervention group = 107, control group = 84) took both the pre- and post-test and assented to have their data included in the study at both test administrations. It was this matched dataset that was employed in data analysis. This sample will be discussed in detail in chapter 4. All pre- or post-tests without a match were excluded from the dataset.

The researcher examined data for errors, through visual analysis and descriptive statistics. All items with missing values were reviewed to determine whether the data gathered could be used or discarded and whether missing data had a pattern that provides further insight into the effectiveness of the research design. Since all items except the demographic ones contributed to one of four composite scores, a survey with even a single missing item negated all items within the scale and would preclude the student’s data from being analyzed. This was especially prevalent for the SSEM scale, where students were more likely to miss one of the 22 items. The survey was purposefully designed in list form to provide students the ability to opt-out of a question if they chose,
but this eliminated the ability to assure that all data had been completed before students moved to the next section of the survey. One hundred and four (26%) surveys contained one or more missing items. Four of those records had more than three (5%) missing items. Closer analysis of missing values showed that most missing values occurred one to three times for any given question with a high of seven missing items for one item. After analyzing the missing values and based on the similarity of the mean scores on each scale for the control and interventions groups on the pre-test, it was determined that missing values would be filled using the mean score for the particular item.

**Data cleaning.** After frequency distributions were calculated for each of the four survey scales for the pre- and post-tests, records were visually screened for missing values. This process uncovered a pattern of purposeful response error that occurred during the post-test administration. In each case, the student used a single number (usually 1 or 10) throughout multiple scales. This was particularly noticeable in the B-FTAS scale where the middle of the scale had 4 reversed scores and the SSEM where there were 22 items with a range of 1 to 10. It also most often occurred in the student engagement scale, which included 22 items and the test anxiety scale, which was the last set of questions in the survey and followed directly after the student engagement questions. After careful consideration and consultation with advisors, seven cases were excluded from the intervention group and six from the control group due to response error of data. One additional record was removed from analysis due to no data entered for either the student engagement or test anxiety scales.
Analytic procedures. After screening the data, the researcher created composite variables for complete scales and associated subscales for student school engagement (aspirations, belonging, and productivity) and test anxiety (social derogation, cognitive obstruction, and physiological tenseness) and the two composite variables for mindfulness (present-moment non-judgmental awareness and self-regulation) using the SPSS Transform Compute Variable command. For clarity, the two variables employed to assess mindfulness will be referred to as 1) awareness or mindful awareness, as appropriate, and 2) self-regulation when being discussed independently. The dependent variables, student school engagement and test anxiety, as well as the mindfulness variables are numerical (i.e., interval/ratio) variables. Demographic data was coded as nominal variables, with gender, SES, disability status, and ESL coded as dichotomous variables. Based on higher mean composite scores for Asian and Caucasian students, race was coded into a dichotomous dummy variable with Asian and Caucasian students coded as “0” and Hispanic and African American students coded as “1”. I created this coding to prepare for regression analysis, where the moderating effect of race/ethnicity would be assessed.

Before performing multiple regression analyses to test for moderating effects of variables, statistical analyses were conducted to gather descriptive information on the sample. To assess differences of composite scores from pre- and post-tests and across the intervention and control groups, the researcher used independent sample t-tests and ANOVA to compare between group differences of the intervention and control groups and paired sample t-tests to compare within group differences based on demographic
categories. Correlation analysis was used to examine the relationships between the independent variables (mindful awareness and self-regulation), dependent variables (student school engagement, and test anxiety) and the demographic variables were run looking for statistically significance relationships (p < .05).

Hierarchical multiple linear regression analyses were conducted to answer the primary research questions, to what extent does teaching mindful awareness skills to middle school students (1) predict change in students’ engagement in school and (2) predict change in students’ level of test anxiety and to what extent do characteristics of gender, race and ethnicity, SES, ESL, and disability status moderate the relationship between teaching mindful awareness skills to middle school students and (1A) change in students’ engagement in school and (2A) change in students’ level of test anxiety? Two separate regressions were run to account for each of the dependent variables (student engagement and test anxiety). The predictor variables (student engagement or test anxiety pre-test and awareness and self-regulation pre-test) and the criterion variable of age were entered on the first step of each multiple linear regression model. The independent variables (mindfulness and self-regulation post-test) were entered on the second step of the multiple linear regression model to assess whether there was a significant difference based on the intervention. The dummy-coded demographic variables of gender, race/ethnicity, low-SES, English not first language spoken, and disability status were entered on the third step of the multiple linear regression model. The fourth and fifth steps of the multiple linear regression model assessed interactions between each of the mindfulness variables and moderating variables. For the multiple
linear regression to test research question 1A, the interaction terms in step four were student engagement and awareness X gender, awareness X race/ethnicity, awareness X SES, intervention X ESL, and awareness X disability status and in step five were student engagement and self-regulation X gender, self-regulation X race/ethnicity, self-regulation X SES, self-regulation X ESL, and self-regulation X disability status. For the multiple linear regression to test research question 2A, the interaction terms in step four were test anxiety and awareness X gender, awareness X race/ethnicity, awareness X SES, intervention X ESL, and awareness X disability status and in step five were student engagement and self-regulation X gender, self-regulation X race/ethnicity, self-regulation X SES, self-regulation X ESL, and self-regulation X disability status. A power analysis was conducted using G*Power 3 to determine the minimum sample size needed for a moderate effect size, which was 138 based on five demographic variables used to examine moderation effects. Table 2 is a data analysis plan that summarizes statistical procedures, research questions, and variables.
### Data Analysis Plan

#### Preliminary Analysis

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Measures</th>
<th>Variables</th>
<th>Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What are the differences in mindfulness, healthy self-regulation, student engagement, and test anxiety after teaching mindful awareness skills among demographic groups?</td>
<td>CAMM, HSR, SSEM, BFTAS, Student Survey/ linked data</td>
<td>Pretest/Posttest: CAMM, HSR, SSEM, BFTAS demographic predictors</td>
<td>Paired Sample t-test, Independent Sample t-test, ANOVA</td>
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</tbody>
</table>

#### Research Question

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Measures</th>
<th>Variables</th>
<th>Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (a) Does teaching mindful awareness skills predict change in students’ engagement in school?</td>
<td>CAMM, HSR, SSEM</td>
<td>Post-test: CAMM, HSR, SSEM</td>
<td>Hierarchical regression</td>
</tr>
<tr>
<td>1 (b) Which demographic characteristics moderate the relationship between teaching mindful awareness skills and change in students’ engagement in school?</td>
<td>CAMM, HSR, SSEM, Student Survey/ linked data</td>
<td>CAMM, HSR, SSEM demographic predictors</td>
<td>Hierarchical regression (moderation)</td>
</tr>
</tbody>
</table>
Table 2 continued.

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Measures</th>
<th>Variables</th>
<th>Data Analysis</th>
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<tbody>
<tr>
<td>2 (a) Does teaching mindful awareness skills predict change in students’ level of test anxiety?</td>
<td>CAMM</td>
<td>Post-test</td>
<td>Hierarchical regression</td>
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<td></td>
<td>HSR</td>
<td>CAMM</td>
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<td>B-FTAS</td>
<td>HSR</td>
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<td>B-FTAS</td>
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<tr>
<td>2 (b) Which demographic characteristics moderate the relationship between teaching mindful awareness skills and change in students’ level of test anxiety?</td>
<td>CAMM</td>
<td>CAMM</td>
<td>Hierarchical regression (moderation)</td>
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<td>HSR</td>
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<td>B-FTAS</td>
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<td></td>
<td>Student Survey/ linked data</td>
<td>demographic predictors</td>
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</table>

Post-Test Questions

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Measures</th>
<th>Variables</th>
<th>Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (a) Do students enjoy learning mindful awareness skills?</td>
<td>Intervention Group Student Survey</td>
<td>Enjoyment Rating</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td>3 (b) What do students like, dislike, and/or find challenging about learning mindful awareness skills?</td>
<td>Intervention Group Student Survey</td>
<td>Open-ended questions on classroom experience</td>
<td>Frequency Table</td>
</tr>
<tr>
<td>3 (c) If students use mindful awareness skills outside of the class, how and where did they use them?</td>
<td>Intervention Group Student Survey</td>
<td>Outside Class Use Open-ended questions on use outside of class</td>
<td>Descriptive Statistics Frequency Table</td>
</tr>
</tbody>
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Methodological Considerations

Due to the nature of this study, where the researcher was intricately involved in all aspects of planning, implementation, and analysis, there was a need to identify and address potential areas of concern prior to the start of the study. The two most salient
concerns centered on ethical treatment of participant and researcher bias. By addressing ethical concerns, the researcher was able to identify, plan for, and articulate procedures to set a clear expectation for stakeholders. Addressing researcher bias early, kept it at the forefront of planning and discussion with advisers.

**Ethical issues.** Ethical issues included the need to store and protect subject information and the need for confidentiality. To address these concerns, only aggregate data will be made available to the school and no identifying data was collected from students. To further ensure confidentiality, free and reduced lunch and disability status were supplied through the school by using a linking code, to which only the principal’s staff have access. While the actual names of the school and district were not used and quotes by students were not attributable to any particular student, in large studies it is possible for individuals who were involved in the process to identify the school that was studied. This was addressed early in the process with administrators. They understood the risk and were willing to proceed.

**Researcher bias.** Since the researcher administered the pre- and post-tests and taught the mindfulness lessons, researcher bias must be considered. As a school counselor and prevention specialist, I facilitated strength based intervention programs that have helped students successfully develop cognitive and social skills and have a bias regarding my belief that they can benefit all students. To address this bias, the majority of data collected was quantitative through the use of pre- and post-tests that were developed and validated by other researchers in previous studies. The researcher also
kept case notes regarding each lesson at the end of each class that were referred back to during analysis.

All pre- and post-tests were administered in the same computer lab for both the intervention and control groups with the researcher explaining the research and assent process to all classes. During the intervention, attendance check-ins were used to track student experiences and use of mindfulness outside of class twice during the study. This allowed the researcher to gain insight into the students’ perspective of the experience during the study. Six questions were included in the intervention post-test that allowed students to rank their experience and give open-ended feedback regarding learning and applying mindful awareness skills outside the classroom. During the post-test, the researcher was aware that some students, particularly in the control group who were taking the assessment during their physical education class, were unhappy about having to participate a second time. This seems to be borne out by a much higher decline rate in the post-test ($n = 64, 20.9\%$) than the pre-test ($n = 25, 8.2\%$). There were also more assessments that were abandoned before completion and some instances where students chose to fill out the assessment without reading it. To avoid researcher bias in decisions related to data cleaning, the researcher erred on the side of keeping data except when there was obvious tampering. This could be detected by students using all the same number in an entire scale (especially the BFTAS that included reverse-scored items in the middle of the scale), especially at the low end of a scale. This did not occur in the pre-test data. The researcher checked all assumptions with advisors before proceeding.
Chapter Summary

The purpose of this study was to examine the relationship between teaching mindful awareness skills to middle school students and student engagement with school and student test anxiety. The sample was drawn from a diverse, suburban middle school in New Jersey. Limitations relevant to work within schools and with adolescents included the need for parental consent and student assent and the need to work within the constructs of particular school procedures and norms. In this study consent was obtained through an opt-out procedure and, to accommodate school schedules, the use of a convenience cluster sample.

The study employed a pre-/post-test design, with specific demographic information collected from students and supplemented by the school principal through use of a linking code. Additionally, four instruments were used at both pre- and post-test administrations. Some of the instruments used are new and special care was taken to further assess validity and reliability based on this student population. Data analysis included statistical and hierarchical multiple regression. Due to the researcher’s active involvement in administration of pre- and post-tests and delivering the intervention lessons, researcher bias was addressed. The next chapter will detail the analytic results from the obtained sample of middle school students.
Chapter Four

The purpose of this study was to investigate whether teaching mindful awareness skills to middle school students could predict student engagement or test anxiety. Additionally, this study investigated the demographic characteristics of gender, race/ethnicity, SES, ESL, and disability status as moderating variables on the relationship between teaching mindful awareness skills to and change in student engagement and/or test anxiety. The original study design employed a pre-post-test, quasi-experimental research design with a non-equivalent control group. A series of confounding circumstances impacted the integrity of the control group results. A methodical analysis of the results showed a lack of fidelity of post-test results in the control group that led to a decision to include only the intervention group in the final analysis.

This chapter will begin with analysis of the data and conditions that led to the decision to amend post-test data analysis. The chapter concludes with preliminary analysis, descriptive statistics, correlation analyses, and analytic results for all inferential statistical analyses used to answer each of the research questions for the intervention group only. Hypothesis testing for the four hypotheses presented in chapter 3 is addressed using hierarchical multiple linear regression. To delineate results according to research questions, excerpts of the data analysis plan introduced in chapter 3 (table 2) will be reintroduced at the transition between sections throughout chapter 4.

Results

In total, 287 of the students who took the pre-test (I = 145, C = 142) and 242 of the student who took post-test (I = 127, C = 115) assented to having their data included in the
study. Based on using a pre- and post-test design with an intervention (I) and control (C) group, a matched dataset \((n = 191, I = 107, C = 84)\) was created, comprised of responses from students who took both the pre- and post-tests and assented to have their data included at both test administrations. This represented a significantly smaller subset of the total population of possible participants, due to students absent at either pre- or post-test or students who assented at pre-test but opted-out at post-test.

**Confounding of Equivalent Group Comparisons**

At pre-test, 7% of students opted out of the study. This accounted for a 6% attrition rate in the intervention group \((n = 9)\) and an 8% attrition rate in the control group \((n = 12)\). At post-test (20.9%), attrition was higher in both the intervention \((n = 27; 17.5\%)\) and control group \((n = 37; 24.5\%)\), but it was greater among the control group.

As Mills and Gay (2016) point out, attrition cannot be assumed to be random, since there can be a systematic pattern in students’ attrition that threatens the representativeness of the original sample (Trochim, 2006). An unexpected change of venue by the school led to testing the control group during physical education classes, a less structured and favorite class for some students in middle school. Some students expressed displeasure about being taken out of class, especially at post-test. In addition to opting out once in the computer lab, since students knew about the post-test, some students may have been able to opt out by simply not leaving physical education class at post-test. The researcher was not able to ascertain this directly, but the number of students who took the pre- or post-test only was more than double for the control group (pre-test, \(n = 50\); post-test, \(n = \)).
40) compared to the intervention group (pre-test, \( n = 19 \); post-test, \( n = 17 \)), which represents a greater fluctuation of students in the sample for the control group.

In addition to attrition, a series of confounding events occurred among the control group that together posed a serious threat to the validity of comparing the intervention group to the control group. The testing conditions for the two groups were not equivalent. Based on state standardized testing, the start of the study was moved from the beginning of the fourth marking period to two weeks later. To avoid confounding results on test anxiety, a decision was made to pre-test both groups after testing. A glitch in state testing further delayed pre-testing of the control group to two weeks after state testing. Some research suggests that test anxiety tends to peak two days before testing and continues to decline after testing (von der Embse, 2012), in which case the control group had more time to recover.

The testing environment for the two groups was not equivalent. Unlike the intervention group where the teacher brought students to the computer lab and helped with supervision and logistics, for the control group the researcher was to meet students at physical education classes and bring them to the computer lab. The researcher administered the survey with no other adults present, which meant directing students to seats, logging onto computers and to survey site, and presenting the study and students’ right to assent or opt-out, and give directions for completing the study. In each class, there were students who required extra assistance, which divided the researcher’s attention. The situation was particularly challenging during third period when two eighth grade classes were assigned to be assessed at the same time. Half the students were seated
at desktop computers and the rest were using tablets. At pre-test, there were too few
desks and some students were seated on the floor. For post-test, additional desks were
moved into the lab and a research assistant helped out in the double class, but it was still
crowded and chaotic.

Demotivation was a factor in the behaviors among some students in the control
group at post-test, which occurred on the second to last full day of school. Keeping
students focused was challenging. Some students were working together despite
instructions to work independently and one student was openly coaxing others to answer
falsely.

The unforeseen issues in the testing environment (testing in physical education
classes, testing environment, unsupervised testing) and timing (delays at pretest, end of
school year at post-test), along with the attrition rate among the control group led to
concerns regarding the fidelity of their post-test results and the continued
representativeness of a relatively equivalent control group at post-test. As recommended
by Trochim (2006), the researcher aimed to quantify the degree of threat among the
control group by analyzing the pre-test scores of the intervention and control groups
based on whether they remained in the study or opted out at post-test. Analysis of pre-
test scores of students who assented to include their pre-test data and then declined to
have their post-test data included, compared to those who assented at pre-and post-test,
reveals a decrease in mean scores for the control group and increased or similar scores for
the intervention group. In the control group, students with higher test anxiety and lower
engagement at baseline were more likely to opt out at post-test, where students in the
intervention group with higher test anxiety and lower engagement at baseline still opted to take the post-test. Based on this evidence, there were apparent systematic patterns in the attrition of the control group that could have influenced the results of the study. A detailed analysis can be found in Appendix E.

**Researcher Decision on Research Design**

While the intent of using a control group was to employ the most rigorous design available within the school environment, based on the evidence above, the researcher made the decision to include only the intervention group in the analysis using a single group, pre- post-test design. Since the research questions aimed to assess whether teaching mindful awareness skills to middle school students could predict student engagement or test anxiety, these questions could still be analyzed using the pre- and post-test results of the intervention group. A downside to a single group, pre- post-test design is a decreased ability to control for extraneous variables, therefore there is the possibility of greater threat to validity. Using the control group’s pre-test data, which had not been significantly different from the intervention group, allowed the researcher to determine general equivalence of the intervention and control group at the beginning of the study.

The researcher examined the differences from pre- to post-test for the intervention groups as a whole and by demographic characteristics. Hierarchical multiple linear regression modeling was conducted to assess whether teaching mindful awareness skills predicts change in 1) students’ engagement with school and 1a) the moderation of the demographic variables on the relationship between teaching mindful awareness skills and
change in students’ engagement with school; and 2) students’ test anxiety and 2a) the moderation of the demographic variables on the relationship between teaching mindful awareness skills and change in students’ engagement with school. Finally, results based on students’ experience of learning mindful awareness skills were assessed. Results of the study based on the intervention group only are reported below, including sample information, preliminary analysis, descriptive statistics, correlation analyses, and analytic results for all inferential statistical analyses and hierarchical multiple linear regressions.

**Student Sample Demographics**

The matched dataset of the intervention group included 107 students, of which 56% were females and 44% were males. By age, 20% of students were eleven, 31% were twelve, 17% were thirteen, and 33% fourteen years old with 52% of students in sixth grade and 48% in eighth grade (due to rounding the total for age is greater than 100%). By race/ethnicity, 52% identified as Caucasian, 20% African-American, 19% Asian, and 9% Hispanic. Within the sample, African American students were over-represented by more than double, while Hispanic students were under-represented by approximately 50%, compared to the school population. Within the dataset, 13% of students received special education services, which was approximately 50% lower than the school population. Slightly higher than the population, 24% of students learned English as a second or third language and 30% received free or reduced lunch.

Throughout the remainder of the results section, analysis will refer to the intervention group only with a sample size of 107 students. It should be noted throughout the study
that based on small sample size for Hispanic students (n = 10) and disability status (n = 14), results for these demographic categories should be interpreted with caution.

**Preliminary Analyses**

<table>
<thead>
<tr>
<th>Preliminary Analysis</th>
<th>Measures</th>
<th>Variables</th>
<th>Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What are the mean differences in mindfulness, healthy self-regulation, student engagement, and test anxiety after teaching mindful awareness skills with respect to demographic groups?</td>
<td>CAMM, HSR, SSEM, Student</td>
<td>Pretest/Posttest: CAMM, HSR, SSEM, BFTAS, Survey/linked data</td>
<td>Paired Sample t-test, Independent Sample t-test, ANOVA</td>
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<tr>
<td>2. What are the correlations among dependent, independent, and control variables?</td>
<td>CAMM, HSR, SSEM, BFTAS, demographic predictors</td>
<td>Pearson Correlation Coefficient</td>
<td></td>
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</tbody>
</table>

Prior to conducting statistical tests for hypothesis testing, descriptive statistics were computed for independent and dependent variables for both the pre- and post-test results to determine the appropriateness of running regression based analyses on requisite assumptions that must be addressed for valid results (Pallant, 2007). To assess the power of regression to correctly detect the relationships between variables, the researcher used the G*Power tool to determine ideal sample size needed to achieve a power of .80 assuming a medium effect size, $R^2 = .15$ and an alpha of .05. There were a total of seven predictors, with two independent variables (awareness and self-regulation) and five moderating variables (gender, race/ethnicity, SES, ESL, and disability status). To compute the sample size, F-test was selected under test family, then multiple regression
in order to run the analysis. The resulting ideal sample size was determined to be 146.

Based on the sample size of 107 and small subgroups for some demographic variables, there is an increased chance of type II error, where a significant predictor would be found to be non-significant. Table 3 summarizes descriptive statistics for the intervention group using the matched data of students who took both the pre- and post-test.

Several preliminary analyses were conducted in preparation for running regression analysis to ensure assumptions were met. Assessing the independent and dependent variables for both the pre- and post-test results indicated that all variables within the sample had skewness and kurtosis values less than an absolute value of 1.0 and were well within the limits that allow for the assumption of normality. Normality of distributions was also assessed through visual inspection of histograms and normal curves. Outliers were assessed through visual inspections of scatter and box plots. There were no outliers at pre- or post-test for awareness, self-regulation, or test anxiety. For student engagement, there was one outlier at pre-test below and no outliers at post-test. The outlier was included in the analysis. No violations of multicollinearity were indicated in variance inflation factor scores (VIFs; VIFs <10) and tolerance (Tols. > .10).
Table 3: Descriptive Statistics of the Study Variables for the Intervention Group

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>Δ</th>
<th>SEΔ</th>
<th>Min</th>
<th>Max</th>
<th>Sk</th>
<th>K</th>
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<td>7.1</td>
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<td>0.70</td>
<td>8</td>
<td>40</td>
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<td>0.70</td>
<td>18</td>
<td>72</td>
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<td>0.16</td>
<td>2.8</td>
<td>9.9</td>
<td>-0.56</td>
<td>-0.38</td>
<td>0.94</td>
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<tr>
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<td>13.1</td>
<td>1.02</td>
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<td>16</td>
<td>72</td>
<td>-0.48</td>
<td>-0.58</td>
<td>0.87</td>
</tr>
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</table>

Note: SE = Standard Error, M = Mean at post-test, SD = Standard Deviation, Δ = Mean Change, SEΔ = Standard Error of Mean Change, Min = Minimum Score, Max = Maximum Score, Sk = Skewness, K = Kurtosis, A = Chronbach's Alpha.

**Descriptive statistics.** Paired sample t-tests were used to examine the mean differences in pre- to post-test scores of the IVs and DVs for the intervention group as a whole and based on the demographic variables, gender, race/ethnicity, low SES, ESL, and disability status, and the control variable age. Examination of the results of the paired sample t-tests identified no statistically significant differences from pre- to post-test for the IVs or DVs within the intervention group as a whole, except on the Physical Tenseness subscale in the B-FTAS. When analyzed by demographic category, there were statistically significant pre- to post-test differences in student engagement for some categories and test anxiety at the subscale level, but none found for awareness or self-regulation.

Independent sample t-tests were used to further examine between group differences for the demographic variables of gender, low-SES, ESL, disability status, and the control variable grade. One-way ANOVAs were run to examine between group differences by age and by race/ethnicity. Results of all the comparative analyses will be
discussed in depth below by assessment scale. These demographic variables are important to consider since the relationship between teaching mindful awareness skills to middle school students and change in students’ engagement in school and student test anxiety are being assessed based on the moderating effect of gender, race and ethnicity, SES, ESL, and disability status. Due to the smaller sample size for students with disabilities ($n = 14$) and Hispanic students ($n = 10$), significant results for these demographic categories should be interpreted with caution.

**Analyses of Independent Variables**

The two independent variables representing mindfulness were assessed through the awareness and self-regulation composite scores obtained through use of the following measures.

**Child and Adolescent Mindfulness Measure (CAMM).** The CAMM is a ten-item measure of mindfulness related to orientation toward present moment and awareness, with a low score of 0 and high of 40 (Greco et al., 2011). Results of paired sample $t$-tests showed that between pre- and post-test, there was virtually no change in awareness ($M = 0.004, SD = 7.2, p = .996$) for the intervention group as a whole or by demographic group. Results of the independent sample $t$-tests showed significant differences between groups based on learning English as a second language ($M = 2.3, 95\% \text{ CI } [-1.7, 6.4], t (103) = .25, p = .008$) at pre-test as assessed by Levene’s test for equality of variances. However according to the test of mean differences, there is no statistically significant mean difference between each group. Results of the one-way
ANOVA showed a significant mean difference between groups for race/ethnicity at post-test (F (3, 103) = 2.866, p = 0.04), but no specific between group differences.

**Healthy Self-Regulation (HSR) scale.** The HSR is a twelve-item measure of the ability to self-regulate emotional responses with scores that range from 12 to 72 (West, 2008). Results of paired sample t-tests showed there were no statistically significant differences from pre- to post-test for self-regulation as a whole (M = 0.45, SD = 7.7, p = .545) or by demographic group. Results of the independent sample t-tests showed a significant difference between groups based on learning English as a second language (M = 5.7, 95% CI [-.4, 11.8], t (103) = 1.9, p = .05) at pre-test as assessed by Levene’s test for equality of variances. However according to the test of mean differences, there is no statistically significant mean difference between groups. Results of the one-way ANOVA showed a statistically significant mean difference between groups for race/ethnicity at post-test with a specific between group difference between African American students (M = 43.7, SD = 12.9) and Caucasian students (M = 52.1, SD = 12.5), F (3, 103) = 2.708, p = .049) based on post-hoc comparisons using the Tukey HSD test.

**Analyses of Dependent Variables**

**Student School Engagement Measure (SSEM).** The SSEM measures students’ self-appraisal of fit with their school environment as a composite score and at the subscale level for aspirations, belonging, and productivity. Scores are averaged, so the range on each subscale and the composite range from a low score of 1 to a high of 10. Results of paired sample t-tests showed there were no statistically significant differences from pre- to post-test for student engagement as a whole (M = -0.13, SD = 1.1, p = .25),
but there was a statistically significant mean decrease in student engagement found for
students who do not receive special education services (M = -0.22, 95% CI [-0.44, -
0.007], t (92) = -2.1, p = .044, d = .21) which represents 87% of students in the
intervention group. There was also a statistically significant mean decrease in student
engagement found for Hispanic students (M = -0.83, 95% CI [-1.57, -0.09], t (9) = -2.54,
p = .032, d = 0.8) specifically.

Results of the independent sample t-tests showed a statistically significant mean
difference between groups based on disability status (M = -0.74, 95% CI [-1.38, -1.08], t
(103) = 2.32, p = .022, d = 0.67) with students with disabilities becoming more engaged
compared to their peers who became less engaged. There were also significant
differences between groups in rate of change based on learning English as a second
language (M = -0.04, 95% CI [-.75, .66], t (103) = -.17, p = .01) as assessed by Levene’s
test for equality of variances. However according to the test of mean differences, there is
no statistically significant mean difference between groups. Results of the one-way
ANOVA showed a statistically significant mean difference between groups for
race/ethnicity at pre-test, (F (3, 103) = 3.895, p = .011, d = 0.08) with a statistically
significant between group difference between African American and Asian students (M =
-1.61, 95% CI [-2.9, -0.33], p = .008) based on post-hoc comparisons using the Tukey
HSD test. This difference did not persist at post-test.

**SSEM subscales.** The subscales of the SSEM measure aspirations, belonging,
and productivity. Results of paired sample t-tests showed that within the SSEM
subscales, when looking at the intervention group as a whole, all mean changes in
subscales scores were non-significant. The only statistically significant pre- to post-test mean differences were found among students who were not receiving special education services \((M = -0.25, 95\% \text{ CI } [-0.5, -0.002], t(92) = -2, p = 0.048, d = .21)\) on the Productivity subscale, which accounted for the majority of the decrease in student engagement. The only other statistically significant mean difference was among Hispanic students \((M = -1.25, 95\% \text{ CI } [-2.15, -0.35], t(9) = -3.14, p = 0.012, d = .98)\) on the Belonging subscale. Based on the results of the independent sample \(t\)-tests, there was a statistically significant mean difference from pre- to post-test in the change score for Aspiration between students receiving special education services \((M = 1.18, SD = 2.3)\) and those who do not \((M = -0.19, SD = 1.2)\), with students receiving special education services achieving greater increases \((M = -1.37, 95\% \text{ CI } [-2.69, -0.04], t(14.119) = -2.2, p = 0.045, d = 0.8)\). Students receiving special education services started with a statistically significant lower score on Aspiration \((M = 2.8, 95\% \text{ CI } [0.44, 3.15], t(13.723) = 2.84, p = 0.013, d = 1.55)\) at pre-test \((M = 7.7, SD = 2.3)\) compared to those who did not \((M = 9.5, SD = 1)\).

Results of the one-way ANOVA showed that the only between group mean difference by age was on the Productivity pre-test subscale, \((F(3,103) = 3, p = 0.033, d = 0.05)\) between eleven- \((M = 7.8, SD = 2)\) and thirteen year-old \((M = 6.6, SD = 1.7)\) students. Tukey post hoc analysis revealed that the mean difference \((1.6, 95\% \text{ CI } [0.11, 3.13], p = .031)\) was statistically significant. The only statistically significant between group mean differences found by race/ethnicity were on the Productivity, \((F(3,103) = 4.1, p = .009, d = 0.05)\) and Belonging, \((F(3,103) = 4.6, p = .004, d = 0.09)\) pre-test
subscales and the change score in Belonging (F (3,103) = 2.7, p = .047, d = 0.05). The between group differences on Productivity at pre-test were shown to be higher for Asian students (M = 8.2, SD = 1.7) than African American students (M = 6.3, SD = 2). Tukey post hoc analysis revealed that the mean difference (1.86, 95% CI [0.42, 3.31], p = .006) was statistically significant. The difference was no longer statistically significant at post-test (p = .169).

The between group differences on Belonging at pre-test were shown to be higher for Asian students (M = 8.4, SD = 1.5) than African American students (M = 6.4, SD = 1.8) and Caucasian students (M = 7.0, SD = 2.2). Tukey post hoc analysis revealed a statistically significant mean difference between Asian students and both African American students (2.0, 95% CI [0.41, 3.5], p = .007) and Caucasian students (1.4, 95% CI [.12, 2.7], p = .027). The difference was no longer statistically significant at post-test with the scores of African American students (M = 0.18, SD = 1.3, p = .125) and Caucasian students (M = .08, SD = 1.7, p = .263) increasing slightly in Belonging, while scores of Asian students (M = -0.34, SD = 1.7) decreased. While not statistically significantly different, belonging scores at pre-test had been higher for Hispanic students (M = 8.1, SD = 0.9) than Caucasian students (M = 7.0, SD = 2.2) but these scores reversed at post-test. The between group differences on change in Belonging were shown to be higher for Caucasian students (M = .1, SD = 1.7) than Hispanic students (M = -1.25, SD = 1.3). Tukey post hoc analysis revealed that the mean difference (1.33, 95% CI [.01, 2.65], p = .048) was statistically significant.
**Brief Version of the FRIEDBEN Test Anxiety Scale (B-FTAS).** The B-FTAS is a 12-item scale with a range of scores from 12 to 72. It measures test anxiety with three subscales: social derogation, cognitive obstruction, and physiological tenseness. Since higher scores on these scales indicate higher test anxiety, lower scores on each of the scales would be considered beneficial. Results of paired sample t-tests showed that there were no statistically significant differences from pre- to post-test for test anxiety for the intervention group as a whole (M = 1.0, SD = 11.5 p = .36) or across demographic categories. Examination of the results of the independent sample t-tests and one-way ANOVAs showed there were no statistically significant mean differences between groups for test anxiety among any demographic category.

**B-FTAS subscales.** Results of paired sample t-tests showed a statistically significant mean difference from pre-to post-test in Physical Tenseness (PT), which increased for the intervention group as a whole (M = .89, 95% CI [.06 to 1.7], t (106) = 2.1, p = .037, d = 0.2). By demographic group, the only statistically significant decrease from pre-to post-test was in Cognitive Obstruction (CO) for females (M = -1.3, 95% CI [-2.6 to -.02], t (59) = -2, p = .047, d = 0.26). Statistically significant increases were found in PT for females (M = 1.2, 95% CI [.9, 2.4], t (59) = 2.2, p = .035, d = 0.28), students who do not receive free or reduced lunch (M = 1.1, 95% CI [.1, 2.1], t(31) = 2.2, p = .031, d = 0.25), and Caucasian students (M = 1.7, 95% CI [.6, 2.8], t(55) = 3, p = .004, d = 0.4). Although not found to be statistically significant (perhaps due to small sample size), it should be noted that the largest decrease in CO was among Hispanic students (M= -2.2, 95% CI [-5.1, .7], t(9) = -1.7, p = .124).
Results of the independent sample t-tests showed no statistically significant between group differences on any of the test anxiety subscales. Examination of the one-way ANOVAs showed statistically significant between group differences found by age and race/ethnicity. The statistically significant between group differences found by age on the CO post-test subscale, \((F (3,103) = 3.6, p = .015, d = 0.08)\) between thirteen year-old students \((M = 13.4, SD = 5.9)\) whose scores declined and both eleven-year-old students \((M = 18.6, SD = 5.1)\) whose scores rose and twelve year-old students \((M = 18.5, SD = 5.9)\) whose scores were basically unchanged, with thirteen year-old students scoring statistically significantly lower. Tukey post hoc analysis revealed that the mean difference between thirteen- and eleven- \((-5.1, 95\% \ CI \ [-9.9, -.3], p = .031)\) and twelve year-old \((-5.1, 95\% \ CI \ [-9.5, -.7], p = .015)\) students was statistically significant.

A statistically significant between group difference was found by race/ethnicity on the CO pre-test subscale, \((F (3,103) = 3.1, p = .031, d = 0.05)\). At pre-test, CO was shown to be higher for Asian students \((M = 19.4, SD = 4.7)\) than African American students \((M = 14.6, SD = 6.6)\). Tukey post hoc analysis revealed that the mean difference \((4.8, 95\% \ CI \ [.4, 9.1], p = .027)\) was statistically significant. The difference was no longer statistically significant at post-test \((p = .377)\) with the scores of African American students \((M = 1.1, SD = 6.5)\) increasing slightly while scores of Asian students \((M = -.7, SD = 4.7)\) decreased slightly. While the between group differences on change in PT subscale was not statistically significant as a whole \((F (3,103) = 2.4, p = .074)\), there was a statically significant difference in change between Caucasian \((M = 1.7, SD = 4.1)\) and African American \((M = -1.3, SD = 5)\) students, with the scores of Caucasian students
increasing in tenseness while the scores of African American students decreased in tenseness. Tukey post hoc analysis revealed that the mean difference (2.9, 95% CI [-5.8, -.1], \( p = .043 \)) was statistically significant.

**Correlation Analysis**

Before running regression models for hypothesis testing, it was necessary to examine correlations between each pair of variables including the dependent variables (student engagement and test anxiety) the independent variables (mindful awareness and self-regulation) the control variables (grade and age) and demographic variables (gender, race/ethnicity, low-SES, English first language, and disability status). This allowed the researcher to: 1) identify and potentially eliminate predictor variables that were highly correlated with each other to avoid multicollinearity that can potentially impact the regression results and 2) ensure that each predictor variable had a statistically significant correlation with at least one of the dependent variables before including it in the analyses.

Looking at the relationships between the IVs and DVs, the researcher found at pre- and post-test statistically significant weak positive correlations between test anxiety and both mindful awareness and self-regulation (CAMM, \( r = .24, p < .012 \); HSR, \( r = .23, p < .016 \)). This is contrary to what would have been expected, since in other comparisons between the CAMM and test anxiety a negative correlation was found (Cunha & Paiva, 2012) and the HSR has been positively associated with positive affect and negatively associated with negative affect (West, 2008) and stress (DeBruin et al., 2014). A statistically significant moderate positive correlation was found between student engagement and self-regulation (\( r= .64, p < .001 \)) only. A statistically significant
weak positive correlation was found between the IVs only for awareness post-test and self-regulation at pre- (r = .22, p < .023) and post-test (r = .33, p < .001), well below a bivariate correlation of .7 that would indicate too close a relationship. Table 4 summarizes the corresponding correlations for all variables.
Table 4: Correlations Among Independent, Dependent, and Predictor Variables

**Correlations Among Measured Variables**

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<th>4</th>
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<td>CAMM Post</td>
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Note: * Correlation is significant at the 0.05 level. ** Correlation is significant at the 0.01 level.

As discussed in chapter 3, based on prior research findings and suggestions to gain a more nuanced understanding of test anxiety based on “minority” classification
(von der Embse, 2012), as well as scores in this study that identified Asian students with both the highest student engagement and highest test anxiety, the variable race/ethnicity is defined as African American and Hispanic students compared with Asian and Caucasian students. There was also a statistically significant weak negative correlation identified between student engagement and age ($r = -.2, p < .035$) and healthy self-regulation and being low SES ($r = -.22, p < .03$), African American or Hispanic ($r = -.21, p < .026$), or learning English as a second language ($r = -.21, p < .03$). Although not hypothesized, a statistically significant weak positive correlation was identified between student engagement and test anxiety ($r = .28, p < .004$). There was a statistically significant weak positive correlation between low SES and 1) learning English as a second language ($r = .2, p < .002$), 2) receiving special education services ($r = .23, p < .017$) and 3) being African American or Hispanic ($r = .35, p < .001$). Disability status was negatively correlated with being female ($r = -.22, p < .026$). As would be expected, a statistically significant high positive correlation was found between age and grade ($r = .89, p < .001$). As a result, in the regression models only age rather than grade was included. This decision was made based on significant rapid, yet variable developmental changes that occur during middle school years (Cozzolino, 2013; Davidson et al., 2012; Siegel, 2013). Thus, age allows for a more nuanced interpretation.

**Hypothesis Testing**

After completing preliminary analysis to assess the fitness of the data for running regression, hierarchical multiple linear regressions were run for 1) student engagement and 2) test anxiety. Each regression included five steps, with steps 1-3 assessing Part A
of each research question and steps 4-5 assessing Part B of the question. For each
question, these parts will be delineated within the text. The goal of each regression was
to first control for the pre-test values of the DV, each IV (Child and Adolescent
Mindfulness Measure and Healthy Self-Regulation), and age, followed by measuring the
predictive power of each of the IVs on the second step, measuring the predictive power of
each independent variable on the third step, by including the demographic variables
(gender, race, SES, ESL, and disability status). Finally, steps four and five measure the
interaction effect of the IVs and the demographic variables on each of the DVs. Each of
the questions and findings are outlined below.

**Question 1**

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Measures</th>
<th>Variables</th>
<th>Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (a) To what extent does teaching mindful awareness skills to middle school</td>
<td>CAMM</td>
<td>Post-test</td>
<td>Hierarchical regression</td>
</tr>
<tr>
<td>students predict change in student engagement?</td>
<td>HSR</td>
<td>CAMM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SSEM</td>
<td>HSR</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SSEM</td>
<td></td>
</tr>
<tr>
<td>1 (b) To what extent do characteristics of gender, race and ethnicity, SES, ESL,</td>
<td>CAMM</td>
<td>CAMM</td>
<td>Hierarchical regression (moderation)</td>
</tr>
<tr>
<td>and disability status moderate the relationship between teaching mindful</td>
<td>HSR</td>
<td>HSR</td>
<td></td>
</tr>
<tr>
<td>awareness skills to middle school students and change in student engagement?</td>
<td>SSEM</td>
<td>SSEM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Student</td>
<td>demographic predictors</td>
<td></td>
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<tr>
<td></td>
<td>Survey/ linked data</td>
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</table>

Hierarchical multiple regression modeling was conducted for the intervention
group of the matched dataset to assess whether 1) teaching mindful awareness skills, as
measured by the awareness and healthy self-regulation post-test scores, predicts change
in students’ engagement with school as measured by student engagement post-test scores, and 2) the moderation of the demographic variables on the relationship between teaching mindful awareness skills and change in students’ engagement with school. In the first model, the control variables (student engagement, mindful awareness, and healthy self-regulation pre-test scores and age) were modeled. In the second model, the independent variables (mindful awareness and healthy self-regulation post-test scores) were modeled. In the third model, the demographic variables (gender, SES, ESL, and special education status) were modeled. In the fourth model, the interaction terms between mindful awareness and each demographic variable were included. In the fifth model, the interaction terms between self-regulation and each demographic variable were included.

According to the results, all five models were statistically significant ($p < .001$) and showed good prediction of model fit with all values of multiple $R$ closer to 1. This indicates that this regression model is best fit with the data and the precision in the prediction of the unknown population parameters based on the sample estimates of the current sample: Model 1, $R = .792$, $F (4, 102) = 42.98, p < .001$; Model 2, $R = .833$, $F (6, 100) = 37.89, p < .001$; Model 3, $R = .843$, $F (11, 95) = 21.22, p < .001$; Model 4, $R = .859$, $F (16, 90) = 15.79, p < .001$; Model 5, $R = .875$, $F (21, 85) = 13.17, p < .001$.

Table 5 shows the results of each model of hierarchical multiple regression analysis with students’ engagement as the outcome variable.

**Part A - To what extent does teaching mindful awareness skills (awareness, self-regulation) to middle school students predict change in students’ engagement in school?**
The first two models addressed the relationship between teaching mindful awareness skills and change in students’ engagement with school (see Table 5). In Model 1, all control variables were entered including age and the pre-test scores for the DV (student engagement pre-test) and IVs (awareness pre-test, self-regulation pre-test). It would be expected that student engagement pre-test score would significantly predict student engagement post-test score, $\beta(107) = .63$, $t (4, 102) = 7.65$, $p < .001$, which was the case. In the first model, self-regulation pre-test, $\beta(107) = .71$, $t (4, 102) = 2.82$, $p < .006$ was also statistically significant in predicting students’ post-test engagement score. The first model accounted for 62.8% of the variance for student engagement.

In the second model, the IVs (awareness and self-regulation post-test scores) were entered. Based on the results, student engagement pre-test, $\beta(107) = .6$, $t (6, 100) = 7.56$, $p < .001$ and both mindfulness post-test variables were statistically significant in predicting students’ post-test engagement score. While self-regulation post-test score, $\beta(107) = 1.34$, $t (6, 100) = 4.63$, $p < .001$, positively predicted student engagement post-test score, awareness post-test score, $\beta(107) = -.74$, $t (6, 100) = -2.02$, $p < .046$, negatively predicted student engagement post-test score. The second model accounted for 69.4% of the variance for student engagement.

Healthy self-regulation post-test consistently positively predicted student engagement from when it was introduced in step 2 through step 5, while healthy self-regulation pre-test score was no longer significant once healthy self-regulation post-test was introduced. The relationship to awareness was much less clear. In model 3, with the addition of the demographic variables, awareness post-test score was no longer
statistically significant in any subsequent model. Awareness pre-test score became statistically significant in positively predicting student engagement in model 3 and again in model 5.
Table 5: Multiple Hierarchical Regression: Student Engagement

Multiple Hierarchical Regression: Student Engagement Pre-test, Awareness and Self-Regulation Pre-test, Awareness and Self-Regulation Post-test, Demographic Variables, and Interaction Terms Predicting Change in Student Engagement with School

<table>
<thead>
<tr>
<th>Model 1</th>
<th>B</th>
<th>T</th>
<th>R</th>
<th>SEE</th>
<th>R²</th>
<th>Sig.</th>
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<td>0.792</td>
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<tr>
<td><strong>HSR Post</strong></td>
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**Model 5**

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*Note:* Significant results in italics.
Part B - To what extent do characteristics of gender, race/ethnicity, SES, ESL, and disability status moderate the relationship between teaching mindful awareness skills to middle school students and change in students’ engagement in school?

Based on the student engagement literature, the researcher hypothesized that boys, low-SES students, African American and Hispanic students, students who learned English as a second language, and students with disabilities would report lower levels of student engagement than girls, moderate to high-SES students, Caucasian and Asian students, students who learned English as their first language, and students without disabilities (Ormrod, 2010; Upadyaya & Salmela-Aro, 2013). Demographic variables were coded as dichotomous variables of gender (male and female as indicated by 0 or 1), socioeconomic status (high 0 or low 1 as measured by the receipt of free or reduced lunch), first language spoken (English 0 or another language 1), and disability status (general education 0, special education 1). Since Asian students had the highest mindfulness scores followed by Caucasian students at both pre- and post-test, race/ethnicity was coded pairing Asian and Caucasian students (indicated by 0) and African American and Hispanic students (indicated by 1) to allow for a more nuanced understanding of minority status.

Models 3 through 5 were conducted to assess the moderation of the demographic variables on the relationship between teaching mindful awareness skills and change in students’ engagement with school. Model 3 was run to test the predictive values of the demographic variables (gender, low SES, ESL, and special education status) associated with student disengagement in preparation for testing for the moderating effects in
models 4 and 5. Based on the results, in step 3 student engagement pre-test, $\beta(107) = .6, t(11, 95) = 7.69, p < .001$, self-regulation post-test, $\beta(107) = 1.32, t(11, 95) = 4.54, p < .001$, and special education status, $\beta(107) = 13.65, t(11, 95) = 2.09, p < .038$, were statistically significant in predicting students’ post-test engagement score. The third model accounted for 71.1% of the variance for student engagement.

Models 4 and 5 were run to test the moderating effects of the demographic variables on the relationship between teaching mindful awareness skills to middle school students and change in students’ engagement in school. An interaction between the demographic variables and awareness was assessed in model 4. An interaction between the demographic variables and self-regulation was assessed in model 5. All interaction variables were mean centered to reduce the correlation between the product term and its components (Warner, 2013). Based on the results in step 4, student engagement pre-test, $\beta(107) = .65, t(16, 90) = 8.11, p < .001$, and self-regulation post-test, $\beta(107) = 1.3, t(16, 90) = 4.25, p < .001$ were statistically significant in predicting students’ post-test engagement score. Awareness X special education status, $\beta(107) = -2.29, t(16, 90) = -2.68, p < .009$, was statistically significant in moderating the relationship between teaching mindful awareness skills to middle school students and change in student engagement post-test scores. The fourth model accounted for 73.7% of the variance for student engagement. Based on the results in step 5, student engagement pre-test, $\beta(107) = .67, t(21, 85) = 8.54, p < .001$, awareness pre-test $\beta(107) = .75, t(21, 85) = 2.25, p < .027$, and self-regulation post-test, $\beta(107) = 1.7, t(21, 85) = 3.88, p < .001$ were statistically significant in predicting students’ post-test engagement score. Awareness X
special education status, \( \beta(107) = -2.36, t(21, 85) = -2.79, p < .006, \) and self-regulation X minority status \( \beta(107) = -2.82, t(21, 85) = -2.82, p < .006, \) were statistically significant in moderating the relationship between teaching mindful awareness skills to middle school students and change in student engagement post-test scores. The final model accounted for 76.5% of the variance for student engagement.

**Question 2**

<table>
<thead>
<tr>
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<th>Measures</th>
<th>Variables</th>
<th>Data Analysis</th>
</tr>
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<tr>
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<td>CAMM \ HSR \ B-FTAS</td>
<td>Post-test \ CAMM \ HSR \ B-FTAS</td>
<td>Hierarchical regression</td>
</tr>
<tr>
<td>2 (b) To what extent do characteristics of gender, race and ethnicity, SES, ESL, and disability status moderate the relationship between teaching mindful awareness skills to middle school students and change in students’ level of test anxiety?</td>
<td>CAMM \ HSR \ B-FTAS \ Student Survey/ linked data</td>
<td>CAMM \ HSR \ B-FTAS \ demographic predictors</td>
<td>Hierarchical regression (moderation)</td>
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</tbody>
</table>

Hierarchical multiple regression modeling was conducted for the intervention group of the matched dataset to assess whether 1) teaching mindful awareness skills, as measured by the awareness and healthy self-regulation post-test scores, predicts change in students’ test anxiety as measured by test anxiety post-test scores, and 2) the moderation of the demographic variables on the relationship between teaching mindful awareness skills and change in students’ test anxiety. In the first model, the control
variables (test anxiety, mindful awareness, and healthy self-regulation pre-test scores and age) were modeled. In the second model, the independent variables (mindful awareness, and healthy self-regulation post-test scores) were modeled. In the third model, the demographic variables (gender, SES, ESL, and special education status) were modeled. In the fourth model the interaction terms between mindful awareness and each demographic variable were included. In the fifth model, the interaction terms between self-regulation and each demographic variable were included. According to the results, all five models were statistically significant ($p < .001$) and showed good prediction of model fit with all values of multiple R closer to 1. This indicates that this regression model is best fit with the data and the precision in the prediction of the unknown population parameters based on the sample estimates of the current sample Model 1, $R = .634$, $F (4, 102) = 17.51$, $p < .001$; Model 2, $R = .697$, $F (6, 100) = 15.75$, $p < .001$; Model 3, $R = .715$, $F (11, 95) = 9.05$, $p < .001$; Model 4, $R = .726$, $F (16, 90) = 6.27$, $p < .001$; Model 5, $R = .742$, $F (21, 85) = 4.96$, $p < .001$). Table 6 shows the results of each model of the hierarchical multiple regression analysis with students’ test anxiety as the outcome variable.

Part A - To what extent does teaching mindful awareness skills to middle school students predict change in students’ level of test anxiety?

The first two models addressed the relationship between teaching mindful awareness skills and change in students’ test anxiety at post-test (see Table 6). In Model 1, control variables were entered including age and the pre-test scores for the DV (test anxiety pre-test) and IVs (awareness pre-test, self-regulation pre-test). In the first model,
only test anxiety pre-test, $\beta(107) = .57$, $t (4, 102) = 7.01$, $p < .001$, was positively, statistically significant in predicting students’ post-test test anxiety score. The first model accounted for 40.2% of the variance for students’ test anxiety post-test scores.

In the second model, the IVs, awareness and self-regulation post-test scores were entered. Based on the results, self-regulation pre-test $\beta(107) = -.29$, $t (6, 100) = -2.1$, $p < .038$ was negatively, statistically significant in predicting students’ post-test test anxiety score, while test anxiety pre-test, $\beta(107) = .49$, $t (6, 100) = 6.19$, $p < .001$ and self-regulation post-test $\beta(107) = .49$, $t (6, 100) = 3.73$, $p = .001$ were positively, statistically significant in predicting students’ post-test test anxiety score. This result indicates that healthy self-regulation post-test scores significantly predicted a slight increase in students’ level of test anxiety. The second model accounted for 48.6% of the variance for students’ test anxiety post-test scores.
Table 6: Multiple Hierarchical Regression: Test Anxiety

**Multiple Hierarchical Regression: Test Anxiety Pre-test, Awareness (CAMM) and Self-Regulation (HSR) Pre-test, Awareness (CAMM) and Self-Regulation (HSR) Post-test, Demographic Variables, and Interaction Terms Predicting Change in Test Anxiety**

<table>
<thead>
<tr>
<th>Model 1</th>
<th>B</th>
<th>T</th>
<th>R</th>
<th>SEE</th>
<th>R²</th>
<th>Sig.</th>
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<tr>
<td>Test Anxiety Pre</td>
<td>0.569</td>
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<tr>
<td>CAMM Pre</td>
<td>0.164</td>
<td>1.203</td>
<td>0.236</td>
<td>0.616</td>
<td>0.579</td>
<td>0.053</td>
</tr>
<tr>
<td>HSR Pre</td>
<td>0.132</td>
<td>1.484</td>
<td>0.104</td>
<td>0.349</td>
<td>0.141</td>
<td>0.871</td>
</tr>
<tr>
<td>11-14+</td>
<td>0.236</td>
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<td>0.096</td>
<td>0.557</td>
<td>0.579</td>
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<td>6.193</td>
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<td>9.68</td>
<td>0.486</td>
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<tr>
<td>CAMM Pre</td>
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<td>0.846</td>
<td>0.289</td>
<td>0.216</td>
<td>0.957</td>
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<td>0.054</td>
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</tr>
<tr>
<td>CAMM Post</td>
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<td>0.494</td>
<td>3.731</td>
<td>0.001</td>
<td>0.987</td>
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<tr>
<td>HSR Post</td>
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<table>
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### MINDFUL AWARENESS SKILLS IN MIDDLE SCHOOL

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<th>HSR Post</th>
<th>Test Anxiety Score Pre</th>
<th>CAMM Pre</th>
<th>HSR Pre</th>
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<td>Disability Status</td>
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<tr>
<td>CAMM_MC_African American or</td>
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<tr>
<td>ELL</td>
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</tr>
</tbody>
</table>

Note: Significant results in italics.
Part B - To what extent do characteristics of gender, race/ethnicity, SES, ESL, and disability status moderate the relationship between teaching mindful awareness skills to middle school students and change in students’ level of test anxiety?

Based on the test anxiety literature, the researcher hypothesized that girls, low-SES students, and students with disabilities would report higher levels of test anxiety than boys, Caucasian, moderate to high-SES, and students without disabilities (Segool et al., 2013; Whitaker-Sena et al., 2007). Some research points to students from minority backgrounds scoring lower on anxiety measures than students from non-minority backgrounds (von der Embse, 2012), but both pre- and post-test data in this study indicated that Asian students had the highest level of test anxiety, with Hispanic students having the lowest test anxiety scores, followed by African American students at post-test. Based on these findings, all dichotomous demographic variables were coded as above.

Models 3 through 5 of the hierarchical multiple regression were run to address the moderating effects of gender, race/ethnicity, SES, ESL, and disability status on the relationship between teaching mindful awareness skills to middle school students and change in students’ test anxiety (see Table 6). In the third step, the demographic variables were entered. In the fourth step, the interaction between awareness and the demographic variables were entered and in the final step, the interaction between self-regulation and the demographic variables were entered. Based on the results, only test anxiety pre-test $\beta(107) = .49, t (11, 95) = 5.94, p < .001$; $\beta(107) = .5, t (16, 90) = 5.79, p < .001$; $\beta(107) = .52, t (21, 85) = 5.87, p < .001$ and self-regulation post-test $\beta(107) = .47, t (11, 95) = 3.53, p = .001$; $\beta(107) = .43, t (16, 90) = 2.99, p = .004$; $\beta(107) = .48, t (21,$
85) = 2.26, $p < .026$ were positively, statistically significant in all three models in predicting students' post-test test anxiety score. None of the demographic variables significantly predicted student test anxiety. The third model accounted for 51.2% of the variance for student test anxiety. In models 4 and 5, none of the demographic variables significantly moderated the relationship between teaching mindful awareness skills to middle school students and student test anxiety post-test scores. The fourth model accounted for 52.7% of the variance for test anxiety, and the final model accounted for 55.1% of the variance for student test anxiety scores at post-test.

The Experience of Learning Mindful Awareness Skills

At the end of the survey, students in the intervention groups were asked to share their thoughts about their experience learning mindful awareness skills and, if they had used mindful awareness outside of class, how and where they used it. To include all students' voices in the data reporting, data was used from all students in the intervention group who completed the post-test and assented to having their data used in analysis ($N = 117$).
### Question 3

<table>
<thead>
<tr>
<th>Post-Test Questions</th>
<th>Measures</th>
<th>Variables</th>
<th>Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (a) Do students enjoy learning mindful awareness skills?</td>
<td>Intervention Group Student</td>
<td>Enjoyment Rating</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td></td>
<td>Survey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (b) What do students like, dislike, and/or find challenging about learning mindful</td>
<td>Intervention Group Student</td>
<td>Open-ended questions on classroom</td>
<td>Frequency Table</td>
</tr>
<tr>
<td>awareness skills?</td>
<td>Survey</td>
<td>experience</td>
<td></td>
</tr>
<tr>
<td>3 (c) If students use mindful awareness skills outside of the class, how and where</td>
<td>Intervention Group Student</td>
<td>Outside Class Use Open-ended</td>
<td>Descriptive Statistics</td>
</tr>
<tr>
<td>did they use it?</td>
<td>Survey</td>
<td>questions on use outside of class</td>
<td>Frequency Table</td>
</tr>
</tbody>
</table>

**Part A – Do students enjoy learning mindful awareness skills?**

The statement “I enjoyed learning mindful awareness skills.” included a six-point Likert-type scale with 1 = strongly agree and 6 = strongly disagree, which was reverse scored by the researcher to have higher scores correspond to higher levels of enjoyment. When analyzing results based on IVs and DVs, those students who slightly did not enjoy mindfulness had significantly more in common with those students who enjoyed learning mindful awareness skills than those who did not. Based on this observation, where appropriate the researcher categorized enjoyment into high \((n = 48)\), moderate \((n = 33)\), and low \((n = 27)\) groups with slightly agree and slightly disagree making up the moderate group. Of the 108 students who responded to the question \((M = 3.8, \text{median} = 4, \text{mode} = 6, 26\%)\), 57% responded positively to enjoying the experience of learning mindful awareness and increased to 71% when including students in the high and moderate
groups. Of the nine students who did not enter a value, two did not answer any of the feedback question, three did not use mindfulness outside of class and did not enjoy learning mindful awareness skills, and four used mindfulness outside of class and enjoyed learning the skills.

Upon closer examination of the data, it was found that in each category there were a few scores where the student’s rating of the experience and open-ended responses were incongruent. In each case the student had either indicated that 1) they enjoyed learning mindful awareness skills on the rating scale, but all of their written responses stated that they did not enjoy learning mindful awareness or 2) they did not enjoy learning mindful awareness skills on the rating scale, but all of their written responses stated that they enjoyed everything about learning mindful awareness. Since the goal was to understand the relationship between enjoyment in learning mindful awareness skills and post-test scores of mindfulness, student engagement, and test anxiety, the researcher chose to adjust the rating score to match students’ written comments for the next phase of analysis. In each case, the researcher reversed the student rating to the exact opposite choice to match the students’ written comments. Strongly agree was switched to strongly disagree, agree to disagree, and slightly agree to slightly disagree and vice versa.

To avoid researcher bias in favor of the intervention, the researcher erred on the side of students not enjoying the experience of learning mindful awareness. The score was reversed if 1) students stated that they did not like learning mindfulness or they enjoyed nothing about the experience and had selected a rating that indicated that they enjoyed the experience, even if the student indicated that they had used mindful
awareness skills outside of class or 2) if students that stated that they enjoyed learning mindfulness, there was nothing they disliked, and they had used mindfulness outside of class, but had selected a rating that indicated that they did not enjoy the experience. This resulted in a 0.1 increase in the mean and no change in median and mode (M = 3.9, median = 4, mode = 6, 27%), but allows for more accurate analysis of the DV and IV scores based on student responses to open-ended questions. Sixty-one percent responded positively to enjoying the experience of learning mindful awareness and increased to 75% when including students in the high and moderate groups.

**Descriptive statistics.** The highest mindful awareness scores at post-test were found in the three categories where students disagreed with enjoyment in learning mindfulness, followed by students who strongly agreed (n = 29) that they enjoyed learning mindfulness. The students who agreed (n = 19) or slightly agreed (n = 19) that they enjoyed learning mindfulness had awareness scores three to six points lower than students in the three categories that disagreed and those who strongly agreed that they had enjoyed learning mindfulness. In contrast to the awareness scores, those students who reported that they disagreed (n = 12) or strongly disagreed (n = 15) with enjoying learning mindfulness had the lowest self-regulation and student engagement scores. The group who slightly disagreed (n = 14) had the highest self-regulation and test anxiety scores and high student engagement scores in line with all three categories that agreed that they enjoyed learning mindfulness. There was a final group who opted not to rate their experience (n = 9). This group had among the lowest awareness scores and the lowest test anxiety, self-regulation, and student engagement scores compared to all
groups. Appendix F contains the mean differences in the IV and DV scores based on how much students enjoyed learning mindful awareness skills.

Since SEL literature indicates that interventions are particularly beneficial for more vulnerable students (Benson et al., 2004; Bronfenbrenner & Morris, 2006; Cozolino, 2013; Durlak et al., 2011; Greenberg et al., 2003; Weissberg et al., 2003), outcomes were assessed according to the demographic variables. The vast majority of students with disabilities (n = 15, 94%), students who learned English as a second or third language (n = 17, 85%), students on free or reduced lunch (n = 27, 98%), and non-Caucasian students (Asian, n = 19, 95%; African American, n = 15, 75%; Hispanic, n = 8, 83%) had highly or moderately rated their enjoyment of learning mindful awareness skills. Females were more likely to identify low enjoyment (n = 19, 31%) of learning mindful awareness skills compared to their male peers (n = 8, 17%). Among sixth grade students, 20% were in the low enjoyment group, which rose to 31% among eighth grade students, yet low enjoyment was least represented among eleven- (n = 2, 11%) and thirteen year-olds (n = 2, 14%) compared with twelve- (n = 9, 26%) and fourteen year-olds (n = 14, 34%). Appendix G contains frequency of responses based on demographic groups.

Part B – What do students like, dislike, and/or find challenging about learning mindful awareness skills?

An overwhelming majority of students gave positive responses to what they liked about learning mindfulness (n = 88) compared with students who liked nothing (n = 12), sleeping during class (n = 3), or gave no response (n = 9). The two most common
response were related to learning how to use mindful awareness to get or stay calm or relaxed ($n = 46$) and being able to use it to handle emotions or challenging situations ($n = 20$). Several students listed particular mindful practices that they liked ($n = 19$), including mindful breathing and heartfulness. Others responded that it was fun, they enjoyed learning it with their peers, or they liked everything about learning how to use mindful awareness skills.

The most common responses to what students disliked was nothing ($n = 58$) and several students answered this question by reporting that they liked everything or almost everything about learning mindful awareness skills ($n = 6$). Responses that reflect reported student dislikes about learning mindful awareness skills included everything ($n = 5$), it was boring ($n = 6$), sessions should be shorter ($n = 3$), breathing ($n = 3$), and closing my eyes ($n = 2$). The most common response to what students found challenging was nothing ($n = 39$) followed by staying focused or concentrating ($n = 25$), staying still ($n = 12$), keeping eyes closed ($n = 8$), and staying awake ($n = 5$).

**Part C - If students use mindful awareness skills outside of the class, how and where did they use them?**

Of the 112 students that responded to the question, “Did you use any mindful awareness skills?” 50% ($n = 56$) responded that they had used mindful awareness skills outside of the class. Students responded that they used it at home ($n = 34$, 29%), in school or school related activities ($n = 21$, 18%) particularly around testing ($n = 15$, 13%), in extracurricular activities and competition ($n = 10$, 9%), to calm oneself down and deal with stress ($n = 20$, 17%), in managing relationships, challenging emotions, or situations
(\(n = 24, 21\%\)), and in bed, waking up, or going to sleep (\(n = 10, 9\%\)). They also reported specific mindfulness practices (\(n = 36, 31\%\)) including mindful breathing (\(n = 17\)) and heartfulness (\(n = 6\)). Percentages do not equal 100%, since several students listed multiple ways they had used mindfulness outside of their health classroom.

**Chapter Summary**

In this chapter, I showed that of the two mindfulness variables, scores on the HSR had a statistically significant predictive relationship with both student engagement and test anxiety and a strong correlation between post-test scores. Though scores on the CAMM had a statistically significant relationship with student engagement in certain models, that relationship was much less clear. For student engagement, the interaction between special education status and CAMM score moderated the relationship between mindful awareness and student engagement, as did the interaction between minority status for African American and Hispanic students and HSR score. For test anxiety, none of the five demographic variables moderated the relationship between mindful awareness and test anxiety.

The vast majority of students moderately to highly enjoyed learning mindful awareness skills and half of the students applied them outside of class. Reviewing the results of the IVs and DVs by level of enjoyment revealed a significant majority enjoyed learning mindful awareness skills, students with the lowest enjoyment had the highest awareness and lowest self-regulation and student engagement scores, and those who slightly disliked learning mindful awareness skills had the highest test anxiety and among
the highest awareness, self-regulation, and student engagement scores. Implications of the results of the study will be discussed in the following chapter.
Chapter Five

Introduction

Through the lens of Interpersonal Neurobiology and Positive Youth Development, my study employed an integrative approach to adolescent development and thriving in school by incorporating the teaching of mindful awareness skills into classroom practice. The goal was to explore the relationship between teaching mindful awareness skills to middle school students and both test anxiety and student engagement, using a universal preventative intervention within a regular classroom setting. Additionally, the moderating effects of student gender, race and ethnicity, SES, learning English as a second language, and disability status on the relationship between teaching mindful awareness skills and change in 1) students’ engagement with school and 2) students’ test anxiety were examined to assess whether a universal intervention supports greater growth for more vulnerable student groups. This chapter summarizes the results of my study, including significant and non-significant findings, and discusses implications for practice, the delimitations and limitations of the study, and recommendations for future research.

Discussion

Mindful Awareness

The scant research on mindfulness and youth has found that some aspects of adult mindfulness measures may not be developmentally appropriate for adolescents or may be interpreted differently by adolescents than adults (Greco et al., 2011; Grossman, 2011; West 2008). To address this issue, my study employed two measures designed for adolescents that measure aspects of mindfulness from two different perspectives. The
CAMM measures present moment awareness and non-judgmental acceptance of thoughts and feelings (Greco et al., 2011), while the HSR measures self-regulation that appears to change in response to mindfulness interventions (West 2008). In the present study, the HSR was more highly correlated with, and the only consistent predictor of, both test anxiety and student engagement scores. It appears that awareness has a connection to student engagement although its role was less clear in my study. When reviewing the sample as a whole, post-test scores negatively predicted student engagement and when considering the effects of moderation, pre-test scores positively predicted student engagement.

**Awareness.** The connection between mindful awareness and the DVs in this study is perplexing. Mindful awareness was significantly correlated with test anxiety, yet it was not a predictor of test anxiety. Awareness was not correlated with student engagement, yet it predicted student engagement in some steps. Post-test scores negatively predicted engagement as a whole and as a moderator with disability status, while pre-test score positively predicted engagement when considering moderation for the whole. There are few other pre-/post-test mindfulness studies of youth. One randomized control trial (RCT) of pre-adolescent students assessing the MindUp curriculum found significant pre- to post-test growth in mindfulness during a 12-week intervention that included one weekly lesson and three three-minute mindfulness practices each day (Schonert-Reichl et al., 2015). Another RCT of sixth grade students found that a six-week mindfulness training did not increase mindful awareness scores (Britton, Lepp, Halsey, Tomas, Fisher, & Gold, 2014). In my study, CAMM scores were
virtually unchanged from pre- to post-test for the group as a whole and all changes by demographic group were insignificant.

Most researchers simply measured mindfulness among adolescents rather than assessing an intervention. Research among college students found that mindfulness scores did not differ between novice meditators and those who did not practice mindfulness (MacKillop & Anderson, 2007). De Bruin, Zijlstra, and Bogels (2014) found that mindfulness scores actually might be lower for adolescents who practice meditation or yoga. In the current study, the 11 students who reported practicing some type of mindfulness or yoga at pre-test showed slightly higher, but non-significant, mindfulness scores as compared to that of their peers. While the intervention decreased cognitive obstruction (a construct opposite of being mindful), mindfulness scores showed no difference from pre- to post-test. Finally, students who enjoyed learning mindfulness and were more likely to use it outside of class had substantially lower awareness scores and higher self-regulation scores than those who most disliked learning mindfulness.

The results of this study add to a growing body of research that has not found a direct relationship between mindfulness measures and mindfulness practice among adolescents. The connection between the measurement of mindfulness and mindfulness scores has been the subject of recent debate. Paul Grossman (2011) suggests that self-report items on a measure of mindfulness may be subject to different interpretation, based on semantics or experience with mindfulness. Since mindlessness is not a felt experience (Langer, 2000), individuals might consider themselves attentive or aware until they
experience mindfulness and then become aware of their lack of attention or mindfulness (De Bruin et al., 2014).

In the few existing studies to validate the CAMM, the racial makeup of the samples were overwhelmingly Caucasian (Cuhna & Paiva, 2012; De Bruin et al., 2014; Greco et al., 2011). This is the first study using the CAMM that included an ethnically and racially diverse population. The students in the current study, as a whole and by grade level, scored lower on mindful awareness than students in one study (De Bruin et al., 2014), but higher than the students in the other two studies (Cuhna & Paiva, 2012; Greco et al., 2011). Two of these studies were conducted in Europe; in each case, boys had significantly higher mindfulness scores. In this study and the original study, which was conducted in Tennessee, scores between boys and girls were not significantly different (Cuhna & Paiva, 2012; Greco et al., 2011). The one study where students scored higher on mindfulness than those in the current study was conducted the Netherlands. The researchers hypothesized that scores may have been higher in the Dutch sample due to a culture that tends to be more open-minded, accepting, and less judgmental (De Bruin et al., 2014). While there is no way of assessing the openness of the other comparison groups, the school in this study became a national School of Character in 2016. Goals of this program include creating an environment of caring, civility, and social emotional learning, which would promote a more open-minded, accepting, and less judgmental mindset (Character.org, 2016), which may have contributed to a higher awareness score at baseline for both the intervention and control groups.
**Self-regulation.** At pre- and post-test, higher HSR scores positively predicted both higher student engagement and higher test anxiety. While not statistically significant as a whole, students’ self-regulation scores increased by half a point from pre- to post-test. Post-test score was a strong predictor of both test anxiety and student engagement. The largest decrease in self-regulation scores was, by age, for eleven-year-olds and thirteen-year-olds. Since post-testing occurred in June, the eleven year-old and thirteen-year-old students would have been the youngest students in sixth or eighth grade respectively, which may suggest a maturation difference. There were also a few thirteen year-old students in sixth grade, which would suggest that those students either started school late or were retained.

There are no standardized scores for the Healthy Self-Regulation scale to which to compare results of this study. Students in the current study scored approximately 10 points higher than the adolescent students in a study assessing mindfulness measures conducted in Michigan (West, 2008). Their self-regulation scores were four to six points higher at pre-test and one to two points higher at post-test than students in an intensive mindfulness study at a youth detention center (Barnert et al., 2013; Himelstein, Hastings, Shapiro, & Heery, 2011). The available data suggests that the students in this study started with higher than average self-regulation scores and that in the five weeks of the study small, non-significant gains were made. This suggests three possible interpretations: 1) a more intensive intervention produces greater results, 2) a longer time between pre- and post-test may increase the development of self-regulation, and 3) if self-regulation scores are already high, there is less room for growth.
Student Engagement

The results of this study indicate that learning mindful awareness skills predicts student engagement, with self-regulation positively predicting and awareness negatively predicting outcomes for the sample as a whole. Yet, in moderation, the awareness pre-test score became a positive predictor for the sample as a whole, but post-test score interacted with disability status as a negative moderator of the relationship between learning mindful awareness skills and student engagement. As in previous student engagement research, this study affirmed that student engagement declined with age. At the end of the intervention, which coincided with the end of the school year, student engagement scores as a whole had dropped slightly as well. Most of the decrease in student engagement scores could be attributed to decreased productivity scores at the subscale level across the intervention group as a whole. This makes sense as students’ motivation and attention often fade towards the end of the school year (Skinner, Furrer, Marchand, & Kindermann, 2008).

The only exceptions were among students with disabilities and African American students, who had significant increases in student engagement scores as a whole and in productivity in particular. Students with disabilities also showed significant aspirational growth. Both groups had the lowest engagement scores at pre-test. This finding appears to support the claim that integrating SEL interventions into regular classroom activities can provide greater gains for the most vulnerable students (Diamond, 2012; Durlak et al., 2011). In contrast, Hispanic students showed a significant decline in belonging. Asian students, who had the highest engagement score of any demographic group at both pre-
and post-test, had moderate decreases in all three of the engagement subscales at post-test. It will be important to explore if environmental factors contribute to the decreases in student engagement that were experienced by Hispanic and Asian students at post-test. Due to the smaller sample sizes for students with disabilities and Hispanic students, significant results for these demographic categories should be interpreted with caution.

Since the Student School Engagement Measure is a relatively new scale, there are no standardized scores to compare with the results of the current study. A pilot study of the SSEM identified outcomes from three urban middle schools (n = 398) with mostly Hispanic student populations (Vazirabadi, 2010). Students in the current study scored higher on each of the subscales (Productivity, Aspirations, and Belonging) compared to each of the schools identified in the published research. Students in the current study appear to have relatively high student engagement, with particularly high aspiration scores, which again could be related to the school’s effort to build a more caring, civil environment.

**Test Anxiety**

The results of this study suggest a relatively high level of test anxiety among students based on the scoring criteria for the test anxiety measure. Perhaps the timing of testing for this study impacted test anxiety scores, since pre-testing for most students occurred one day after completing state-mandated standardized exams and post-testing occurred within a week of final exams. There is evidence that anxiety goes up before a high-stakes test, peaks approximately two days before and then begins to decrease during and after the exam (von der Embse, 2012). Some mindfulness research suggests that
anxiety may go up when beginning to apply mindfulness, since becoming mindful may focus attention on noticing bodily sensations, thoughts, and emotions (Siegel, 2010b). Both of these circumstances may have contributed to high test anxiety scores for participants in this study.

Throughout the literature, there is a positive relationship between test anxiety and girls, low-SES students, and students with disabilities (Lowe & Lee, 2008; Lowe et al., 2008; Segool et al., 2013; von der Embse et al., 2013; von der Embse & Hasson, 2012; Whitaker-Sena et al., 2007; Zeidner, 1990). Results regarding race and ethnicity have been contradictory, with Caucasians scoring higher in some studies and lower in others (von der Embse, 2012). This study adds another contradictory result, finding that Hispanic and African American students scored lower on test anxiety than Caucasian and Asian students, with Asian students having the highest test anxiety levels. There was no difference between male and female students at pre-test, with males having higher test anxiety at post-test.

The results of this study indicate that learning mindful awareness skills predicts test anxiety, with the post-test self-regulation score being a particularly positive predictor. While this might seem counterintuitive, results at the subscale level provide a more nuanced interpretation. From pre- to post-test, physical tenseness (PT) increased among all groups, except African American students, who became less tense. Though PT increased, cognitive obstruction (CO) decreased, especially for thirteen-year-old students, girls, and Hispanic students. Again, due to the small sample sizes for Hispanic students results should be interpreted with caution. Significant decreases found on the cognitive
obstruction subscale may be relevant from a neurobiological standpoint. Recent research indicates that cognitive obstruction, including rumination and mind wandering, depletes available working memory and disrupts the ability for organization of thoughts and on-task behaviors (Mrazek et al., 2013). Cognitive processes have been found to have a greater negative impact on test performance than physiological symptoms (von der Embse, 2012). In this study, some mindful awareness lessons taught students to observe and accept their bodily sensations and emotions and then soften or release them. It seems logical that learning a vocabulary around and taking notice of tenseness would lead to noticing and reporting more tenseness. The findings suggest, especially for girls, that while physical tenseness scores grew, better cognitive processing may allow students to notice tenseness in the present moment and mindfully choose strategies to reduce it. Many students who reported using mindful awareness skills outside of their health classes identified using it to calm themselves down, manage stressful situations, or specifically using them in testing situations.

There was an unexpected correlation between mindfulness and test anxiety. In this study, both awareness and self-regulation had significant positive correlations with test anxiety. This is contrary to other studies that found negative correlations (Cunha & Paiva, 2012; Marks, Sobanski, & Hines, 2010; Schnell et al., 2015; West 2008). Recent studies conducted with university students or high school students showed that dispositional mindfulness predicted lower social and test anxiety and greater ability to focus attention and filter out distractions (Bellinger et al., 2015; Cunha & Paiva, 2012; Mrazek et al., 2013). These studies were conducted with students who were in late
adolescence. Test anxiety tends to peak in mid-adolescence (von der Embse et al., 2013). Developmental research also indicates that in early adolescence, youth have cognitive ability equal to adults, but often lack the emotional regulation, especially in stressful situations, to make effective decisions (Davidson et al., 2012). These differences may be borne out in this study. Cognitive obstruction was found to be significantly lower among thirteen-year-olds than eleven- and twelve-year-olds, which could point to a developmental cognitive shift that occurs around age thirteen. De Bruin and colleagues (2014) found differences in how mindfulness was perceived between 10-12 year olds and 13-16 year olds, which may point to a developmental shift in cognition around age 13. Perhaps among early adolescent students, the structural brain changes that support cognitive control over emotions are not yet fully developed.

Reviewing the data on how much students enjoyed learning mindfulness also gave some insight into these results. Those with high awareness scores also tended to have higher test-anxiety. The group with high awareness and highest self-regulation score also had the highest test anxiety score (3 points over the next closest group). Perhaps middle school students who are highly aware and have a high level of self-regulation are more prone to worry and stress, and, by extension, test anxiety. Alternately, since physical tenseness was the primary contributor to the increase in test anxiety, while cognitive obstruction declined and self-regulation increased, it is possible that as students became more aware of their bodily sensations, they also gained control over managing them. Mindfulness practices have been shown to facilitate the capacity
for tolerance without reactivity to challenging physical and emotional states (Black, 2015; Davidson et al., 2012).

The Experience of Learning Mindfulness

Overwhelmingly students enjoyed learning mindful awareness skills, especially among students on free and reduced lunch, students with disabilities, students who learned English as a second language, and students identified as a racial or ethnic minority. From an SEL perspective, the fact that students who tend to be most affected by test anxiety and disengagement enjoyed learning mindful awareness skills suggests that it may be a useful tool to support vulnerable students. Based on its positive reception and that mindfulness supports healthy brain functioning, teaching these skills universally seems appropriate.

There are two particularly interesting outcomes of the study based on enjoyment. First, the students who most disliked learning mindful awareness skills had the lowest scores on self-regulation and student engagement, but the highest scores on mindful awareness. Yet the group who slightly disliked the intervention had the highest scores on self-regulation and test anxiety (by three points) and among the highest scores on awareness and student engagement. Based on scores, this group was most similar to the students with the highest rating of enjoyment. Both groups had high scores on all four of the IVs and DVs. It appears that these students would benefit from a targeted intervention to reduce test anxiety. The two other groups that positively rated their experience learning mindfulness had high self-regulation and student engagement scores, but also had the lowest awareness scores of all groups. These findings seem to indicate 1) that
there is a connection between low engagement, low self-regulation and high awareness scores and 2) low mindfulness scores are not necessarily an indication that a mindfulness intervention was not beneficial. To Grossman’s (2011) point, there may be a need for further investigation of how mindfulness measures are interpreted by adolescents or if what is measured accurately reflects what is gained through mindfulness practice.

**Implications for Practice**

Results from my study have several important implications for school counselors and the counselor educators who train them, for administrators and teachers looking to implement MBSEL programs, and for future research. The results address a dearth in mindfulness literature regarding youth and a gap in research between pre-adolescence and later adolescence. The study found that learning mindful awareness skills predicted both student engagement and test anxiety. Cognitive obstruction decreased, which allows for increased on-task behavior and effective use of working memory. It also found that results were greater for some students who tend to be more vulnerable to disengagement and to test anxiety, affirming a key premise of social emotional learning (Durlak et al., 2012). Integrating mindfulness interventions into classrooms has the potential to support healthy brain development for all students while creating an opportunity to change a negative trajectory for vulnerable students. This can be particularly important during middle school, when engagement tends to wane (Yazzie-Mintz &McCormick, 2012), test anxiety continues to rise (Segool et al, 2013), and the onset of anxiety and depression becomes prevalent (Merikangas et al., 2010). To the researcher’s knowledge, this is the first study to specifically explore the relationship between learning mindful awareness
skills and student engagement. It affirms what teachers have already known, student engagement dropped at the end of the year, particularly productivity. Yet this outcome was not universal. Student engagement increased among students with disabilities and African American students. Finally, this study found that learning mindful awareness skills was overwhelmingly well received by students, with half of students using these skills outside of class and applying what they learned to manage challenging situations in their lives.

**Recommendations for School Counselors**

Particularly in school settings, counselors are combining paradigms of counseling, prevention, and social emotional learning to aid students in successfully building the mindsets and behaviors necessary to meet academic and developmental challenges (ASCA, 2014). School counselors have the requisite skills, and should have a crucial role in assessing school needs, developing program focus, as well as program delivery and evaluation (Stone & Dahir, 2016). They can be leaders in preventing disengagement, since they serve an integral role in assessing student motivation, engagement, and barriers to their academic success and well-being. Though often not specifically trained to assess test anxiety, school counselors can start a dialogue about the importance of test anxiety as a factor in test performance that shifts focus away from purely basic skills remediation. With estimates as high as 40% of students experiencing some level of test anxiety (Cizak & Burg, 2006), school counselors can champion efforts to assess for test anxiety and facilitate interventions that range from individual to classroom and school-wide
School counselors are skilled in teaching students strategies that can promote both academic success and the “non-cognitive” skills that students need to be successful in school and in life. These social emotional skills are increasingly including aspects of mindfulness because it promotes self-awareness, emotional self-regulation, mental flexibility, attuned communication, and prosocial behavior (Siegel, 2010a). Most people require some type of formal training to develop the potential for mindful awareness (Roeser & Peck, 2009). This study found that learning mindful awareness skills lowered cognitive obstruction for girls, supported student engagement among students with disabilities, and was enjoyed, especially by students with disabilities, students who learned English as a second language, low SES students, and students identified as a minority. Some schools have instituted using mindfulness to reduce problem behaviors and increase prosocial behaviors with good results (Khorsandi, 2016). School counselors can teach these skills to students in their offices and in classrooms. They can work with colleagues and administrators to integrate mindful practices into classrooms and the school community. Even small doses of mindfulness have been shown to be effective (Sanger & Dorjee, 2015), but opportunities for repetition throughout the day support greater growth (Schonert-Reichl et al., 2015; The Hawn Foundation, 2011), which suggests that school-wide initiatives would have the greatest impact.

School counselors are often not trained in mindfulness, but are likely to be applying aspects of mindfulness in the interventions that they currently use with students.
(Shoemaker, in preparation). A growing body of research suggests that mindfulness-based interventions are important in supporting the healthy social, emotional, and cognitive development of students (Brensilver, 2016; Lantieri & Zakrzewski, 2015), which is a key role of school counselors.

Learning the how and why of teaching and applying mindfulness skills in educational settings is becoming vital. While it is recommended that school counselors start by learning and using mindfulness themselves, they do not need to be experts to teach students basic practices. There are effective curricula focused specifically on teaching mindfulness skills to students, such as MindUp, Learning to Breathe, and Mindful Schools, as well as an abundance of free, web-based resources. In many schools, there are teachers currently using mindfulness practices with their students with whom school counselors can collaborate. Incorporating mindful awareness into social emotional learning could be supported through professional learning communities. School counselors have an important role in effectively integrating mindful practices into the school community.

**Recommendations for Counselor Educators**

In order to practice within their scope of knowledge, counselors must be trained. A recent study of school counselors in a mid-Atlantic state found that only 13% of school counseling professionals (25% of those who graduated in the last 3 years) reported receiving mindfulness training in their counselor education program (Shoemaker, in preparation). While CACREP (2016) standards do not address mindfulness specifically, the integration of neuroscience research into counselor education curricula is addressed
(Standards 2.F.3.e). As research mounts on the effectiveness of mindfulness-based interventions in clinical and educational settings, counselor education programs need to infuse mindfulness training into counseling curriculum. Stauffer and Pehrsson (2012) have proposed sixteen mindfulness competencies to prepare counselors for teaching mindfulness to clients. Reilly (2016) makes a case for mindfulness infusion through CACREP standards in counselor education programs.

Infusion of mindfulness (and the neuroscience research that explains it) is important for counselor educators for four reasons: 1) to train the next generation of counselors to be prepared to use these research-based interventions to support client and student wellness and growth; 2) to support counseling students’ enhanced development of cognitive functioning, emotional self-regulation, attuned communication, cultural competency necessary to become effective counselors; 3) to inoculate students from compassion fatigue by incorporating mindfulness practice in exploration and practice self-care routines; and 4) to prepare counselors-in-training to embrace continual learning and skills development in their graduate programs and post-graduation to accommodate the rapid pace of neurobiological and mindfulness findings that alter understanding and best practices in the counseling field. Understanding healthy brain functioning can de-stigmatize brain-based symptoms, create impetus for change, and impact best practices in choice of interventions (Badenoch & Cox, 2010; Ivey & Zalaquett, 2011; Montgomery, 2013; Siegel, 2010). Infusing mindfulness practices into curriculum, counselor educators provide opportunities for students to experience and reflect on the practices to build the skills and confidence necessary to teach them to their clients. Teaching mindfulness has
shown promising results in developing empathy, attunement, and counseling skills (Buser, Buser, Peterson, & Seraydarian, 2012; Campbell & Christopher, 2012; Fulton & Cashwell, 2015; Schomaker & Ricard, 2015), in tolerating ambiguity and managing emotional issues related to counselor development (Bohecker, Wathen, Wells, Salazar, & Vereen, 2014), and in developing multicultural competency (Ivers, Johnson, Clarke, Newsome, & Berry, 2014). Mindfulness practices also support anxiety management and self-compassion, which promote both client growth and key aspects of CIT self-care (Christopher & Maris, 2010; Felton, Coates, & Christopher, 2015; Reilly, 2016).

This study examined the relationship between learning mindfulness and both student engagement and test anxiety. School counselors often become experts in learning to engage students, but test anxiety is less examined, though it affects both academic success and the biopsychosocial well-being of students. Test anxiety often continues to affect students in postsecondary settings, including in counseling programs. Exploring test anxiety and ways to intervene in assessment courses can support counseling students’ personal development, while providing training that supports their professional development. Understanding the underlying mechanisms of and interventions for test anxiety are valuable assets for counseling students who want to work in schools, with children and adolescents, or in career counseling.

**Recommendations for Implementation in Schools**

The three most poignant findings of this study were: 1) further affirmation that universal preventative interventions support student achievement and healthy development in a way that narrows the skills gap for vulnerable students, 2) many
students reported that they enjoyed learning mindful awareness, and 3) learning mindful awareness skills decreases cognitive obstruction, which is a factor in poor test performance, suggesting that addressing test anxiety in school may positively impact test results. Each of these have implications for schools as an educational shift appears to be occurring away from purely academic goals to those that encompass a more holistic view of education (U.S. Department of Education, 2014). Paradigm shifts require time to thoughtfully process (Dahir & Stone, 2007) and plan for successfully implementing change (Fixsen Blasé, Naoom, & Duda, 2015). This section identifies some areas for consideration for those interested in incorporating findings into their school curriculum.

Since NCLB, many schools have been laser focused on increasing test scores, with a major focus on remediation for those who do not meet proficiency criteria and skill and drill practice for all students as testing dates approach. These programs are often marginally effective and can come at a high price to students’ sense of self-efficacy, motivation, and engagement with school (Broderick & Jennings, 2012; Rollins, 2014; Taylor, 2014). The high-stakes nature of these exams brings about a biopsychosocial state that limits students’ ability to effectively use their knowledge and reasoning skills. In this state, as much as 40% of time is spent on worry, mind wandering, and off-task thoughts, depleting working memory available for organizing thoughts and problem solving (Mrazek et al., 2013; Whitaker-Sena et al., 2007; Zeidner, 1998). This may explain why remediation may be ineffective. Learning mindful awareness creates a cognitive shift that can decrease these off-task behaviors (Bellinger et al., 2015) and may
be enjoyable for students. Enjoyable activities in school tend to support engagement (Taylor, 2014).

Interventions that address test anxiety also positively impact self-efficacy and student engagement (Breso et al., 2011). With an estimate of about a third of all students experiencing some form of test anxiety (Segool et al., 2013) and test anxiety impacting test scores up to 15% (von der Embse & Hasson, 2012), schools would be wise to incorporate test anxiety interventions into their efforts. In the present study, teaching mindful awareness skills lowered cognitive obstruction for most students and significantly for girls and thirteen year-olds. Half of the participants reported using mindfulness skills outside of the class in which it was taught, using it to manage stressful situations, including test anxiety. Assessing test anxiety and incorporating mindfulness practices in remediation programs may support student success on tests and reduce their anxiety.

Mindfulness-based social emotional learning (MSBEL) interventions show potential for strengthening brain functions that support self-regulation, motivation, prosocial behavior, cognitive clarity, and emotional stability that underlie student engagement with school and can decrease test anxiety (Davidson et al., 2012; Diamond, 2012). The U.S. Department of Education’s (2014) Guiding Principles: A Resource Guide for Improving School Climate and Discipline encourages strategic integration of SEL in schools to promote self-awareness, self-management, social awareness, relationship skills, resilience, and responsible decision-making. These are outcomes of mindfulness practice (Siegel, 2010a). Integrating MBSEL into schools has the potential to dramatically shift students’ experience of school and themselves as learners. As the
school community supports both educational and developmental success, they set a healthy trajectory into adulthood and throughout life (Cozzolino, 2013).

While learning how to practice mindfulness is not difficult, it will require a paradigm shift for many faculty members. Many evidence-based practices have failed at the implementation stage, because readiness for change was not considered (Fixsen, Blasé, Horner, & Sugai, 2009). New paradigms require a thoughtful process for rethinking and reframing (Dahir & Stone, 2007), as well as a plan that addresses the what, who, how, and when of implementing change (Fixsen et al., 2015). There are many ways to effectively integrate MBSEL into the school community, using outside organizations, education-based curriculums, to smartphone applications, although recent findings show that the most successful programs were teacher-led (Waters et al., 2015). Addressing the needs and concerns of those expected to implement curriculum with students can ensure better outcomes. While beyond the scope of this study, there are many excellent resources from within the field of implementation science that can support successful implementation of MBSEL program in a systematic, thoughtful way. A good place to start is with Fixsen and colleagues’ (2015) Implementation Drivers: Assessing Best Practices.

**Recommendations for Future Research**

Assessing lasting change requires more elapsed time after completion of the intervention. Yeo and colleagues (2016) found that a test anxiety intervention showed a significant decline at post-test, but a significantly greater decline two months later. The current study is among the first to assess the relationship between mindfulness and
middle school students, who are early adolescents. Results indicated that awareness
remained virtually unchanged and physical tenseness increased, raising test anxiety. Yet
cognitive obstruction decreased. Perhaps becoming mindful leads to more thoughtful
analysis. It also seems plausible that tenseness scores might increase immediately after
experiencing a mindfulness intervention, due to greater awareness of inattention and
physical sensations, and decrease with practice (Siegel, 2010b). The opportunity for a
time series of post-tests would allow researchers to assess whether there is continued
growth or change over time beyond completion of the intervention. Further research
replicating this study during the middle of the school year, when there is a more stable
routine, and using a multi-school sample, would strengthen the generalizability of results.
Based on promising results and small sample sizes, replicating this study with a larger
sample of students with disabilities and/or greater racial and ethnic diversity would be
important.

Including grades or some measure of academic achievement would allow for
assessments of results based on academic achievement. This would be beneficial for
three reasons: 1) grades can be used as a measure of academic engagement (Vizarabadi,
2010), 2) interventions can be developed that target particular academic challenges, and
3) there is some research that indicates that test anxiety is more prevalent for
academically average students (Yeo et al., 2016). Along these lines, there is research that
indicates that test anxiety is more prevalent among middle SES students (Cuhna & Paiva,
2012). This data may be harder to obtain, since income level is not typically included in
student databases, but understanding its impact would be valuable.
Further research into the relationship between mindful awareness skills and test anxiety may allow more targeted interventions that can improve students’ academic experience and remediation programs often mandated for those who score poorly on state tests. Since an early outcome of mindfulness practice appears to be greater cognitive control (Bostic et al., 2015; Grecucci et al., 2015; Hilt & Pollak, 2012), adding a neuroscientific or physiological measure may further illuminate the relationship. This may be particularly beneficial, since this study found less cognitive obstruction and more physical tenseness. Since all results were based on self-reported perception, there is a possibility that students became more aware of physical sensations, which led to higher report, rather than actually experiencing more tenseness.

Since there is some question about whether mindfulness assessments accurately measure mindfulness, especially among adolescents, Grossman (2011) recommends measuring constructs that are more clearly understood and changed by mindfulness rather than mindfulness itself. Since much of the validation of mindfulness measures have not assessed change in mindfulness after an intervention, it may be prudent to at least incorporate additional assessment measures along with mindfulness measures to continue to expand the base of knowledge.

Finally, based on the newness of research on mindfulness and adolescent students and the newness of the instruments used test anxiety and student engagement, the instruments have only limited testing of validity and reliability and there are no established normed scores. Identifying average, adequate or high, medium or low levels
of awareness, self-regulation, engagement, or test anxiety would render these instruments more meaningful, and thus useful.

**Delimitations and Limitations**

The findings of this study suggest meaningful implications for school counselors, school administrators, counselor educators, and researchers, however, there are a number of delimitations and limitations that should be considered when interpreting results.

**Delimitations**

The three key considerations that contributed to the delimitations of this research design were choosing a mindfulness curriculum as opposed to a MBSEL curriculum, working within the framework of schools, and the timing of the study. While there are similarities between SEL curricula and mindfulness-based curricula, this study focuses specifically on mindfulness practices. Working within school communities creates parameters based on the environment and culture of the school itself, and the ability to obtain consent to conduct the study from various levels of school administration, from teachers whose classrooms would be impacted, and from students’ parents or guardians to gather data from their children. Finally, timing of the study is impacted by class periods, marking periods, school holidays, and other cyclical and individually scheduled events.

**Mindfulness curriculum.** As a prevention specialist, the research has taught several SEL curricula, as well as mindfulness practices to middle school students. A conscious decision was made to choose a mindfulness intervention rather than a broader MBSEL program. While mindfulness interventions and SEL show promise as
complementary processes with overlapping beneficial outcomes (Brensilver, 2016; Diamond, 2010; Davidson, 2012; Lantieri & Zakrzewski, 2015; Schonert-Reichl et al., 2015), a concern with using a program that combined both mindfulness and SEL was isolating each of the constructs to gain insight into which components of the curriculum were responsible for change related to the intervention. Choosing a mindfulness-focused curriculum eliminated the need to isolate social, relational, and decision-making constructs, since they are not specifically taught in the curriculum. Rather, mindfulness programs view these as innate capacities that emerge through experiences of self-compassion, empathy, and kindness (Lantieri & Zakrzewski, 2015). It was hypothesized that the development of awareness, attentional control, and emotional regulation could be assessed through mindfulness measures.

School environment. From a prevention perspective, employing a universal intervention was preferable to pullout groups. Even when interventions are positive in nature, students who are selected for pullout groups can question why they have been targeted. Universal interventions tend to be cost effective and support for students who may have unidentified risk factors, in this case for test anxiety or disengagement. To carry out a universal intervention, health classes were the logical place to conduct this study, since there are commonalities among New Jersey Department of Education curriculum standards in health (NJCCCS, 2014) and mindful awareness practices. In fact, Mindful Schools associates the attentional training of mindfulness practice with developing ‘muscle memory’ in physical exercise. In mindfulness, it is more important to engage in the practice than to cognitively understand it (Brensilver, 2016).
Creating a true experiment in a school setting is extremely challenging because using random selection of students in a multi-week intervention study is very disruptive to the day-to-day operation of a school. The use of cluster sampling, where entire classroom groups are used, is common in educational research (Wang & Fan, 1997) because administrators create these groupings each year with a goal of creating blended, effective, functioning learning environments, as well as for convenience. Since the assignment of students to particular class sections tends to be a deliberate process based on academic, behavioral, and scheduling considerations, threats to validity such as the cohort effect can be introduced. To implement the most rigorous research design possible within the limitations of the school environment, a quasi-experimental pre-/post-test, correlational research design with a control group was adopted. This allowed for the comparison of groups before introducing the intervention, which showed no significant differences between the intervention and control groups at pre-test.

Another way to strengthen the research design would have been to research students in multiple schools. This option was considered. A prospectus was developed and sent with a cover letter to all school superintendents through the county prevention agency, which has a working relationship with the schools. The only district that responded was a district that the researcher had provided prevention services to several years before. The Student Assistance Counselor (SAC) had continued to invite the researcher to join in or present at prevention and character education activities. It was the SAC who championed the research and solicited buy-in from the school principal. It was the principal who championed the research and solicited buy-in from the superintendent.
of schools. Based on the size and diverse demographic makeup of the school and the ability to work with both sixth and eighth grade students, a decision was made to research one school, thus limiting the diversity of the sample and generalizability of results.

**Timing of the study.** Ideally the study would have taken place in the third marking period (usually late-January through March), since students are settled into their classes and there are few scheduled breaks. Due to timing challenges, the principal and I agreed that the study would begin in fourth marking period after state testing. Students attend health class for one marking period, approximately eight weeks was the outer bound of the study. Based on the state’s testing schedule, the intervention was scaled back to include one half-hour lesson and nine fifteen-minute lessons. It was administered to the intervention group over six weeks, while the control group had moved on to physical education class. The Mindful Schools curriculum is designed to allow flexibility in the choice of lessons employed. After an issue with state testing delayed the conclusion of testing and the need to reschedule computer labs, the intervention group actually received a total of nine lessons (2 ½ hours) over five weeks. Recent research indicates that even short bursts of learning mindfulness can be beneficial (Sanger & Dorjee, 2015), which informed the decision to work within the additional time constraints. However, the shorter timeframe and positioning of the intervention between high-stakes testing events may have impacted the results of the study.

**Limitations**

The greatest limitation turned out to be the timing of the study, as discussed in chapter 4. The last marking period of the school year is not optimal for conducting
research in schools, due to the high prevalence of state-mandated testing, end of the year events, and a decrease in student engagement that often occurs as the school year comes to an end.

Based on length of the survey (66 items), it is possible that items near the end of the instrument were answered with less thought once fatigue and/or boredom set in. Since less engaged students may consider the survey a burden, it is possible that students with high levels of engagement answered the assessment items more accurately. Less engaged students are more likely to be absent (Vazirabadi, 2010). Students absent at pre- or post-test were not included in the study, since they did not have test data that could be matched together. Therefore, the sample may be biased towards students that were less likely to be absent.

Based on a heightened sensitivity to negative emotions and a negativity bias that is particularly prevalent in adolescents (Hanson, 2015; Siegel, 2013), negatively worded items, such as some of the instruments in this study contained, may elicit a strong emotional response (Grossman, 2011). The ability to choose a zero may have been appealing to some less engaged or mischievous students. The reversed scoring then turns a choice to show disinterest into a high mindfulness score. The questionnaire was administered online. To avoid false responses, students were allowed to skip items they preferred not to answer, responses were allowed to be left blank, but there was no way to assess whether they were left blank on purpose. Opting to use a “skip” or “no answer” choice would have allowed students to purposefully choose not to respond to an item but
would have allowed for a forced response. Though the rate of missing data was very low, this would have eliminated all unanswered questions.

Some survey words were challenging for some students, especially for sixth graders. Several students asked to have the word “perceived” explained. A surprising issue arose in response to the demographic question on race/ethnicity. Some students asked what the question meant and a few insisted that they were just American. Four students identified themselves as Native American although there were no students in the sample identified as such, by their school demographic information. It appears that for some middle school students, their perception of race and ethnicity is not aligned with demographic norms used in survey research.

Conclusion

This study examined the relationship between teaching mindful awareness skills to middle school students and both student engagement and test anxiety. Additionally, this study investigated the demographic characteristics of gender, race/ethnicity, SES, ESL, and disability status as moderating variables on the relationship between teaching mindful awareness skills to and change in student engagement and/or test anxiety. Results demonstrated that learning mindful awareness skills, particularly aspects of self-regulation, predicted both student engagement and test anxiety. At the demographic level, learning mindful awareness skills had the greatest gains in student engagement for African American students and students with disabilities and the greatest impact on test anxiety for girls and thirteen year-old students. An important finding at the subscale level, one that warrants further investigation, is the overall increase in physical tenseness
while cognitive obstruction declined. Since cognitive obstruction is more likely to negatively affect test performance than physical tenseness and has also been linked to rumination and worry, learning mindful awareness skills may support better test performance and enhance emotional and cognitive functioning, which are key to academic success and a healthy trajectory into adulthood.
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Appendix A

Pre/Post-test Assessment

Pre- and Post-Surveys will be administered electronically. This appendix contains paper versions of the assessments.

**Demographic Information**

**Pre-test:**
1. Your age as of today:
   
   Years: 11, 12, 13, 14, 15, 16
   
   Month your were born in: January - December

2. Type in your Lunch Code (the number you type in on the lunch line each day)

3. Gender:
   
   A Female
   
   B Male

4. Ethnicity/Race (check all that apply):
   
   A Caucasian or White
   
   B Latino or Hispanic
   
   C Asian or Pacific Islander
   
   D African American or Black
   
   E American Indian
   
   F Multi-racial

5. Is English the first language you learned to speak?
   
   A Yes
   
   B No

   Post-test only: What was the first language you learned to speak?

6. Have you ever attended the lunchtime or afterschool yoga sessions at your school?
   
   A Yes
   
   B No

7. Have you ever done any type of mindful awareness activity?
   
   A Yes
   
   B No

   C I don’t know
Child and Adolescent Mindfulness Measure (CAMM)

We want to know more about what you think, how you feel, and what you do.

Read each sentence. Then, circle the number that tells how often each sentence is true for you.

0 = Never True
1 = Rarely True
2 = Sometimes True
3 = Often True
4 = Always True

1. I get upset with myself for having feelings that don’t make sense. 0 1 2 3 4

2. At school, I walk from class to class without noticing what I’m doing. 0 1 2 3 4

3. I keep myself busy so I don’t notice my thoughts or feelings. 0 1 2 3 4

4. I tell myself that I shouldn’t feel the way I’m feeling. 0 1 2 3 4

5. I push away thoughts that I don’t like. 0 1 2 3 4

6. It’s hard for me to pay attention to only one thing at a time. 0 1 2 3 4

7. I get upset with myself for having certain thoughts. 0 1 2 3 4

8. I think about things that have happened in the past instead of thinking about things that are happening right now. 0 1 2 3 4

9. I think that some of my feelings are bad and that I shouldn’t have them. 0 1 2 3 4

10. I stop myself from having feelings that I don’t like. 0 1 2 3 4
Healthy Self-Regulation—(HSR)

Instructions:

For each of the items, read the sentence. Then, click on the number that reflects your actual experience, not what you believe your experience should be.

1. I accept myself even if I still have things to learn. 1 2 3 4 5 6
2. If I realize I have forgotten what I’m doing in the middle of a task, I can bring my focus back. 1 2 3 4 5 6
3. I need to get revenge if I’m insulted. 1 2 3 4 5 6
4. Others could describe me as patient with myself. 1 2 3 4 5 6
5. I have a peaceful attitude toward myself. 1 2 3 4 5 6
6. My anger comes on too fast for me to stay in control. 1 2 3 4 5 6
7. When I get annoyed I have a healthy way to calm down. 1 2 3 4 5 6
8. I recognize when I’m getting upset and calm myself. 1 2 3 4 5 6
9. I can stop myself from saying mean things. 1 2 3 4 5 6
10. I am known to lose my temper. 1 2 3 4 5 6
11. I am patient with other people. 1 2 3 4 5 6
12. I have a healthy and natural way to relax. 1 2 3 4 5 6
### Student School Engagement Measure

**Directions:**

For each item, read the sentence.

Then, using the scale of 1 to 10, (With 1 being strongly disagree and 10 being strongly agree), click on the number that shows how much you agree or disagree with the sentence.

Choose only one answer.

<table>
<thead>
<tr>
<th></th>
<th>My family knows how I am doing in school.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I like most of my teachers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>If I do not know what something means, I do something to figure it out.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>I study at home.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>I plan to pursue more education after high school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>There is someone in my family who helps me when I have trouble completing my homework.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>Most days, I look forward to going to school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>I pay attention to my teachers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>My school work is important.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>When I am doing school work, I make sure I understand what I am learning.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>I look for more information about things we are learning in school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>My school work is important.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>Being successful in school will help me in the future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>13</td>
<td>I am proud to be a student at this school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>14</td>
<td>When learning new things, I try to connect them to things I already know.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>When I have an assignment due, I keep working until it is finished.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>
16. Getting good grades is important to me. 1 2 3 4 5 6 7 8 9 10
17. It is important to me to be successful in a job. 1 2 3 4 5 6 7 8 9 10

Strongly Disagree  Strongly Agree

18. I talk to my family about problems I have at school. 1 2 3 4 5 6 7 8 9 10
19. There is a lot I can learn from my teachers. 1 2 3 4 5 6 7 8 9 10
20. Teachers help me to be successful at school. 1 2 3 4 5 6 7 8 9 10
21. I know how to study for tests. 1 2 3 4 5 6 7 8 9 10
22. I feel like a part of my school. 1 2 3 4 5 6 7 8 9 10
Brief - FRIEDBEN Test Anxiety Scale

Directions:
Read each sentence.
Then, click on the letter that best describes your feeling.

<table>
<thead>
<tr>
<th>Characterizes me perfectly</th>
<th>Neutral</th>
<th>Does not characterize me at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
</tbody>
</table>

Example: During a test, I keep moving uneasily in my chair.

A B C D E F

If the student feels this describes him/her perfectly, s/he should mark letter “A” on the Scantron sheet.

1. If I fail a test I am afraid I will be perceived as stupid by my friends.
   A B C D E F

2. If I fail a test I am afraid people will consider me worthless.
   A B C D E F

3. I am very worried about what my teacher will think or do if I fail his or her test.
   A B C D E F

4. I am worried that all my friends will get high scores on the test and only I will get low ones.
   A B C D E F

5. I am worried that failure in tests will embarrass me socially.
   A B C D E F

6. During a test my thoughts are clear and I neatly answer all questions.
   A B C D E F

7. During a test I feel I’m in good shape and that I’m organized.
   A B C D E F

8. I feel my chances are good to think and perform well on tests.
   A B C D E F

9. I usually function well on tests.
   A B C D E F

10. I am very tense before a test, even if I am well prepared.
    A B C D E F

11. While I am sitting in an important test, I feel that my heart pounds strongly.
    A B C D E F

12. I am terribly scared of tests.
    A B C D E F
Post-test Responses to Learning Mindful Awareness Skills

Post-test only:

1. I enjoyed learning mindful awareness skills?
   Strongly Agree 1 2 3 4 5 6 Strongly Disagree

2. What did you like about learning mindful awareness skills?

3. What was challenging about learning mindful awareness skills?

4. Is there anything you did not like about learning mindful awareness skills that you would like to share with the researcher?

5. Did you use any of the mindful awareness skills outside of this class?
   If yes, where did you used mindful awareness skills outside of class?

6. Please share examples of how you used mindful awareness skills outside of class.
Appendix B

Parental Recruitment and Opt-Out Materials

A Study About Teaching Mindful Awareness Skills in Middle School

- I am looking at how teaching Mindful Awareness Skills (like focusing attention and managing thoughts and feelings) to middle school students affects how they think about school, schoolwork, and taking tests.
- During health class, students will take a brief survey near the beginning and end of Marking Period 4. Each will take about 20 minutes.
- Students in some health classes will then have 15-minute lessons on Mindful Awareness Skills, twice a week for 5 weeks as part of their regular health class.
- Benefits of learning Mindful Awareness Skills may include increased ability to focus attention and manage thoughts, feeling and actions.
- Others may benefit due to what is learned about teaching Mindful Awareness Skills in middle school.
- Risks are no greater than those in ordinary life.
- Student data from this survey will be confidential. No individual information will be collected or released in any way.

Kathy Shoemaker, a Doctoral Student in the Counseling & Educational Leadership Department, is conducting this study. If you do not want your child’s survey results used in this study or in future research, or you have questions about this study, please contact her at shoemakerk2@montclair.edu or at xxx-xxx-xxxx.

This study has been approved by the Montclair State University Institutional Review Board, study #IRB-FY15-16-31.
Dear Parent or Guardian,

I am writing to let you know about a research study about teaching mindful awareness skills to middle school students and its relationship to student engagement and to student test anxiety. This study is being conducted by Kathy Shoemaker, a doctoral student under the advisement of Dr. Dana Heller Levitt, from the Counseling and Educational Leadership Department at Montclair State University. This study will involve students answering a survey during their health class about their perceptions about school, schoolwork, and taking tests. This will take place near the beginning and end of the 4th Marking Period. Starting in the fourth marking period, Kathy, an experienced school counselor and teacher, will teach mindful awareness skills as part of health classes two times a week for five weeks. After the final lessons are taught, all students who took the first survey will complete a second survey.

It will take about 20 minutes for students to fill out the survey at the beginning and end of the study. No identifying information will be gathered from students and no individual information will be released in any form. For students in the assigned health classes who will learn mindful awareness skills, the first lesson will be take 30 minutes followed by 15-minute lessons, two times a week for five weeks.

Thank you for considering your child's participation in this study. If your child will participate in the study, there is nothing more you need to do. While all students will participate in the activities that occur in their health classes, if you do not want your child’s survey results used in this study or in future research, or you have additional questions about this study, please contact Kathy at shoemakerk2@montclair.edu or at XXX-XXX-XXXX or Dr. Levitt at levittd@mail.montclair.edu or at XXX-XXX-XXXX.

This study has been approved by the Montclair State University Institutional Review Board.

Sincerely,

Kathy Shoemaker, Ed.S.  Dana Heller Levitt, Ph.D.
Doctoral Student  Faculty Advisor

Counseling and Educational Leadership Department, Montclair State University
Appendix C

Student Online Assent

Dear Student,

You are invited to participate in a study about teaching mindful awareness skills to middle school students. I hope to learn if teaching mindful awareness skills to middle school students affects how students think about coming to school, schoolwork, and taking tests. You were selected to participate in this study because you are scheduled for health class during marking period 2 or 3.

If you decide to participate, please complete the following set of questions. The survey is designed to measure your feelings and thoughts about school, schoolwork and taking tests. It will take about 20 to 30 minutes to complete the survey. You will be asked to answer questions about how you feel and think about school, schoolwork, and taking tests. You may not directly benefit from this research. However, we hope this research will result in better understanding if teaching mindful awareness skills to middle school students helps students enjoy school more or feel calmer about taking tests. If it does perhaps more middle schools will teach these skills to students.

You should feel no greater discomfort or inconvenience than in your regular life. Data will be collected using the Internet. While there are no guarantees on the security of data sent on the Internet, no personal information will be collected. Confidentiality will be kept to the degree permitted by the technology used.

Your decision whether or not to participate will not affect your relationships with your school or your teachers.

If you decide to participate, you are free to stop at any time. You may skip questions you do not want to answer.

Please feel free to ask questions regarding this study. You may contact me or my Faculty Advisor, if you have additional questions. You can contact Dr. Levitt at levittd@mail.montclair.edu or at 973-655-2097 or myself, Kathy Shoemaker, at shoemakerk2@montclair.edu or 973-655-3306.

Any questions about your rights may be directed to Dr. Katrina Bulkley, Chair of the Institutional Review Board at Montclair State University at reviewboard@mail.montclair.edu or 973-655-5189.

Thank you for your time.
Sincerely,
Kathy Shoemaker,
College of Education, Department of Counseling & Educational Leadership

By clicking the link below, I confirm that I have read this form and will participate in the project described. Its general purposes, the particulars of involvement, and possible risks and inconveniences have been explained to my satisfaction. I understand that I can discontinue participation at any time.

[Please feel free to print a copy of this consent.]

☐ I agree to participate (link to survey) ☐ I decline (link to close webpage)

The study has been approved by the Montclair State University Institutional Review Board as study #IRB--FY15-16-31 on January 5, 2016.
Appendix D

Mindfulness Lesson Plans

<table>
<thead>
<tr>
<th>Curriculum Plan for Teaching Mindful Awareness Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective:</strong> To teach mindful awareness skills to middle school students, so that they can apply them in other contexts of their lives to expand their social, emotional, and cognitive responsiveness in various situations</td>
</tr>
<tr>
<td><strong>Curriculum Standards:</strong></td>
</tr>
<tr>
<td>NJ Core Curriculum Content Standards: 2014 Health Literacy: 2.1.6.E.1, 2.1.8.E.1, 2.1.8.E.4, 2.2.6.A.1, 2.2.8.A.1, 2.2.6.B.2, 2.2.6.B.3, 2.2.8.B.1, 2.2.8.B.3, 2.2.6.C.1, 2.2.6.C.2, 2.4.6.A.3, 2.5.6.B.2, 2.5.8.B.2; 21st Century Skills: CRP1, CRP 3, CRP4, CRP5, CRP6</td>
</tr>
<tr>
<td><strong>Evaluation of Student SWBAT:</strong></td>
</tr>
<tr>
<td>by the end of the program, define mindful awareness as components of paying attention on purpose, in the present moment, noticing without judging identify the components of mindful posture, mindful listening, various mindful breathing techniques, heartfulness, gratitude, and body scan and use them outside of class to manage thoughts, emotions, and situations in a responsive rather than reactive way identify and label thoughts, emotions, and situations as pleasant, unpleasant, or both based on context; as past, present, or future thinking sit in a mindful posture and use a mindfulness practice for at least 2 minutes</td>
</tr>
<tr>
<td><strong>Teacher:</strong></td>
</tr>
<tr>
<td>Students will have actively engaged in connecting mindful awareness to context in their lives Students will have actively participated in mindfulness experiences and shared their experience with classmates</td>
</tr>
<tr>
<td><strong>Materials:</strong></td>
</tr>
<tr>
<td>Chime, Markers or Chalk, Board to write on Mindful Schools Lesson Plans Poems: Autobiography in Five Short Chapter by Portia Nelson; Guesthouse by Rumi Messages from Water Sheet by Masaru Emoto - retrieved from website Attendance Check-ins</td>
</tr>
<tr>
<td>Curriculum Plan for Teaching Mindful Awareness Skills</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Lesson:</strong> Day 1</td>
</tr>
<tr>
<td><strong>Name:</strong> Introduction to Mindfulness, Mindful Posture &amp; Mindful Listening</td>
</tr>
<tr>
<td><strong>Objectives:</strong></td>
</tr>
<tr>
<td>describe Skills, Awareness, and Mindfulness and what mindful awareness skills are</td>
</tr>
<tr>
<td>describe outcomes of strengthening mindful awareness and how it can help students in school and life</td>
</tr>
<tr>
<td>identify the steps and use Mindful Posture</td>
</tr>
<tr>
<td>identify aspects of mindfulness including noticing and observing without judgment when we experience thoughts and feelings and how practicing mindfulness can help us become less activated by strong thoughts and feelings</td>
</tr>
<tr>
<td><strong>SWBAT:</strong></td>
</tr>
<tr>
<td>identify the steps and use Mindful Posture</td>
</tr>
<tr>
<td>identify aspects of mindfulness including noticing and observing without judgment when we experience thoughts and feelings and how practicing mindfulness can help us become less activated by strong thoughts and feelings</td>
</tr>
<tr>
<td><strong>Activities:</strong></td>
</tr>
<tr>
<td>Write Mindful Awareness Skills on board and use words to define the term starting from skills and working backwards - get student input. End with explanation of the whole</td>
</tr>
<tr>
<td>Students often tie awareness to their surroundings. Have students practice awareness of their surroundings, describing what they notice</td>
</tr>
<tr>
<td>Tie strengthening mind to strengthening bodies: where the mind is, increasing ability to focus, recognize and manage emotions, make better decisions and empathize</td>
</tr>
<tr>
<td>Teach Mindful Posture: face forward, feet flat on floor, back comfortably upright, stillness, quiet, mind and body relaxed yet alert, letting your eyes close (or some variation)</td>
</tr>
<tr>
<td>With students in Mindful Posture, read a list of emotions and have students acknowledge to themselves whether they have experienced each. Explain that mindfulness allows us to notice when we have these emotions and how we feel them in our bodies and minds so we can react differently</td>
</tr>
<tr>
<td>Teach students to mindfully listen, first with a chime (30 seconds or more) and then to their surroundings (30 seconds to 1+ minutes). Have students notice how they feel, if its challenging, notice thoughts or feelings</td>
</tr>
<tr>
<td>Discuss what students noticed</td>
</tr>
<tr>
<td>Close with listening to the chime until they do not hear it anymore</td>
</tr>
<tr>
<td><strong>Homework:</strong></td>
</tr>
<tr>
<td>Between now and next class see if you can use mindful listening</td>
</tr>
</tbody>
</table>
### Curriculum Plan for Teaching Mindful Awareness Skills

<table>
<thead>
<tr>
<th>Lesson:</th>
<th>Day 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name:</strong></td>
<td><strong>Mindful Breathing</strong></td>
</tr>
<tr>
<td><strong>Objectives:</strong></td>
<td>describe the difference between reacting and responding bring awareness to the situation without reacting allowing to notice emotions and thoughts and bodily reactions identify anchors to use when breathing to allow oneself to stay focused or bring focus back to the breath</td>
</tr>
<tr>
<td><strong>SWBAT:</strong></td>
<td>practice Mindful Breathing with an anchor</td>
</tr>
<tr>
<td><strong>Activities:</strong></td>
<td>Ask students to review what we did in the first session: define mindful awareness skills, mindful posture, mindful listening Read Frankl quote about stimulus and response and get student feedback about what it means. Using visualization have students imagine a situation that makes them angry and their typical reaction: What they say, do? Yell, swear, say or do something that they regret later. Talk about what they imagined, consequences at school or elsewhere Do again up to the event and notice where they feel the anger in their body, notice thoughts associated with it. Feelings of revenge, anger, hate, hurt, disappointment? Discuss creating space through observing without reacting and how mindfulness can cultivate ability to observ and, respond differently. Use poem, &quot;Autobiography in Five Short Chapters Teach Mindful Breathing and how to identify anchors by practicing breathing and moving from anchor at the nose, chest, and belly End with breathing using anchor of their choice</td>
</tr>
<tr>
<td><strong>Homework:</strong></td>
<td>Between now and next class see if you can use mindful listening or mindful breathing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lesson:</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name:</strong></td>
<td><strong>Heartfulness</strong></td>
</tr>
<tr>
<td><strong>Objectives:</strong></td>
<td>Identify that they can actively choose thoughts and intentions use heartfulness to create positive intentions toward others and themselves identify how choosing positive thoughts to send to others and themselves may affect self and/or others - compassionate attitude</td>
</tr>
<tr>
<td><strong>SWBAT:</strong></td>
<td>Establish opening ritual: get into Mindful Posture, close eyes, listen to chime until you don't hear it and go right into Mindful Breathing with an anchor (1-2 Mintutes) Talk about DC experiment to lower crime Teach using heartfulness for someone the student cares about and then toward themselves (at least 3 rounds + 2 silent for each) Process the heartfulness experience: How did that feel? Who did you send thoughts to? Did it feel awkward to have these kinds of thoughts? Discuss sending kind thoughts to other then to self. How might you use this in school or other parts of your life? Close with the same ritual we opened with (1-2 minutes)</td>
</tr>
<tr>
<td><strong>Activities:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Homework:</strong></td>
<td>Between now and next class see if you can use one of mindful awareness skills you have learned so far</td>
</tr>
</tbody>
</table>
### Curriculum Plan for Teaching Mindful Awareness Skills

<table>
<thead>
<tr>
<th>Lesson: Lesson</th>
<th>Day 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name:</strong></td>
<td><strong>Noticing and Labeling Thoughts</strong></td>
</tr>
<tr>
<td><strong>Objectives:</strong></td>
<td>Notice when mind wanders and bring it back to the breath. Notice the thought when the mind has wandered and label it as a thought. Identify the ability to bring mind back to an anchor as a skill.</td>
</tr>
<tr>
<td><strong>SWBAT:</strong></td>
<td>Mindful Minute+ starting ritual. Practice mindfulness and notice 1st thought, ask students about their experience. Teach students that by labeling thoughts, &quot;thinking thinking&quot; acknowledges it and allows us to go back to anchor quicker. Practice Mindful Breathing with labeling. Introduce using same process for noticing emotions or using to stay focused in class.</td>
</tr>
<tr>
<td><strong>Activities:</strong></td>
<td>Attendance Check-in. Close with 5 rounds of heartfulness for self and classmates.</td>
</tr>
<tr>
<td><strong>Homework:</strong></td>
<td>Between now and next class see if you can notice and label thoughts as thinking. Try to use one of mindful awareness skills you have learned so far.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lesson: Lesson</th>
<th>Day 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name:</strong></td>
<td><strong>Noticing the Nature of Emotions, Mindful Breath, and Counting</strong></td>
</tr>
<tr>
<td><strong>Objectives:</strong></td>
<td>Notice how emotions can become overwhelming when we add thoughts to them. Normalize mind wandering as human. Identify mindful awareness as a skill that can be strengthened with practice.</td>
</tr>
<tr>
<td><strong>SWBAT:</strong></td>
<td>Mindful Minute+ starting ritual. Ask students if they can remember a fairy tale where a big, scary monster traumatizes people until someone stands up and the monster becomes less scary or friendly - tie to emotions. Use an example of where fear took over and kept someone from something enjoyable or important: Jumping off the Dock (awfulizing, missing out on joy). Teach breath counting as a way to stay mindful. Practice Breath Counting for 1 minute and process the experience with students.</td>
</tr>
<tr>
<td><strong>Activities:</strong></td>
<td>Close with Breath Counting for 1-2 minutes.</td>
</tr>
<tr>
<td><strong>Homework:</strong></td>
<td>Between now and next class see if you can notice and label thoughts as thinking. Try to use one of mindful awareness skills you have learned so far.</td>
</tr>
<tr>
<td>Curriculum Plan for Teaching Mindful Awareness Skills</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Lesson:</strong> Day 6</td>
<td></td>
</tr>
<tr>
<td><strong>Name:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Objectives:</strong> Identify situations, thoughts and feelings as pleasant or unpleasant without adding details to lessen reaction to them</td>
<td></td>
</tr>
<tr>
<td><strong>SWBAT:</strong> label thoughts and feelings as pleasant/unpleasant without adding details during mindfulness practice</td>
<td></td>
</tr>
<tr>
<td>create a mindfulness practice to use in testing situations</td>
<td></td>
</tr>
<tr>
<td><strong>Activities:</strong> Mindful Minute+ starting ritual</td>
<td></td>
</tr>
<tr>
<td>With students in mindful posture, read list of situations, thoughts and feelings instructing students to add as much detail as possible. Then instruct students that they only have 2 options pleasant/unpleasant to categorize each item into with no extra details</td>
<td></td>
</tr>
<tr>
<td>Debrief by asking students was there something unpleasant that stood out? Was there something pleasant that stood out? Address how some were both depending on the person or context</td>
<td></td>
</tr>
<tr>
<td>Introduce test anxiety by asking who likes/dislikes taking tests</td>
<td></td>
</tr>
<tr>
<td>Ask about feeling students have around test-taking and studying for tests</td>
<td></td>
</tr>
<tr>
<td>With students n mindful posture, guide them through a testing visualization where they struggle and use mindfulness to recover and debrief. Do it again, creating a pre-test mindfulness relaxation</td>
<td></td>
</tr>
<tr>
<td>End by briefly discussing brain chemicals of anxiety that prevent accessing memory and thinking clearly and how mindfulness releases chemicals that calm the brain and support clear thinking and problem solving</td>
<td></td>
</tr>
<tr>
<td><strong>Homework:</strong> Between now and next class see if you can notice pleasant and unpleasant thoughts. Which do you have more of? Try to use one of mindful awareness skills you have learned so far</td>
<td></td>
</tr>
</tbody>
</table>
# Curriculum Plan for Teaching Mindful Awareness Skills

## Lesson: Day 7

### Name:
Past/Present/Future & Noticing (Breath 3)

### Objectives:
- Identify and label distracting thoughts as past, future or other then refine labels to include planning, imagining, worrying, evaluating
- Use past/future labels while practicing mindful breathing
- Apply using time oriented labels to situations in their everyday life

### SWBAT:
- Use past/future labels while practicing mindful breathing
- Apply using time oriented labels to situations in their everyday life

### Activities:
- Mindful Minute+ starting ritual
- Using self as an example, model mindful breathing practice using body motions to right or left, vocalizing distractions and asking students to identify them as past or future
- Have students practice mindful breathing for 1-2 minutes, identifying when their minds wander as past, future or other and then discuss students experience
- Using analogy of car with gears and needing them all to operate well, tie it to how minds work best when we can choose to shift gears as we need to
- Teach students other helpful labels that they can use to anchor: planning, worrying, imagining, judging
- Close with using a guided mindfulness practice to direct students in and out of present moment using in/out breath as an anchor back to the present: past/future/evaluating/body sensations

### Homework:
Between now and next class see if you can notice thoughts when your thoughts have moved from the present to the past or future and label them. Try to use one of mindful awareness skills you have learned so far

## Lesson: Day 8

### Name:
Body Scan & Mindfulness of Emotions

### Objectives:
- Tie concept of body as a guest house to prior knowledge of having guests come over: Key concepts of welcoming, treating with respect
- Tie emotions to guest we like ro dislike, stay too long or too short
- Notice sensations and emotions in the body and ability to calm or relax them
- Understand that by noticing sensations and emotions they can choose to let them pass or savor them rather than feeling controlled by them

### SWBAT:
- Notice sensations and emotions in the body and ability to calm or relax them
- Understand that by noticing sensations and emotions they can choose to let them pass or savor them rather than feeling controlled by them

### Activities:
- Mindful Minute+ starting ritual
- Discuss what happens for students when guests come over what they do, how they treat the person, some guest they like better, some stay too long.
- Read Rumi poem: Guest House. Make connection to emotions as visitors that we put in rooms (parts of our body; butterflies in stomach, weight of world on shoulders). By noticing them we can either encourage them to pass quicker or savor them
- Do Body Scan followed by discussion about what was noticed, how noticing gives us ability to make choices
- Close with students in mindful posture, read list of emotions and have students try to notice where they sense them in their bodies. At end, have them process what they noticed

### Homework:
During the week, when you notice an emotion, try to notice where you feel it in your body
## Curriculum Plan for Teaching Mindful Awareness Skills

<table>
<thead>
<tr>
<th>Lesson:</th>
<th>Day 9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name:</strong></td>
<td>Review of Learning + Heartfulness with Challenging People &amp; Gratitude and Appreciation</td>
</tr>
<tr>
<td><strong>Objectives:</strong></td>
<td>understand that people are interconnected and that our attitude and behavior affects others around us apply heartfulness throughout their day in a variety of situations apply heartfulness to a difficult relationship and notice how they personally respond to it connect gratitude and appreciation to heartfulness and be able to use them in their everyday life</td>
</tr>
<tr>
<td><strong>SWBAT:</strong></td>
<td>apply heartfulness throughout their day in a variety of situations apply heartfulness to a difficult relationship and notice how they personally respond to it connect gratitude and appreciation to heartfulness and be able to use them in their everyday life</td>
</tr>
<tr>
<td><strong>Activities:</strong></td>
<td>Mindful Minute+ starting ritual Review what we have learned by having students tell me: Mindful Posture, Mindful Listening, several ways to use Mindful Breathing, Breath Counting, Noticing and Labeling Thoughts, Emotions, Past, Present, and Future, Heartfulness for self and others, Body Scan. If necessary ask how students have applied it outside of class Draw three or more trees including intertwined roots on the board. Ask class about what we notice about trees when we walk into the woods; then what important things about the tree don't we see. Talk about how roots are interconnected below the surface (both support and can bring down one another). Connect thoughts and how they impact others Use messages from water to talk about how intentions even affects water and how human bodies are made up of mostly water Using guided imagery, walk students through day of heartfulness, then heartfulness with a difficult person which allows them to choose how they respond to these people Explain how gratefulness and appreciation are aspects of heartfulness and mindful awareness. Humans tend to focus on negative;, mindfully focusing attention on what we are grateful for can shift attitude or mood Attendance Check-in, write down 3 things you are grateful for Try starting day with heartfulness and see what happens.</td>
</tr>
<tr>
<td><strong>Homework:</strong></td>
<td>Encourage students to continue to use mindfulness and establish a daily practice of mindfully checking in that works for them personally: observing body sensations, thoughts, emotions as a way to continue to strengthen their mind &quot;muscle&quot;</td>
</tr>
</tbody>
</table>
Appendix E

Pre-test Scores by Post-test Opt-Out Status

*Pre-test Scores of Students Who Assented at Pre-test by Post-test Opt-Out Status*

<table>
<thead>
<tr>
<th></th>
<th>Opt Out</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
</tr>
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<tr>
<td><strong>Control</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Mindful Awareness Score</td>
<td>No</td>
<td>82</td>
<td>25.4</td>
<td>9.3</td>
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</tr>
<tr>
<td></td>
<td>Yes</td>
<td>23</td>
<td>27.8</td>
<td>7.8</td>
<td>1.6</td>
</tr>
<tr>
<td>Healthy Self-Regulation Score</td>
<td>No</td>
<td>82</td>
<td>51.0</td>
<td>11.8</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>23</td>
<td>48.9</td>
<td>11.0</td>
<td>2.3</td>
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<tr>
<td>Test Anxiety Score</td>
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<td>48.6</td>
<td>13.6</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>23</td>
<td>50.6</td>
<td>11.8</td>
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<tr>
<td>Student Engagement Score</td>
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<td>7.72</td>
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<tr>
<td></td>
<td>Yes</td>
<td>23</td>
<td>7.57</td>
<td>1.69</td>
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<td><strong>Intervention</strong></td>
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<tr>
<td>Mindful Awareness Score</td>
<td>No</td>
<td>114</td>
<td>24.8</td>
<td>7.7</td>
<td>0.7</td>
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<tr>
<td></td>
<td>Yes</td>
<td>17</td>
<td>24.9</td>
<td>9.0</td>
<td>2.2</td>
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<tr>
<td>Healthy Self-Regulation Score</td>
<td>No</td>
<td>114</td>
<td>49.3</td>
<td>11.5</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>17</td>
<td>52.5</td>
<td>10.2</td>
<td>2.5</td>
</tr>
<tr>
<td>Test Anxiety Score</td>
<td>No</td>
<td>114</td>
<td>51.2</td>
<td>13.1</td>
<td>1.2</td>
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<tr>
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<td>Yes</td>
<td>17</td>
<td>45.5</td>
<td>10.7</td>
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<td>Student Engagement Score</td>
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<td>114</td>
<td>7.65</td>
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<td>Yes</td>
<td>17</td>
<td>8.16</td>
<td>1.17</td>
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</tbody>
</table>
Appendix F

Mean and Standard Deviation Results by Demographic Categories

_Mean and Standard Deviations by Demographic Categories for the Intervention Group by Scale - Child and Adolescent Mindfulness Measure_

<table>
<thead>
<tr>
<th></th>
<th>Pre-</th>
<th>Post-</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N  M  SD</td>
<td>M  SD</td>
<td>Δ  SD</td>
</tr>
<tr>
<td>CAMM</td>
<td>107 24.9 7.6</td>
<td>24.9 7.1 0.0</td>
<td>7.2</td>
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<tr>
<td>Grade 6</td>
<td>57 24.6 7.7</td>
<td>25.7 6.2 1.1</td>
<td>7.1</td>
</tr>
<tr>
<td>Grade 8</td>
<td>50 25.2 7.6</td>
<td>24.0 8.0 -1.2</td>
<td>7.2</td>
</tr>
<tr>
<td>Age: 11</td>
<td>21 25.5 6.5</td>
<td>25.1 6.9 -0.3</td>
<td>6.3</td>
</tr>
<tr>
<td>12</td>
<td>33 24.7 7.8</td>
<td>26.1 5.9 1.4</td>
<td>7.4</td>
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<tr>
<td>13</td>
<td>18 23.7 8.3</td>
<td>21.8 7.7 -1.8</td>
<td>7.0</td>
</tr>
<tr>
<td>14+</td>
<td>35 25.5 7.8</td>
<td>25.3 7.8 -0.2</td>
<td>7.5</td>
</tr>
<tr>
<td>Female</td>
<td>60 24.7 7.2</td>
<td>24.6 7.1 -0.1</td>
<td>7.0</td>
</tr>
<tr>
<td>Male</td>
<td>47 25.2 8.2</td>
<td>25.4 7.2 0.2</td>
<td>7.4</td>
</tr>
<tr>
<td>Asian</td>
<td>20 26.9 7.1</td>
<td>26.7 6.3 -0.2</td>
<td>5.4</td>
</tr>
<tr>
<td>AfricanAmerican/Black</td>
<td>21 24.5 7.1</td>
<td>22.8 6.3 -1.7</td>
<td>7.9</td>
</tr>
<tr>
<td>Hispanic</td>
<td>10 20.3 8.8</td>
<td>20.4 7.9 0.1</td>
<td>11.2</td>
</tr>
<tr>
<td>Caucasian</td>
<td>56 25.2 7.6</td>
<td>25.9 7.2 0.7</td>
<td>6.7</td>
</tr>
<tr>
<td>Low-SES</td>
<td>32 23.5 8.3</td>
<td>22.9 8.2 -0.6</td>
<td>7.1</td>
</tr>
<tr>
<td>Not Low-SES</td>
<td>75 25.5 7.3</td>
<td>25.8 6.5 0.3</td>
<td>7.2</td>
</tr>
<tr>
<td>English 1st Language</td>
<td>81 25.5 6.9</td>
<td>25.7 6.7 0.2</td>
<td>7.6</td>
</tr>
<tr>
<td>ESL</td>
<td>26 23.1 9.4</td>
<td>22.5 7.9 -0.6</td>
<td>5.9</td>
</tr>
<tr>
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*Note:* No significant results were found.
Mean and Standard Deviations by Demographic Categories for the Intervention Group by Scale - Healthy Self-Regulation Subscale of the Mindfulness Thinking and Acting Scale for Adolescence

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Note: Significant results in italics.
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*Note:* Significant results in italics.
Mean and Standard Deviations by Demographic Categories for the Intervention Group by Scale - Student School Engagement Measure Subscales

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Note: M = Mean at post-test, SD = Standard Deviation, Δ = Mean Change
Mean and Standard Deviations by Demographic Categories for the Intervention Group by Scale - FREIDBEN Test Anxiety Scale (Brief Version)

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*Note: M = Mean at post-test, SD = Standard Deviation, Δ = Mean Change, Significant results in italics.*
Appendix G

Self-Reported Enjoyment of Learning Mindful Awareness

*Descriptive Statistics of Intervention Group at Post-test Based on Student Self-Report of Enjoyment Learning Mindfulness*

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Appendix H

Demographics by Enjoyment Level

Response to Enjoyed Learning Mindfulness at Post-test by Demographics

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