

University of Northern Colorado

Scholarship & Creative Works @ Digital UNC

Dissertations

Student Research

12-2019

Mindfulness Intervention to Support School Engagement With At-Risk Students at an Urban Charter High School

Sarah Groark

Follow this and additional works at: <https://digscholarship.unco.edu/dissertations>

Recommended Citation

Groark, Sarah, "Mindfulness Intervention to Support School Engagement With At-Risk Students at an Urban Charter High School" (2019). *Dissertations*. 615.

<https://digscholarship.unco.edu/dissertations/615>

This Text is brought to you for free and open access by the Student Research at Scholarship & Creative Works @ Digital UNC. It has been accepted for inclusion in Dissertations by an authorized administrator of Scholarship & Creative Works @ Digital UNC. For more information, please contact Jane.Monson@unco.edu.

© 2019

SARAH GROARK

ALL RIGHTS RESERVED

UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

MINDFULNESS INTERVENTION TO SUPPORT SCHOOL
ENGAGEMENT WITH AT-RISK STUDENTS AT AN
URBAN CHARTER HIGH SCHOOL

A Dissertation Submitted in Partial Fulfillment
of the Requirement for the Degree of
Doctor of Philosophy

Sarah Groark

College of Education and Behavioral Sciences
Department of School Psychology

December 2019

This Dissertation by: Sarah Groark

Entitled: *Mindfulness Intervention to Support School Engagement with At-Risk Students at an Urban Charter High School.*

has been approved as meeting the requirement for the degree of Doctor of Philosophy in the College of Education and Behavioral Sciences in the Department of School Psychology,

Approved by the Doctoral Committee

Robyn S. Hess, Ph.D., Research Advisor

David M. Hulac, Ph.D., Committee Member

Brian D. Johnson, Ph.D., Committee Member

Eric Peterson, Ph.D., Faculty Representative

Date of Dissertation Defense _____

Accepted by the Graduate School

Cindy Wesley, Ph.D.
Interim Associate Provost and Dean
Graduate School and International Admissions
Research and Sponsored Projects

ABSTRACT

Groark, Sarah. *Mindfulness Intervention to Support School Engagement with At-Risk Students at an Urban Charter High School*. Published Doctor of Philosophy dissertation, University of Northern Colorado, 2019.

Every year, more than 500,000 students drop out of school, often after years of growing disinterest and disengagement. As a result, models of school engagement are commonly used as a framework to guide interventions. Unfortunately, some students may experience high levels of dysregulation and poor executive functioning which interfere with their ability to engage in school. The purpose of this study was to investigate whether a school-based mindfulness intervention would support school engagement behaviors with adolescents at an urban charter school. It was hypothesized that mindfulness would support students' executive functioning in the areas of attention, cognitive flexibility, and emotion regulation. Changes in students' executive functioning were assessed through pre- and post-measures and progress monitoring. The nine participants' outcomes were assessed using multiple, single-case analysis and cross-case comparison.

Results suggested that implementing a mindfulness intervention in a high school setting is feasible and may be effective in supporting factors related to school engagement. The most promising effects were observed in increased cognitive flexibility skills and improved academic performance. Participants did not show any differences in attendance or emotion regulation. The other assessed outcomes, including on-task

behavior, emotional engagement, rule-following behavior, lowest grade performance, and attentional skills did not result in significant cross-case analysis, but several participants did demonstrate improvements in each of these behaviors. The results of this study contribute to a growing body of literature linking mindfulness-based interventions with increased executive functioning skills. It also provides evidence of mindfulness-based interventions' utility in supporting the overall well-being of adolescents.

TABLE OF CONTENTS

CHAPTER

I.	INTRODUCTION	1
	Background of the Problem	
	Theoretical Framework	
	Statement of the Problem	
	Research Questions	
	Delimitations	
	Definition of Terms	
	Summary	
II.	REVIEW OF LITERATURE.....	16
	School Engagement	
	Mindfulness	
	Executive Function	
	Attention	
	Cognitive Flexibility	
	Emotion Regulation	
	Summary	
III.	METHODOLOGY.....	49
	Context of the Study	
	Study Design	
IV.	RESULTS.....	71
	Single Case Results	
	Cross-Case Analysis of Pre-Post Data	
	Summary of Findings	
V.	DISCUSSION.....	140
	Changes in Behavioral Engagement	
	Changes in Cognitive Engagement	
	Implications of the Findings	

Limitations of the Study
Future Directions
Conclusion

REFERENCES..... 155

APPENDIX

A. Institutional Review Board Approval 181
B. Informed Consent and Administrator Approval 184
C. Teacher Behavior Ratings 187

LIST OF TABLES

TABLE

1.	Participant Descriptive Data	51
2.	Intervention Sequence	65
3.	Madison (Participant 1) DERS results	78
4.	Ethan (Participant 2) DERS results	85
5.	David (Participant 3) DERS results	92
6.	Paola (Participant 4) DERS results	99
7.	Amber (Participant 5) DERS results	105
8.	Noah (Participant 6) DERS results	111
9.	Edgar (Participant 7) DERS results	117
10.	Sofia (Participant 8) DERS results	123
11.	Morgan (Participant 9) DERS results	126
12.	Daniela (Participant 10) DERS results	129
13.	Participants Cross-Case Pre-Post Data (Attendance/High Grade/Low Grade)	131

LIST OF FIGURES

FIGURE

1.	Madison (Participant 1): Attendance and grades	74
2.	Madison (Participant 1): On-task behavior	75
3.	Madison (Participant 1): Emotional engagement behavior	76
4.	Madison (Participant 1): Rule-following behavior	77
5.	Ethan (Participant 2): Attendance and grades	81
6.	Ethan (Participant 2): On-task behavior	82
7.	Ethan (Participant 2): Emotional engagement behavior	83
8.	Ethan (Participant 2): Rule-following behavior	84
9.	David (Participant 3): Attendance and grades	88
10.	David (Participant 3): On-task behavior	89
11.	David (Participant 3): Emotional engagement behavior	90
12.	David (Participant 3): Rule-following behavior	91
13.	Paola (Participant 4): Attendance and grades	94
14.	Paola (Participant 4): On-task behavior	95
15.	Paola (Participant 4): Emotional engagement behavior	96
16.	Paola (Participant 4): Rule-following behavior	97
17.	Amber (Participant 5): Attendance and grades	101
18.	Amber (Participant 5): On-task behavior	102
19.	Amber (Participant 5): Emotional engagement behavior	103

20.	Amber (Participant 5): Rule-following behavior	104
21.	Noah (Participant 6): Attendance and grades	107
22.	Noah (Participant 6): On-task behavior	108
23.	Noah (Participant 6): Emotional engagement behavior	109
24.	Noah (Participant 6): Rule-following behavior	110
25.	Edgar (Participant 7): Attendance and grades	113
26.	Edgar (Participant 7): On-task behavior	114
27.	Edgar (Participant 7): Emotional engagement behavior	115
28.	Edgar (Participant 7): Rule-following behavior	116
29.	Sofia (Participant 8): Attendance and grades	119
30.	Sofia (Participant 8): On-task behavior	120
31.	Sofia (Participant 8): Emotional engagement behavior	121
32.	Sofia (Participant 8): Rule-following behavior	122
33.	Morgan (Participant 9): Attendance and grades	125
34.	Daniela (Participant 10): Attendance and grades	127
35.	Daniela (Participant 10): Intervention	128
36.	Cross-case analysis of attendance	132
37.	Cross-case analysis highest grade	133
38.	Cross-case analysis lowest grade	134
39.	Cross-case analysis of on-task behavior	135
40.	Cross-case analysis of rule-following behavior	136
41.	Cross-case analysis of WRAML-2 Attention/Concentration Index	137
42.	Cross-case analysis of TMT B/A ratio results	138

43. Cross-case analysis of DERS overall score..... 139

CHAPTER I

INTRODUCTION

Increasing graduation rates is a primary goal for educators and educational policy. According to the National Center for Education Statistics, the dropout rate continues to decrease (McFarland, Cui, & Stark, 2018). Despite this promising trend, each year, more than five hundred thousand students aged 15 to 24 drop out of school (McFarland et al., 2018). In recent years, the construct of school engagement has been used to understand why some students persist in school and others leave before graduation. School engagement is broadly considered to be the degree to which students are connected or invested in their education and is often described as a multifaceted construct consisting of academic, behavioral, cognitive, and emotional factors (Fredricks, Blumenfeld, & Paris, 2004; Reschly, Appleton, & Christenson, 2007). As a result, many interventions designed to keep students in school are based on the foundation of enhancing school engagement behaviors. However, some students may want to engage in school, but experience internal factors such as poor executive functioning and dysregulated emotions that make it difficult for them to participate in the school environment (Nesbitt, Farran, & Fuhs, 2015; Owens, Stevenson, Hadwin, & Norgate, 2012; Pekrun & Linnenbrink-Garcia, 2012). In order to examine some of these internal factors, the purpose of this study was to explore the effectiveness of a mindfulness intervention in increasing student engagement by increasing executive functioning skills (emotion regulation, cognitive flexibility, and attention).

Background of the Problem

The relationship between school engagement and dropping out has been of interest for a long time (Fredricks et al., 2004; Rumberger & Rotermund, 2012). Despite the fact that school completion rates have increased, the realization of the social ramifications of dropping out have resulted in an increased focus on having all students complete high school. Individuals who fail to complete high school make significantly less income over their life and are much more likely to experience other negative outcomes such as underemployment, poverty, and incarceration [American Psychological Association (APA), 2012]. To help address this issue, the No Child Left Behind (NCLB) legislation included graduation rates as a key indicator in determining whether a school was making adequate yearly progress in addressing gaps in educational achievement (Christenson & Thurlow, 2004). In 2015, NCLB was replaced with the Every Student Succeeds Act (ESSA). This new legislation continues a focus on increasing graduation rates.

The research on the risk factors related to school dropout generally focus on attributes of the individual student. Students who are more likely to drop out of high school often experience multiple risk factors across academic, behavioral, attitudinal, and environmental domains (Rumberger & Rotermund, 2012; Suh, Suh, & Houston, 2007). The most commonly cited risk factors are low socioeconomic status, poor academic achievement, and disruptive behaviors (Suh et al., 2007). Low SES is a particularly strong indicator as students who come from lower income families are significantly more likely to leave high school before graduation (McFarland et al., 2018; Suh et al., 2007).

Beyond these broad generalizations, there continues to be disproportionality in school completion rates across gender and race/ethnicity, even when controlling for socioeconomic status. For example, males have higher rates of school failure than females. Students from Hispanic backgrounds, with a 7.9 percent dropout rate, or American Indian/Alaska Native, with a 10.11 percent dropout rate, are much more likely to leave school before graduation than other ethnic groups (McFarland et al., 2018). These statistics point to the importance of considering outcomes based on demographic variables and potential differences in the experiences of students who represent different groups. Furthermore, it must be noted that many of these risk factors represent inalterable variables that cannot be changed through intervention (e.g., gender, ethnicity, and SES). Instead, researchers have sought to identify alterable variables that provide a guiding framework for both defining school engagement and targeting interventions (Reschly & Christenson, 2012).

A student's decision to drop out of school does not occur overnight; instead, school disengagement is a process that occurs over a significant period of time and often begins early in the student's educational career (Christenson & Thurlow, 2004; Reschly & Christenson, 2012; Rumberger & Rotermund, 2012). The factors that contribute to academic success include both individual factors (e.g., previous educational experiences, attitude toward education, academic behavior, and academic achievement) and institutional factors (e.g., family resources, school resources and practices, and community factors) (Rumberger & Rotermund, 2012). Indicators of academic disengagement often appear as early as elementary school with poor academic performance. For example, lack of proficiency in basic reading skills by 3rd grade has

consistently been linked with poor academic outcomes and school failure (APA, 2012). As students progress through school, other symptoms such as poor attendance and disruptive behaviors begin to emerge (Christenson & Thurlow, 2004). In fact, findings from one study suggested that students who would not complete school could be predicted with 60 percent accuracy based upon patterns of attendance, disruptive behaviors, and academic failure in the sixth grade (Balfanz, Herzog, & Mac Iver, 2007). Similarly, the process of re-engaging students requires sustained effort over a period of time (Christenson & Thurlow, 2004).

School engagement is often conceptualized as occurring within a continuum from low to high with students' level of engagement falling somewhere along this continuum (Reschly & Christenson, 2012). Although early intervention in school engagement is the most effective, continuing efforts are also needed for older students who struggle to remain engaged in school. One critical period that sets the stage for school completion is the transition to high school. The expectations at high school are often greater and students who struggle begin to demonstrate increased levels of disengagement (Balfanz et al., 2007). Unfortunately, at this point in time, there is more information available on the indicators of risk for school failure than there is information on effective interventions for increasing school engagement.

Common interventions employed by schools designed to enhance school engagement include partnering with families, creating safe schools, investing in relationships between staff and students, creating cooperative learning environments, and having high academic expectations (APA, 2012). Efforts to increase school engagement have primarily occurred at the school and classroom-level (Fredricks et al., 2004). There

is little research examining individual differences that are related to school engagement (Reschly, Huebner, Appleton, & Antaramian, 2008). One example of an intervention for high school students that is targeted at the individual is the Check & Connect mentoring intervention which is grounded in the relationship between the student and the mentor (Reschly & Christenson, 2012).

One important shift in the development of effective interventions was an emphasis on increasing school engagement and completion and rather than focusing on preventing dropout. This change resulted in the implementation of interventions targeted on fostering skills that students needed in order to successfully complete academic tasks. By supporting these skills, interventions were now targeting an increase in school engagement behaviors as related to school completion rather than simply try to *prevent* an outcome (Reschly & Christenson, 2012).

Theoretical Framework

The goal of this study was to explore whether a mindfulness-based intervention would increase school engagement behaviors. There are several three- and four-factor models of school engagement in the literature (Finn & Zimmer, 2012). For the purpose of this study, a three-factor model by Fredricks et al. (2004) that is one of the more commonly used approaches was selected to guide this study. Fredricks et al. (2004) conceptualized school engagement as a multidimensional construct with three interacting levels of engagement: cognitive, behavioral, and emotional. Cognitive engagement includes concepts such as self-regulation, goal-oriented learning, investment in learning, and metacognitive skills. These skills overlap in large part with those skills considered key to executive functioning (McCloskey, Perkins, & Divner, 2009). Behavioral

engagement is best described as behaviors that students engage in that positively contribute to the learning environment and are typically measured through attendance, classroom behavior, grades, and positive participation in classroom and extracurricular activities (Appleton, Christenson, & Furlong, 2008; Fredricks et al., 2004). Finally, emotional engagement describes the student's experience of being at school. Students with positive emotional engagement feel like they belong at school and are invested in the school environment (Appleton et al., 2008; Fredricks et al., 2004). These skills exist along a continuum for each student and may vary depending on the context.

This study focused on increasing the cognitive and behavioral engagement of participants by increasing their attention, cognitive flexibility, and emotion regulation skills via a mindfulness-based intervention. Since cognitive and behavioral constructs are core features of school engagement (Fredricks et al., 2004), it follows that if students were able to exercise better control of elements related to these factors (i.e., the executive functioning skills of attention, cognitive flexibility, and emotion regulation), they would be able to demonstrate higher levels of school engagement. There exists a strong link between mindfulness practices and increased overall executive functioning skills (Teper & Inzlicht, 2013). If mindfulness practices support the development of executive functioning skills, it is possible that mindfulness practices would also support cognitive and behavioral aspects of school engagement behaviors. At the core of school engagement is the individual student who interacts with the school environment with a unique set of skills and areas of need. The school engagement model outlines specific skills within the framework that are associated with school engagement. For example, Black and Fernando (2014) found that a mindfulness-based intervention supported the

development of executive function skills (i.e. attention and emotion regulation) and increased academic participation in elementary students. It stands to reason that if adolescent students demonstrate higher levels of these skills, they are more likely to be engaged and if not, it is proposed they would need to strengthen these skills in order to increase their school engagement. These skills include, but are not limited to, maintaining attention, cognitive flexibility, and emotion regulation skills. These are also skills that are positively correlated with mindfulness practices. The purpose of this study is to consider the relationship between the development of mindfulness skills and school engagement behaviors.

Mindfulness is a term that is used to describe a wide-variety of practices based upon Hindu, Buddhist, and Chinese meditation and medical traditions (Bishop et al., 2004; Tang & Posner, 2013). Psychological processes that are correlated with mindfulness practices include increased relaxation, sustained attention, working memory skills, cognitive flexibility, specific autobiographical memory, problem-solving skills, and acceptance (Chambers, Gullone, & Allen, 2009; Creswell, 2017). These techniques have also successfully been used with nonclinical populations to decrease negative affect, reduce anxiety, manage stress, improve interpersonal relationships, and increase attention and general executive functions (Chambers et al., 2009).

The relationship between mindfulness practices and increased ability to access executive function skills is of particular interest to researchers (Gallant, 2016). Much of the research has focused on the characteristic of the individual meditator in relation to performance on executive functioning tasks. For example, some studies have been completed comparing long-time meditators (practicing meditation for at least one year) to

nonmeditators to examine differences in their performance on various executive functioning tasks. One study looking at individual differences in neural activity in performance self-monitoring between long-time meditators and nonmeditators indicated that meditators demonstrated fewer errors during an inhibition task (Stroop task) and greater ability to self-monitor behavior (Teper & Inzlicht, 2013). Studies such as these suggest that engaging in meditation results in increased executive functioning abilities. Moreover, recent studies have indicated that engaging in meditation practices results in specific changes to the brain with even limited meditation practice (Chambers et al., 2009; Hölzel et al., 2011b). Based upon these findings, the possibility of using mindfulness-based practices to increase executive functioning skills in children and adolescents is an increasingly popular focus of research (Mak, Whittingham, Cunningham, & Boyd, 2018).

Much of the research on mindfulness-based interventions (MBIs) has been conducted with adults. There is, however, a growing body of literature demonstrating the effectiveness of this approach with children and adolescents (Dunning et al., 2019). For example, a study with ten children aged 11-15 diagnosed with ADHD examined the effects of an eight-week mindfulness program. The participants self-reported a reduction in externalizing, internalizing, and attention problems (van de Weijer-Bergsma, Formsma, de Bruin, & Bögels, 2012). Finally, another study completed with children ages 9 to 13 ($n=20$) utilizing Mindfulness-Based Cognitive Therapy (MBCT) resulted in improved attentional abilities (Semple, Lee, Rosa, & Miller, 2009). These types of studies provide support for MBIs as a promising practice with younger populations, but many of these studies have been completed with clinical populations in clinical settings.

Less is known about the effectiveness of school-based implementation of these types of programs.

Many of the school-based mindfulness interventions are simply modified versions of Mindfulness Based Stress Reduction (MBSR). Developed by Jon Kabat-Zinn in the 1980s, MBSR focuses on present moment awareness (both sensory and cognitive) and nonjudgmental awareness of thoughts and feelings (Kabat-Zinn, 2003). Curricula such as Soles of the Feet (Singh, Singh, Singh, Singh, & Winton, 2011), Learning to BREATHE (Broderick & Frank, 2014), MindUP Curriculum (Scholastic, 2011), and Mindful Schools (Mindful Schools, 2015) have been utilized with school-based facilitators to address populations at the universal, targeted, or intensive level (Burke, 2010; Felver, Doerner, Jones, Kaye, & Merrell, 2013; Metz et al., 2013). Preliminary research on these programs indicated that these practices can be successfully implemented with a school-based population. For example, the Learning to BREATHE curriculum provides both a six-week and an eighteen-week program for adolescents targeted at increasing emotion regulation, allowing for flexibility in implementation (Broderick, 2013). A pilot study utilizing the Learning to BREATHE curriculum with a general education population found small, but statistically significant, improvements in emotion regulation. In this study, the adolescents ($n=129$) participated in the six-week curriculum. At the end, participants reported increased emotion regulation skills as well as decreased stress levels (Metz et al., 2013). These studies add to an ever-growing body of research that supports the use of mindfulness interventions within school-based contexts to support development of skills that may serve as the foundation to school engagement.

Statement of the Problem

Graduation from high school is an important accomplishment for students as individuals without high school diplomas are at-risk for further negative outcomes such as unemployment and involvement in the justice system (Christenson & Thurlow, 2004). Increasing student engagement is a commonly cited method of encouraging school completion over the course of a student's academic career (Appleton et al., 2008; Balfanz et al., 2007; Reschly & Christenson, 2012). There is evidence that behavioral disengagement often precedes dropping out (Fredricks et al., 2004) and therefore, attention to interventions that increase school engagement are needed. School engagement is a large construct with multiple dynamic variables that include environmental and individual factors. Although much of the intervention research on student engagement focuses on addressing environmental factors, some students have issues that interfere with their ability to develop behaviors and skills that increase school engagement (Reschly & Christenson, 2012). These issues include difficulty with overall executive functions that support behavioral and cognitive engagement behaviors.

Therefore, this study focused on intervening at the individual level by attempting to help students develop the necessary executive functions that are related to core constructs in the school engagement model (Fredricks et al., 2004). Specifically, the purpose of this study was to explore whether participation in a mindfulness program resulted in greater levels of executive functioning and increased school engagement. The results of this study may contribute to the growing body of literature supporting the use of mindfulness interventions with youth who are at risk for school dropout due to poor cognitive and behavioral engagement or as a preventive intervention to support the

development of fundamental executive functioning skills that support school engagement. That is, the use of these preventive interventions may help increase self-regulation skills and support behaviors that allow these youth to experience increased school engagement. Using multiple, single subject designs, the researcher investigated the effectiveness of a mindfulness-based intervention on the cognitive and behavioral aspects of student engagement. The participants for this study were drawn from students attending an urban charter school.

Research Questions

- Q1 Does participation in a six-week, 6 to 10-session mindfulness intervention increase school engagement as measured by indicators of cognitive engagement (e.g., emotional regulation, cognitive flexibility, and attention).
- H1 Participation in a six-week (6 to 10 sessions) mindfulness intervention will increase school engagement as measured by indicators of cognitive engagement (problem solving ability, executive functioning).
- Q2 Does participation in a six-week, 6 to 10-session mindfulness intervention increase school engagement as measured by indicators of behavioral engagement (e.g., attendance, grades, on-task behavior, and teacher report).
- H2 Participation in a six-week (6 to 10 sessions) mindfulness intervention will increase school engagement as measured by attendance, grades, on-task behavior, and teacher report).

Delimitations

In this study, the focus was on the alterable, individual factors that contribute to school engagement. Other environmental factors such as school culture and family involvement were recognized as relevant, but beyond the scope of the current study. Moreover, the emphasis was directed towards understanding the specific impact of a group intervention on individual level variables. The use of single subject design allowed

the researcher to monitor potential changes in participants' behavior that might coincide with their participation in the mindfulness intervention. Further, a small sample size was selected as a function of the group delivery method and to allow for more depth in measuring outcomes. Finally, there were some limits to the constructs measured as specific areas of executive functions (e.g., attention, cognitive flexibility, and emotion regulation) are often interrelated to other skills and difficult to isolate.

Definition of Terms

Behavioral engagement. Behavioral engagement is one of the components of school engagement. It is focused on the student's participation in the educational environment by following behavioral expectations, attending class, and contributing to the learning environment (Fredricks et al., 2004; Wang & Holcombe, 2010).

Cognitive engagement. Cognitive engagement is one of the components of school engagement. A student's cognitive engagement is conceptualized as investment and engagement in the process of learning and mastering skills and the active use of self-regulation strategies (Fredricks et al., 2004; Wang & Holcombe, 2010).

Cognitive flexibility. Cognitive flexibility is an element of executive function. It describes the ability to shift between tasks and/or mental states. At times, it is also referred to as "shifting" (Müller & Kerns, 2015).

Emotion regulation. Emotion regulation (ER) can be defined as a set of processes that control not only the amount of stimulation coming in, but also a means to modulate the arousal response to that stimuli (Chambers et al., 2009). Emotion regulation is often used interchangeably with "self-regulation."

Emotion regulatory flexibility. Emotion regulatory flexibility is a theory of emotion regulation proposed by Bonanno and Burton (2013). In this model of emotion regulation, self-regulatory strategies are a dynamic process dependent upon context sensitivity, regulation repertoire, and response to feedback. Context sensitivity is the ability to assess both the regulatory demands of a situation and the opportunities to support regulation as the situation evolves while also selecting appropriate response strategies. Within this construct is also a focus on individual differences in one's repertoire of regulatory strategies and ability to adjust responses based upon environmental feedback (Bonanno & Burton, 2013).

Emotional engagement. Emotional engagement, often used interchangeably with psychological engagement, is one component of school engagement. This type of engagement describes the student's emotional interaction and identification with the educational environment. A student's positive and negative perceptions of the school, staff, and peers is believed to influence their emotional investment in being a member of the school community (Fredricks et al., 2004; Wang & Holcombe, 2010).

Executive functioning. Executive functioning describes an interconnected set of skills that includes the ability to plan, maintain attention, inhibit behavior, initiating behavior, the ability to flexibly shift emotionally and cognitively, self-monitoring, and emotionally regulate (McCloskey et al., 2009).

Mindfulness. Broadly defined, mindfulness can be described as a way of intentionally focusing attention to the present moment without judgment (Kabat-Zinn, 2003). Depending on the approach, mindfulness practices can include traditional meditation practices (both walking and sitting), guided meditations, breath awareness,

yoga, sensory-related practices, and focused attention on present moment awareness (Kabat-Zinn & Hanh, 2013).

Mindfulness-Based Cognitive Therapy (MBCT). MBCT is a manualized mindfulness intervention that is based largely on Mindfulness-Based Stress Reduction. Developed by Teasdale, Segal, and Williams to prevent relapse of symptoms of major depression, this eight-week group intervention focuses on attentional control and decentering or detachment from one's thoughts (Teasdale et al., 2000)

Mindfulness-Based Stress Reduction (MBSR). Mindfulness-Based Stress Reduction is the most commonly researched of the mindfulness-based therapies. Developed by Jon Kabat-Zinn in the 1980s, MBSR focuses on present moment awareness (both sensory and cognitive) and nonjudgmental awareness of thoughts and feelings (Kabat-Zinn, 2003).

Mindfulness-Based Interventions (MBIs). This broad term encompasses a range of practices that incorporate mindfulness practices as part of the treatment modality. These practices include MBSR, MBCT, Dialectical Behavioral Therapy (DBT), Acceptance and Commitment Therapy (ACT), and specific mindfulness curricula such as Soles of the Feet (Singh et al., 2011), Learning to Breathe (Broderick, 2013), MindUP Curriculum (Scholastic, 2011), A Still Quiet Place (Saltzman, 2014), and Mindful Schools (Mindful Schools, 2019).

School engagement. School engagement is a multifaceted construct consisting of three interrelated factors: behavioral engagement, cognitive engagement, and emotional engagement. These factors are dynamic, malleable, and exist on a continuum (Fredricks et al., 2004).

Summary

Many students struggle to complete high school. Failure to complete high school is associated with a range of adverse outcomes (APA, 2012). Due to the importance of completing secondary education, this study focused on supporting high school students considered at-risk for school noncompletion. In order to contribute to the current body of literature on individualized interventions to support school engagement, a small-group, targeted intervention was selected. Building on the growing body of evidence linking mindfulness-based practices and executive function skills, a mindfulness-based intervention in order to determine if these practices positively contribute to the development of executive functioning skills that are hypothesized to support academic success. Using Fredricks et al. (2004) tripartite model of school engagement (cognitive, behavioral, and emotional engagement), participants' response to the mindfulness-based intervention was monitored using single-subject design over the course of a six-week mindfulness-based intervention.

CHAPTER II

REVIEW OF LITERATURE

In order to examine the effect of a mindfulness-based intervention on executive functioning skills hypothesized to support school engagement behaviors, an overview of the school engagement model is provided. The primary research question focused on whether participation in a mindfulness-based intervention increased the executive functioning skills (i.e. attention, cognitive flexibility, and emotion regulation) of adolescents who were considered at risk for school completion. To that end, an overview of executive functioning and the specific identified domains is presented. Finally, a description of mindfulness and the research supporting the use mindfulness-based interventions with children to support both executive functioning and school engagement are presented.

School Engagement

School engagement is a popular topic in education (Appleton et al., 2008; Eccles, 2016; Reschly et al., 2007). A high level of school engagement is hypothesized to increase the likelihood of a student completing high school (Appleton et al., 2008; Archambault, Janosz, Morizot, & Pagani, 2009; Fredricks et al., 2004; Rumberger & Rotermund, 2012). The basic idea is that the more students feel involved and connected to their learning environment, the more likely they are to show up and participate in the educational programming. This construct is a useful tool for conceptualizing a student's interaction with the educational environment because it is multifaceted, focuses on

factors that are malleable, and recognizes levels of engagement along a continuum (Fredricks et al., 2004).

According to the model of school engagement developed by Fredricks et al. (2004), there are three primary constructs including cognitive engagement, behavioral engagement, and emotional engagement. The direct evidence for the relationship between school engagement and school completion is tentative; however, it hypothesized that engagement functions as a mediator between the context and outcomes (Reschly et al., 2007). The primary model of school engagement also focuses on school engagement at the individual, classroom, and school level (Fredricks et al., 2004). For example, level. school-level factors include student participation in school policy, cooperative relationships between staff and students, and small school environments (Fredricks et al., 2004). Classroom-level factors describe the amount of academic and emotional support provided by teachers, peer relationships, and general classroom structure (Fredricks et al., 2004). Finally, the individual level of school engagement focuses on the needs of the student, including the need to feel connected, autonomous, and competent (Fredricks et al., 2004). There is evidence to support the importance of considering student-targeted factors with a focus on alterable variables (i.e., attendance, academic performance, behavior) when designing interventions to support school engagement and completion (Archambault et al., 2009; Reschly & Christenson, 2012).

One of the challenges to conducting research on school engagement is that the overarching construct of school engagement is composed of several sub-constructs that are in turn, made up of additional complex constructs. Due to the complexity of these underlying constructs, it has been challenging for researchers to evaluate which elements

of this large concept are most relevant to school completion and, by extension, which interventions are most effective in supporting students to remain in school. Another critique of the current body of knowledge on student engagement is the absence of research on individual differences and how these factors may influence a student's ability to complete school (Archambault et al., 2009; Reschly et al., 2008). While consideration of larger contextual factors (e.g., school environment, curriculum, student-teacher relationships) is important, there is evidence to support the importance of individual differences in relation to school engagement. It may be that both environmental and individual models used together provide the most comprehensive model to explain school engagement.

Self-determination theory provides another lens on school engagement. Within this framework, it is the individual's need for autonomy and competence that interact with the environment that results in different levels of engagement (Wang & Holcombe, 2010). A three-year longitudinal study completed with 293 middle and high school students provided evidence that when students experienced positive emotions at school associated with their individual development of a wider repertoire of coping mechanisms, they demonstrated improved cognitive and behavioral skills (Reschly et al., 2008). These results support further investigation into the use of interventions to specifically promote the development of individual skills in students that are associated with student engagement behaviors.

Adding to the complexity to the school engagement framework is the inconsistent procedures used to measure the various constructs, which are also inconsistently delineated (Fredricks & McColskey, 2012). Some of the most common procedures for

measuring engagement include student self-report, parent and teacher ratings, direct observation, educational artifacts (e.g., attendance rates, grades), interviews, and experience-sampling methods (ESM) (Fredricks & McColskey, 2012). Historically, the use of self-report results has been the most popular method for collecting student engagement data so that the student's internal experiences can be accessed. These data are particularly helpful when attempting to assess cognitive and emotional engagement (Fredricks & McColskey, 2012). As with all data collection, it is best to use multiple assessment instruments and modalities in order to ensure sufficient information has been collected for meaningful interpretation. Despite the different conceptualizations, instruments, and explanations of school engagement, most agree that behavioral engagement in school is critical to success.

Behavioral Engagement

Behavioral engagement is perhaps the most concrete construct in the school engagement model; it is defined as positive engagement in the classroom and larger school environment (Appleton et al., 2008; Fredricks et al., 2004; Reschly & Christenson, 2012). These behaviors can consist of the following of school rules, active participation in the classroom, and involvement with extracurricular activities. The individual skills required to engage in these behaviors might include motivation and emotion regulation, as well as many others. Behavioral engagement has been measured through teacher report, student self-report, review of academic progress (e.g., work completion, credits earned toward graduation), and direct observation (Appleton et al., 2008; Fredricks et al., 2004; Fredricks & McColskey, 2012; Wang & Holcombe, 2010). Behavioral engagement has been associated with a variety of positive outcomes such as higher

achievement, school completion, and general well-being (Reschly et al., 2007).

Interventions to support behavioral engagement often occur at the school-wide level and include community building interventions such as creating smaller learning environments and promoting proactive school policies, as well as encouraging practices that allow students to participate in the community (Reschly et al., 2007).

Cognitive Engagement

Cognitive engagement is primarily focused on the student's investment in learning and the underlying skills needed to be able to benefit from instruction. These underlying skills are generally related to executive functioning skills. Primarily, cognitive engagement is conceptualized as the willingness to learn, self-regulated learning, or metacognitive skills (Archambault, et al., 2009; Fredricks et al., 2004). The measurement of cognitive engagement is often completed through the utilization of measures of metacognition that measure the student's ability to self-report their cognitive processes, organizational strategies, and self-monitoring (Fredricks et al., 2004).

Emotional Engagement

Emotional engagement, often used interchangeably with psychological engagement, is the third component of school engagement. This type of engagement describes the student's emotional interaction and identification with the educational environment. A student's positive and negative perceptions of the school, staff, and peers is believed to influence their emotional investment in being a member of the school community (Fredricks et al., 2004; Wang & Holcombe, 2010). Emotional engagement is most often assessed through student self-report, although teacher ratings are also common (Fredricks & McColskey, 2012).

While much of the research on school engagement has assessed each of these constructs separately, increasingly these constructs are understood to be dynamically connected (Li & Lerner, 2013). Research has demonstrated unique relationships between behavioral and emotional engagement, behavioral and cognitive engagement, and emotional and cognitive engagement (Li & Lerner, 2013; Pietarinen, Soini, & Pyhältö, 2014). For example, Li and Lerner (2013), using a self-report rating scale of school engagement, found moderate correlations between the three constructs. More specifically, they found that emotional engagement was predictive of future behavioral and cognitive engagement and behavioral engagement was predictive of future emotional and cognitive engagement (Li & Lerner, 2013). The research on the relationship between the individual constructs is still early in development, but these results support the broader school engagement construct.

Mindfulness

One of the hypotheses in this study is that a student's executive functioning skill development affects their school engagement behaviors. Specifically, the executive functioning skills of attention, cognitive flexibility, and emotion regulation were targeted as highly relevant to school engagement behaviors. Due to a growing body of research linking mindfulness practices and executive function, a mindfulness-based intervention (MBI) was implemented. The following sections will provide an overview of mindfulness, mindfulness interventions (with a focus on children and adolescents and school-based interventions), and the relationship between mindfulness, executive function (with a focus on attention, cognitive flexibility, and emotion regulation), and school engagement.

As previously stated, mindfulness is a term that is commonly used to describe a wide-variety of practices that evolved from eastern spiritual and medical traditions (Creswell, 2017; Tang & Posner, 2013). Over recent years, mindfulness has become a prevalent topic in research, education, and popular culture (Schonert-Reichl & Roeser, 2016). So, what is mindfulness? Broadly defined, mindfulness can be described as a way of intentionally focusing attention to the present moment without judgment (Kabat-Zinn, 2003). This manner of paying attention to the present contrasts sharply from our current lifestyle in the United States where being distracted and on “autopilot” is a more common way of interacting with the world (Siegel, 2007). Instead of this type of limited experience, mindfulness practices can result in an awakening of the mind to the present moment and our experience of that moment.

Depending on the approach, mindfulness practices can include traditional meditation practices, guided meditations, breath awareness, yoga, sensory-related practices, and focused attention on present moment awareness (Kabat-Zinn & Hanh, 2013). Although mindfulness practices may use any combination of the approaches described above, there are some common threads within different mindfulness traditions. For example, all mindfulness practices have a focus on the breath, increasing awareness of the present moment experience, and nonjudgmental awareness. The focus on the breath is a foundational element as the breath is always available to our awareness, grounds the individual in a physical sensation, and generally, is a neutral stimulus. Moreover, the focus on the breath also supports the self-regulation of attention (Bishop et al., 2004). Nonjudgmental awareness is another key feature of mindfulness practices that make them distinctive from other behavioral therapies. Nonjudgmental awareness of

one's thoughts and experiences is utilized as a tool to depersonalize experiences and increase emotion regulation, decrease emotional distress to these experiences, as well as increase metacognitive skills as practitioners become more aware of their thought processes (Bishop et al., 2004).

As mindfulness is a commonly used term that can perhaps be overused to describe practices that might be better described as coping strategies or confused with religious practices, it is also helpful to describe what mindfulness is not. For example, deep breathing is a commonly used coping skill, but taken alone, is not a mindfulness practice. One common misconception is that mindfulness practices are grounded in religious beliefs including Buddhist, Jewish, Christian, Hindu, Islamic, and Taoist teachings (Siegel, 2007). While aspects of mindfulness are commonly found in a variety of religions, the mindfulness approach practiced within educational and therapeutic settings is secular with no religious affiliation (Creswell, 2017). Another common misperception is that mindfulness is simply a form of meditation. Although meditation is an essential component of mindfulness practice, mindfulness practices have their own specific routines that may differ from many meditative traditions. Finally, one other common misperception of mindfulness practices is that they are synonymous with simply paying attention. Again, while attention to the present moment is a key feature of these practices, it is only one component of a larger theoretical framework and system.

Mindfulness-Based Interventions

In recent years, there has been an increasing amount of research completed on mindfulness-based interventions (MBIs) (Khoury et al., 2013; Schonert-Reichl & Roeser, 2016). Mindfulness-based interventions are generally considered to be part of the

“Third-Wave” of cognitive behavioral therapies (Baer, 2003). Third-wave behavioral techniques are characterized by approaching maladaptive thoughts through a lens of acceptance. Instead of attempting to change one’s thoughts, clients change their relationship with or experiencing of these thoughts (O’Brien, Larson, & Murrell, 2008). Mindfulness has been extensively researched in regard to specific mental health issues in clinical populations. MBIs have been found to be effective treatments for ameliorating symptoms for major depression, anxiety, psychosis, substance abuse, trauma, eating disorders, and Attention Deficit/Hyperactivity Disorder (Chambers et al., 2009; Hofmann, Sawyer, Witt, & Oh, 2010; van de Weijer-Bergsma et al., 2012). Also, these techniques have been used successfully with nonclinical populations to decrease negative affect, reduce anxiety, manage stress, improve interpersonal relationships, and increase attention and executive functions (Chambers et al., 2009). A criticism of some of the early mindfulness research was the lack of rigor or consistency in the construction of the experiments (Dunning et al., 2019). For example, a few consistent criticisms included the absence of a clearly operationalized definition of mindfulness, lack of control groups, small sample sizes, and inconsistent measurement of constructs (Bishop et al., 2004; Creswell, 2017).

One of the most commonly researched mindfulness programs is Mindfulness Based Stress Reduction (MBSR) developed by Jon Kabat-Zinn (Goldin & Gross, 2010). Kabat-Zinn, a medical doctor, is considered a pioneer in the introduction of mindfulness-based practices. Although the practice of mindfulness had been used for centuries in the eastern hemisphere, it was not until the early 1980s that Kabat-Zinn introduced this concept into western medicine. MBSR focuses on present moment awareness (both

sensory and cognitive) and nonjudgmental awareness of thoughts and feelings (Kabat-Zinn, 2003). Participants in MBSR attend an eight-week group session program that directly teaches these skills and requires daily practice. Kabat-Zinn (2003) explains his motivation for introducing these practices as two-fold. First, MBSR was conceptualized as a means to relieve the suffering of patients with complex and/or intense pain and illness who had been resistant to other forms of treatment. Secondly, MBSR was considered to serve as a template or model of effective service delivery for treating a wide-range of psychological and medical diagnoses (Kabat-Zinn, 2003).

Eventually, mindfulness practices were incorporated into several formal interventions. In England, Mindfulness-Based Cognitive Therapy (MBCT) was developed by Segal, Williams, and Teasdale in 1995, primarily to prevent relapse of major depressive disorder (Baer, 2003; Teasdale et al., 2000). MBCT utilizes a more specific cognitive model and operationalized definition of mindfulness than MBSR (Chambers et al., 2009). The primary goal of MBCT is to encourage participants to detach from the thoughts associated with depression thereby decreasing their tendency to ruminate (Baer, 2003). MBCT has also been adapted for use with children (i.e., MBCT-C; O'Brien et al., 2008). The adaptations for this population include shorter periods of formal mindfulness practice, focus on sensory experiences, and inclusion of the family (O'Brien et al., 2008). Casting a wider net, several empirically supported therapeutic interventions incorporate elements of mindfulness. For example, some of these practices are incorporated into Dialectical Behavior Therapy and Acceptance and Commitment Therapy (O'Brien et al., 2008).

A meta-analysis of MBIs that controlled for some of the identified research limitations indicated that MBIs were more effective when used to treat psychological disorders than when used to treat physical or medical conditions (Khoury et al., 2013). This analysis included 209 studies with a focus on research that implemented a mindfulness intervention directly to participants and that reported enough data to calculate an effect size. The researchers also included criteria around the use of established protocols, the training of those delivering the intervention, and the number of sessions in the intervention phase (Khoury et al., 2013). The effect size for MBIs was found to be moderate to large (effect sizes of .72 for anxiety and .66 for depression) (Khoury et al., 2013). Although mindfulness programs were initially used to manage medical conditions, the results from this meta-analysis supported the use of MBIs for treating anxiety and depression. Additionally, these results supported the efficacy of mindfulness interventions with a wide-variety of populations when certain standards were maintained. The most robust evidence supports the use of mindfulness-based interventions in preventing relapse in depression and substance abuse (Creswell, 2017).

Based on these promising results with adult populations, research on the effects of mindfulness-based interventions with children has become a popular research topic. Many studies targeted similar behaviors and/or mental health diagnoses that were researched with adult populations (e.g., mood disorders, trauma, ADHD symptoms), but there has also been a focus on more youth-specific behaviors such as aggression and disruptive behaviors (Creswell, 2017). Research with youth lags behind research with adults, and the body of evidence for the efficacy of MBIs with youth is still early in its development (Klingbeil et al., 2017). Much of the research with youth have focused on

school-based interventions. For example, a recent meta-analysis of group-design mindfulness interventions with youth included 78 studies, 49 of which were completed in schools (Klingbeil et al., 2017). A large portion of the early research assessed the feasibility of implementing MBIs in the schools. As the field has evolved, the outcomes of focus have increasingly concentrated on disruptive behavior, executive function, internalizing disorders, and academic achievement (Klingbeil et al., 2017). Similar to the critiques of the research with adults, there is a limited amount of robust evidence to support that MBIs are more effective with younger populations than other interventions (i.e. established CBT therapies) (Renshaw, Fischer, & Klingbeil, 2017). The current state of the research remains in the realm of a “promising” practice, but not established.

Many of the MBIs originally designed for and implemented with adults have been modified for use with children and adolescents. For example, MBCT was adapted by Segal and Lee in 2002. Mindfulness-based cognitive therapy for children (MBCT-C) incorporates most of the elements of the adult version, but in order to meet the developmental needs of children, the sessions are shorter, practices are broken into shorter periods and interspersed throughout the sessions, and group sizes are smaller (Semple et al., 2009). A proliferation of programs designed for children and/or adolescents has also emerged over the last several years. Curricula such as Soles of the Feet (Singh, et al., 2011), MindUP (Scholastic, 2011), A Still Quiet Place (Saltzman, 2014), Learning to BREATHE (Broderick & Frank, 2014), and Mindful Schools (Mindful Schools, 2015) have been developed and utilized with school-based facilitators and populations as universal, targeted, or intensive interventions (Burke, 2010; Felver et al., 2013; Metz et al., 2013). Early studies on these curricula indicate that these practices

can be successfully implemented in the school setting. These studies add to an ever-growing body of research that supports the use of mindfulness interventions within youth in school-based contexts.

Mindfulness in Schools

As interest with mindfulness-based interventions as a promising intervention to support the development of important school-related behaviors and skills has grown, the amount of research on these interventions has also rapidly increased (Meiklejohn et al., 2012; Renshaw et al., 2017). Considered within the layered intervention systems commonly found in schools, the potential utility of MBIs as both a universal (Tier 1) and targeted intervention (Tiers 2 and 3) has been advocated (Felter et al., 2013; Renshaw et al., 2017).

In an attempt to synthesize the findings of published studies on the effects of MBIs with youth, several meta-analyses or systematic reviews have been published in recent years (Carsley, Khoury, & Heath, 2018; Dunning et al., 2019; Klingbeil et al., 2017; Mak et al., 2018; Zenner, Herrnleben-Kurz, & Walach., 2014; Zoogman, Goldberg, Hoyt, & Miller, 2015). Several of these meta-analyses specifically review school-based studies (Felter, Celis-de Hoyos, Tezanos, & Singh, 2015; Zenner et al., 2014). Even with the meta-analyses, extrapolating results is made difficult by the heterogeneity of the studies (e.g., different interventions, developmental ages, measures used, lack of replication).

The research with school-based interventions with adolescents has mostly focused on feasibility of intervention, general well-being, and management of mental health symptoms, and less attention has been paid to educational outcomes (Rawana, Diplock,

& Chan, 2018). In regard to feasibility, outcomes were positive. For example, Bluth et al. (2016) implemented the Learning to BREATHE curriculum with a diverse sample of students with a history of academic challenges. After initial resistance, the participants became more invested and attendance exceeded similar studies. Across research studies, both adolescents and school staff have responded positively to MBIs (Zenner et al., 2014). General well-being (e.g., stress levels, positive affect) have also been reported to improve after participation in this type of programming (Rawana et al., 2018; Zenner et al., 2014). Management of mental health symptoms has been mixed. Similar to adults, anxiety and depression were often improved through participation in MBIs (Rawana et al., 2018). As noted, there were few studies that incorporated academic and/or executive function outcomes. Most recently, in a review of the research, Rawana et al. (2018) reported positive academic outcomes based upon grades, attendance, and teacher report and improved executive functioning. For example, Bakosh, Mortlock, Querstret, and Morison (2018) found improvements in academic performance (i.e. grades) with an elementary school population that participated in a mindfulness-based intervention.

There are a few MBIs that were designed to be implemented specifically in schools. For example, the MindUP program was designed for use with school-aged children from Kindergarten to 8th grade (Scholastic, 2011). These curricula are designed to be universally implemented and led by the teacher. Additionally, these curricula provide suggestions on ways to integrate mindfulness into various areas of the curriculum (e.g., math, reading, science). There are also several short, structured mindfulness practices to complete throughout the day. An RCT study with elementary students

utilizing the MindUP curriculum yielded significant improvements in executive functioning, feelings of well-being, and prosocial behavior (Schonert-Reichl et al., 2015).

The Mindful Schools (MS) curriculum was designed to be implemented in urban and under-resourced public schools (Mindful Schools, 2015). The Mindful Schools curriculum was designed to be delivered in 15- to 30-minute modules that can be easily integrated into the school environment and adapted to meet the needs of diverse environments (Mindful Schools, 2019). Research on the MS curriculum is early in development. In a program evaluation of the MS program, changes in students' behavior, attention, mindfulness, and transition time were evaluated (Smith, Guzman-Alvarez, Westover, Keller, & Fuller, 2012). Using random assignment and a control group, three elementary schools (K-5) in an urban school district participated in the MS program (two receiving the intervention and one control group). One of the treatment groups receiving MS instruction also received additional teacher development on implementing mindfulness practices in the classroom. In total, there were 800 students across all three settings and 15 or 16 participating teachers in each school. Students were evaluated using a standardized rubric. Students' attentional abilities were also assessed with the Attention Network Test for Children (ANT-C) as well as their use of mindfulness based on a modified version of the Child and Adolescent Mindfulness Measure (CAMM; Kuby, Mclean, & Allen, 2015). The results from the program evaluation indicated marginal, but not statistically significant, improvements short-term overall improvements for both treatment groups in observable behaviors. In the areas of paying attention and participation, there were statistically significant improvements when compared to the control group. There was no change in self-control or social behaviors. Similarly, the

results from the ANT-C indicated no change in attentional abilities. There were significant improvements in transition from recess in the treatment groups (Smith et al., 2012).

A study completed by Black and Fernando (2014) at an urban elementary school used the same rubric assessing attention, self-control, participation, and caring/respect. Students were randomly assigned to two treatment groups: Mindful Schools (five weeks long; 15-minute sessions three times per week) or Mindful School plus an additional seven weeks of weekly classes (total of 12 weeks and 22 sessions). Across both groups, improvements were reported in all four areas, but only attention improved with the additional sessions (Black & Fernando, 2014). The results from these studies indicate that Mindful Schools curriculum may have positive effects on student behavior and academic engagement. No published studies were found that described the utilization of the MS curriculum with adolescents. The results from these studies provide a great deal of information about the potential effects of mindfulness-based interventions implemented in schools, but there still remain many questions in regard to the specific contexts, populations, and format of the interventions that can be described as an established intervention to support students.

Neural Mechanisms of Mindfulness

One of the primary research questions explored in mindfulness research with both youth and adults is the underlying mechanism of mindfulness. Over the past two decades, the amount of research on mindfulness utilizing brain-scanning techniques such as fMRI has increased and provided some information as to why mindfulness practices result in behavioral changes and neural response (Tang, Hölzel, & Posner, 2015). For example,

the relationship between mindfulness practices and increased ability to access executive function (EF) skills is of particular interest to researchers. Randomized-control trial studies have produced evidence that mindfulness improves performance on measures of sustained attention (Felver, Tipsord, Morris, Racer, & Dishion, 2017; Jensen, Vangkilde, Frokjaer, & Hasselbach, 2012; Tarrasch, 2018), working memory (Jha et al., 2019), and task switching (Purohit & Pradhan, 2017).

At the core of mindfulness-based theories of change is the concept of neural plasticity (Gallant, 2016; Meiklejohn et al., 2012; Moses & Choudhury, 2016). For example, one RCT study on the effects of MBSR training completed by Hölzel et al. (2011a) demonstrated increased gray matter density in the left hippocampus, an area of the brain associated with arousal and emotion regulation. In regard to neuroplasticity, the hippocampus is also known for its ability to generate new neurons (Hölzel et al., 2011a). The authors also found alterations in the post cingulate cortex, left temporoparietal junction, and cerebellum (Hölzel et al., 2011a). Due to the inconsistent research methods (e.g., data collection, mindfulness interventions), there is a high degree of variability across the research in the areas of the brain that are found to be relevant to mindfulness interventions (Tang et al., 2015). Several areas of the brain often identified include the cerebral cortex (multiple prefrontal areas, anterior cingulate cortex, frontopolar cortex, mid-cingulate cortex, orbitofrontal cortex), subcortical grey matter, subcortical white matter, cerebellum, brain stem, amygdala, striatum, and insula (Tang et al., 2015). The diversity of the findings also suggests that the neural mechanism of mindfulness involves not specific brain structure but neural networks (Tang et al., 2015).

As research has accumulated, evidence of the complexity of the effects of mindfulness interventions is becoming more apparent. For example, a meta-analysis of RCT mindfulness-based interventions with youth showed that MBIs had a greater effect on adolescents than younger children (Dunning et al., 2019). Because the brain is not fully developed until young adulthood, it stands to reason that mindfulness practices would have different effects at different points of development, but the exact nature of these difference is not fully understood (Dunning et al., 2019). Another variable is the past meditation experience of study participants. The neural mechanisms at play may differ between individuals who are learning the skill of mindfulness compared to individuals who have mastered it (Tang et al., 2015).

More neural mechanisms will be elaborated below in relation to specific EF areas (attention, cognitive flexibility, and emotion regulation), with a focus on research with adolescent populations. Due to the high neuroplasticity associated with adolescent development combined with higher cognitive skills than younger populations and increased rates of psychopathology, adolescents have been identified as a unique population within which to study the mechanism of mindfulness (Felver et al., 2017; Moses & Choudhury, 2016). Because aspects of brain functioning are still developing, adolescence presents a unique opportunity for intervention to support healthy development (Carsley et al., 2018).

Executive Function

Executive functions are essential skills that children and adolescents need in order to be successful in school as these skills support their ability to acquire knowledge for both academic and social success (Blair & Diamond, 2008; Denckla & Mahone, 2018;

Liew, 2012). Like school engagement, executive functioning is an umbrella term that includes many dynamically-related areas of cognitive functioning largely housed in the prefrontal cortex (Goldstein, Naglieri, Princiotta, & Otero, 2014). Some commonly cited executive functioning skills are attention, cognitive flexibility, emotion regulation, initiation, inhibition, goal setting, planning, organization, self-monitoring, and working memory. Of particular relevance to mindfulness, executive function has been described as the mechanisms that allow an individual to respond rather than react to external stimuli (Denckla & Mahone, 2018). Several educational disabilities (e.g., ADHD, specific learning disabilities) are characterized by executive function deficits, which speaks to the importance of these skills for academic achievement (Denckla & Mahone, 2018).

Throughout mindfulness research, the interaction between mindfulness practices and increased executive function skills is a prominent theme (Bishop et al., 2004). Another element of executive functioning that is relevant to school engagement includes metacognitive skills that support cognitive engagement (Bishop et al., 2004). Metacognition is often described as thinking about one's own thinking (McCloskey et al., 2009). In fact, in their operational definition of mindfulness, Bishop et al. (2004) described mindfulness as the practice of metacognition.

Attention

The skill of attention and the associated neural networks have been hypothesized to be a cognitive process that underlies many cognitive and psychological processes (Posner & Rothbart, 2007; Ristic & Enns, 2015). The ability to maintain attention to selective stimuli is essential for academic and social success. Attentional deficits are

considered to be a prominent feature in many developmental disabilities and are directly related to academic deficits (Denckla & Mahone, 2018).

Despite the fact that attention is essential to all cognitive processes and considered a key component to executive functioning, there is no agreed upon definition of attention (Ristic & Enns, 2015). Across development, attention involves the ability to register stimuli, orient to its source, and focus on input of that new information. The efficiency of this process improves throughout development (Rueda et al., 2004). In one model of attentional development, attention begins as response to cuing and increasingly develops into effortful control (Posner & Rothbart, 2007). This model of attention is also referred to as executive attention and “involves mechanisms for monitoring and resolving conflict among thoughts, feelings, and responses” (Posner & Rothbart, 2007, p. 7). The development of executive attention is a necessary prerequisite for both self-regulation and cognitive flexibility as these skills require the active selection and modulation of stimuli (Posner & Rothbart, 2007; Sanger & Dorjee, 2015). There are also models that include combinations of these constructs and incorporate sustained attention (i.e., maintaining attention during long, repetitive, unarousing tasks) and selective attention (i.e., maintaining attention with conflicting stimuli) (Tang et al., 2015). Research on attention and mindfulness with youth commonly refer to the tripartite model of attention and may include sustained and selective attention within that framework.

Mindfulness and Attention

Attention is hypothesized to be one of the areas of executive functioning most directly improved through mindfulness practices (Mak et al., 2018; Tang et al., 2015; Tarrasch, 2018; Zoogman et al., 2015). For example, mindfulness-based practices train

the individual to notice when their mind wanders and refocus attention on the present moment. Although mind-wandering is linked to creativity, there is also evidence that individuals with higher rates of this trait have more learning difficulties (Mooneyham & Schooler, 2013; Sanger & Dorjee, 2015).

The evidence supporting increases in attentional ability when mindfulness practices are introduced is particularly robust with both adults and youth. For example, one study with 17 adult participants who participated in an MBSR course as compared to a control group, demonstrated increased ability in selective and receptive attention (Jha, Krompinger, & Baime, 2007). In a study with adolescents who were diagnosed with ADHD, and were assessed with direct measures of attention in the form of rating scales and a computerized attention test (van de Weijer-Bergsma et al., 2012), indicated a significant increase in attentional abilities and general executive functions after participating in a mindfulness program. The results from the computerized attention assessments supported these responses as well (effect size was high with $d=1.0$). The participants' reaction time slowed on the task and they made fewer errors on the task. These results indicated that the participants were not only able to better maintain attention, but to monitor their responses and make fewer errors. At an 8-week follow-up, the participants maintained these improvements in EF skills (effect size for speed was moderate with $d=0.7$).

Another study was targeted specifically at increasing the attentional abilities of elementary students (Napoli, Krech, & Holley, 2005). With 194 elementary students who attended 12 one-hour mindfulness sessions, direct measures of attention and teacher reports of behaviors related to attention problems were completed pre-/post-intervention.

There were moderate effect sizes on measures of attention ($d=0.49$), social skills ($d=0.47$), test anxiety ($d=0.39$), and selective attention ($d=0.60$). The results supported the hypothesis that mindfulness interventions would result in increased selective attention skills and decreased attention-related behavioral problems among students (Napoli et al., 2005).

In a meta-analysis of research on MBIs focusing on executive function and attention in children and adolescents, Mak et al. (2018) reported promising findings of EF and/or attentional improvements. Changes in attentional abilities are most commonly assessed through the use of self-report, pen-paper measures (i.e. Trail-Making Test and Stroop), and computerized assessments (Mak et al., 2018; van de Weijer-Bergsma et al., 2012), with the latter methodology appearing to be more sensitive to subtle differences. The Attention Network Task (ANT) is a computerized task that is commonly employed as a measure of orienting and executive attention (Sanger & Dorjee, 2015; Tang et al., 2015; Zylowska et al., 2008). Using the ANT to measure change in adults and adolescents with ADHD after a MBSR-adapted intervention, Zylowska et al. (2008) reported statistically significant improvement in executive attention. The anterior cingulate cortex (ACC), a key area of the brain for the regulation of attention, appears to be most connected to the neural changes resulting from the mindfulness practice (Tang et al., 2015). Alterations in the dorsolateral prefrontal cortex have also been observed (Tang et al., 2015). Both functional and structural changes in the brain have been observed, although these do not fully explain the changes in attentional control (Tang et al., 2015). Taken collectively, the current body of evidence is promising and supports the hypothesis

that engaging in mindfulness practices may increase the foundational attentional skills that students need to cognitively engage in school.

Cognitive Flexibility

Cognitive flexibility is another element of executive function. It describes the ability to shift between tasks and/or mental states, and it is sometimes referred to as “shifting” (Müller & Kerns, 2015). This shifting involves the ability to flexibly redirect one’s focus between both concepts and tasks. Well-developed attentional abilities support cognitive flexibility by managing the input of stimuli and ability to focus on most relevant stimuli (Moore & Malinowski, 2009). Another key ability required for cognitive flexibility is the ability to respond to stimuli in a non-reactive way (i.e., nonhabitually). These skills are often measured through activities that require sorting items/concepts, rule-following tasks during which the rules change (Wisconsin Card Sort), task switching (Trail-Making Test, part B), and problem solving (Tower of London) (Takacs & Kassai, 2019). Cognitive flexibility is hypothesized to be one of the executive functions that most directly affects academic achievement (Meltzer, 2018). Academic skills that rely on cognitive flexibility include reading comprehension, mathematical problem solving, and written expression (Meltzer, 2018).

Mindfulness and Cognitive Flexibility

There is less research on the effect of mindfulness practices have on performance on tasks requiring cognitive flexibility (Gallant, 2016; Moore & Malinowski, 2009). When considering the available data, outcomes have been mixed. In a pair of studies with undergraduates, using a model of cognitive control measuring both proactive and reactive processes, Chang, Kuo, Huang, and Lin (2018) found that a brief mindfulness

intervention resulted in increased reaction times and more flexible responses. They also found that those with higher dispositional mindfulness (more mindful without formal intervention) were more likely to use both proactive and reactive controls. In this model, the ability to use both forms of control is indicative of greater cognitive flexibility (Chang et al., 2018). With an adult sample, Moore and Malinowski (2009) found that attentional abilities and cognitive flexibility were associated with higher levels of mindfulness and experience meditating. Participants with more meditation experience were better able to inhibit an automatic response and maintain cognitive control while flexibly shifting between task demands (Moore & Malinowski, 2009). Finally, a study completed with elementary age students using the MindUP curriculum resulted in increased cognitive flexibility measured via a Flanker task when compared to a control group (Schonert-Reichl et al., 2015). These studies provide support to the relationship between MBIs and cognitive flexibility, but more research with adolescent populations is clearly indicated.

Emotion Regulation

Emotion regulation (ER) is a necessary executive functioning skill needed by students to engage in behaviors that align with school engagement. ER can be defined as a set of processes that control not only the amount of stimulation coming in, but also a means to modulate the arousal response to that stimuli (Chambers et al., 2009; Gross, 2013). The ability to regulate one's emotions is essential for daily functioning. Delays in these skills can directly affect the development of both academic and social skills in youth (Liew, 2012).

Although ER is considered to be an aspect of executive functioning, it is also a complex construct in and of itself. Gross (2013) identified three defining characteristics

of emotion regulation. To begin with, in this model, emotions are events that motivate the individual to manage how emotions come to be within them (i.e., the goal of the emotion). The second characteristic of emotion regulation is the individual's attempts to manage their response to the emotion. These processes can include commonly identified emotion regulation techniques such as cognitive reappraisal, emotion suppression, situation modification, and distraction (Werner & Gross, 2009). Gross (2013) conceptualizes these processes existing along a continuum that include implicit and explicit processes. The final aspect of emotion regulation concerns how the individual attempts to manage emotions and how this affects overall experience and expression of the emotion (Gross, 2013). Gross (2013) further elaborated that there exists "intrinsic emotion regulation" and "extrinsic emotion regulation" (p. 6). Intrinsic emotion regulation is the individual's regulation of their own emotions, and extrinsic emotion regulation is when an individual engages in behaviors with the purpose of regulating another person's emotions (Gross, 2013). Mindfulness practices are primarily targeting intrinsic emotion regulation processes. It is also important to note that emotion regulation does not just involve the attempts to minimize emotions, but it can also involve the motivation to expand an emotional experience (Gross, 2013).

More recently, this model of emotion has evolved to include the concept of emotion regulation flexibility (Aldao, Sheppes, & Gross, 2015). Emotional regulatory flexibility is another theory of emotion regulation proposed by Bonanno and Burton (2013). In their model of emotion regulation, self-regulatory strategies are viewed as a dynamic process that is dependent upon context sensitivity, regulation repertoire, and response to feedback (Bonanno & Burton, 2013). Context sensitivity is the ability to

assess both the regulatory demands of a situation and the opportunities to support regulation as the situation evolves while also selecting appropriate response strategies (Bonanno & Burton, 2013). Within this construct, there is a focus on individual differences in the individual's repertoire of regulatory strategies and ability to adjust response based upon environmental feedback (Bonanno & Burton, 2013).

Emotional dysregulation, on the other hand, can be conceptualized as deficits in one's ability to respond to stimuli in an organized and flexible manner (Siegel, 2015). This disorganized response may include excessively random/chaotic or rigid/inflexible responses (Siegel, 2015). When individuals become emotionally dysregulated, higher cognitive functions (e.g., abstract thinking and self-reflection) are compromised (Siegel, 2015). Moreover, many mental health disorders are characterized by emotional dysregulation such as mood disorders, anxiety disorders, Attention Deficit Hyperactivity Disorder, Borderline Personality Disorder, and Post Traumatic Stress Disorder (Goldin, Ziv, Jazaieri, Hahn, & Gross, 2013).

Emotional dysregulation in children and adolescents is often observed as students who are easily aroused, demonstrate poor impulse control, and are easily distracted (Harrison, Vannest, Davis, & Reynolds, 2012). Although less noticed by teachers, dysregulation can also be exhibited as withdrawal from the environment and social interaction (Harrison et al., 2012). Both external and internal manifestations of poor emotion regulation are often disruptive to classroom learning and difficult for teachers to manage. Students who are extremely dysregulated and disruptive are often identified as being the most challenging for teachers (Briesch, Ferguson, Volpe, & Briesch, 2012). Furthermore, students who are dysregulated and engage in disruptive behaviors are at a

much higher risk for negative outcomes such as removal from the classroom through suspensions, expulsion, drop-out, and involvement in the juvenile justice system (Christle, Jolivette, & Nelson, 2005). A longitudinal study of post-secondary outcomes for students with identified emotional disabilities indicated that lack of access to the general education environment as a result of removals from school resulted in decreased ability to engage in normative relationships that support the development of pro-social skills. Furthermore, these students were often provided with less rigorous academic coursework (Wagner & Davis, 2006).

Beyond the disruption to learning and negative consequences associated with these dysregulated emotions, children who struggle with emotion regulation are impacted in their ability to benefit from instruction. For example, attention, working memory, and encoding skills are often compromised when one is in a heightened state of arousal (Martin & Ochsner, 2016; Siegel, 2015). Finally, children who are emotionally dysregulated are more likely to struggle with social relationships (Riediger & Klipker, 2013). The ability to regulate arousal levels is fundamental for students to be engaged in the learning environment.

Adolescence (roughly defined between the ages of 10-19) represents a unique period for emotional experiences and the accompanying emotion regulation development (Ahmed, Bittencourt-Hewitt, & Sebastian, 2015). There is a great deal of neurological development occurring during this period of development, particularly in areas of the brain associated with emotion regulation. The rapid neural development combined with the substantial increase in social and academic demands makes adolescence a critical period for developing these skills (Ahmed et al., 2015).

The ability to regulate emotional experiences is very important for adolescents. Adolescents with better ER skills often have higher academic achievement and fewer mental health symptoms (Riediger & Klipker, 2013). In alignment with Gross' (2013) model, the development of ER in adolescence is affected by both internal and external factors (Riediger & Klipker, 2013). Internal factors are characterized by neurological responses, while external factors include familial and peer relationships. For example, the presence of peers has been associated with the activation of neural patterns associated with higher risk-taking behaviors (Martin & Ochsner, 2016).

Important neural changes such as increased myelination and synaptic pruning occur in adolescence. These changes have important implications for ER as pruning creates more sensitive neural connections and myelination allows for increased speed of these connections resulting in significant growth in affected brain structures (Ahmed et al., 2015). Implicated systems include the limbic region (amygdala), several cortical areas [dorsolateral prefrontal cortex (dlPFC), medial prefrontal cortex (mPFC), anterior cingulate cortex (ACC), and orbitofrontal cortex (OFC)], and the pathways connecting many of these regions (Ahmed et al., 2015). One theory of adolescent emotional dysregulation involves an imbalance between the PFC, striatum, and amygdala (Ahmed et al., 2015). The amygdala functions to encode affective stimuli and has been linked to emotional reactivity (Martin & Ochsner, 2016). One study using fMRI found that adolescents who had more difficulty managing negative affect had more activation of the amygdala when prompted to engage in cognitive reappraisal of aversive visual stimuli (Stephanou et al., 2016). These findings support theories of increased reactivity to emotional stimuli during adolescence (Stephanou et al., 2016). The importance of

emotion regulation and higher levels of reactivity makes adolescence a meaningful developmental phase for interventions targeting these skills.

Mindfulness and Emotion Regulation

Current research indicates that there exists a strong link between mindfulness practices and increased overall EF and emotion regulation (Luberto, Cotton, McLeish, Mingione, & O'Bryan, 2014; Tang et al., 2015; Teper & Inzlicht, 2013). Throughout the literature, a pattern of decreased activation in the amygdala and increased activity in the PFC has been observed when mindfulness interventions have been implemented (Hölzel et al., 2011b; Ochsner & Gross, 2008; Tang et al., 2015). These results indicate a decrease in emotional reactivity and increase in executive functioning skills. The orbitofrontal cortex (OFC) is hypothesized to help down-regulate amygdala activity in order to mediate emotional responses (Chambers et al., 2009). More specific studies on the PFC have indicated a role for the anterior cingulate cortex (ACC) for self-monitoring, the ventral PFC for response inhibition, and dorso-medial PFC for monitoring of affective states (Chambers et al., 2009; Hölzel et al., 2011b; Lutz et al., 2013). Current research also supports a model of ER in which the anterior cingulate cortex and the dorsolateral prefrontal cortex (DLPFC) work together in cognitive regulation and self-monitoring behavior (Martin & Ochsner, 2016; Teper & Inzlicht, 2013).

One study by Lutz et al. (2013) evaluated the effects of a brief mindfulness intervention on emotion regulation among nonclinical adults (ages 20-57) versus a control group who did not receive any intervention. In this study, individuals were randomly assigned to groups, but matched for age and gender with 24 participants receiving the mindfulness intervention and 22 in the control group. The researchers

analyzed whole-brain response as well as regions of interest (i.e., amygdala, insula, dorsolateral prefrontal cortex, and dorsomedial prefrontal cortex) utilizing fMRI data. Both groups were presented with emotional pictures (pleasant, unpleasant, neutral, and unknown) preceded by a cue as to the emotional valence of the picture. The mindful group was instructed to apply mindful awareness during unpleasant and unknown tasks. The control group was asked to expect and perceive the stimuli. The results from the analyses of specific regions of interest indicated that during the negative stimuli, there was decreased activity in the right amygdala in the mindful group when actually perceiving the stimuli (medium effect size, $d=0.71$). When the mindful group was cued to expect negative stimuli, they demonstrated increased activity in the dorsomedial prefrontal cortex, left anterior insula, and left dorsolateral prefrontal cortex. In contrast, the control group demonstrated increased activation in the right amygdala (an area of the brain related to fear responses) and indicated greater emotional reactivity to these stimuli (effect size ranged from medium on the left with $d=0.68$ to large on the right with $d=0.81$).

Similar group differences occurred when the groups were cued to expect unknown stimuli. The analysis of whole brain response patterns indicated increased activity in the mindful group during the cueing phase for both negative stimuli and unknown stimuli. With the negative stimuli, the mindful group demonstrated increased left-sided prefrontal activity (superior frontal gyrus extended to the anterior cingulate cortex) and middle temporal gyrus. With the unknown stimuli, there were similar patterns of left frontal activation as well as activation in the bilateral anterior insula, right inferior parietal lobules, and subcortical left caudate among both groups (Lutz et al.,

2013). These results are noteworthy because they support the hypothesis that even short mindfulness training exercises can have effects at the neural level. With these types of promising findings after only a brief intervention, it is reasonable to consider whether a longer term intervention might create more lasting change in levels of EF reflected in broad constructs such as school engagement.

A review of the literature on MBI and ER reveals a particular interest in the role that mindfulness plays in the ability to not only increase the amount of stimuli a person can tolerate, but also the ability to recover from disorganizing events more quickly and increase metacognitive skills (Bishop et al., 2004). The specific ER strategies that are commonly cited in the literature are expressive suppression and cognitive reappraisal (Goldin, McRae, Ramel, & Gross, 2008; Ochsner & Gross, 2008). Expressive suppression involves the conscious inhibition of the expression of emotions when aroused. Cognitive reappraisal involves the active reinterpretation of stimuli in order to modify the emotional meaning (Chambers et al., 2009). For example, when practicing mindfulness, a common cognitive reappraisal technique taught is to categorize experiences as pleasant or unpleasant in order to minimize emotional reactivity. The ability to engage in these practices has been theorized as related to dispositional mindfulness and can be enhanced through MBIs (Goldin et al., 2013; Hill & Updegraff, 2012; Luberto et al., 2014). Currently, there is very little research exploring the neural mechanisms of change when children or adolescents engage in mindfulness practices. There are parallels, however, in the changes in executive functioning skills in both adults and children (i.e. increased attentional abilities) (Teper & Inzlicht, 2013). As there is evidence of neural changes that occur along with changes in executive functioning skills

in adults, it seems reasonable to hypothesize that similar neural changes are happening with children and adolescents.

Much of the research on mindfulness-based practices to increase emotion regulation has been conducted with adults. There is, however, a growing body of literature specific to children and adolescents (van de Weijer-Bergsma et al., 2012). For example, a study with adolescents with learning disabilities with co-morbid anxiety indicated that participants experienced increased functioning after completing a mindfulness intervention. The study included 34 adolescents (aged 13 to 18) at a private special education school in the Northeast. After a 5-week mindfulness meditation intervention, the participants reported a substantial decrease in trait anxiety. Furthermore, the teachers and participants reported significant improvements in social functioning. The teachers also reported significant improvements in academic functioning among participants (Beauchemin, Hutchins, & Patterson, 2008). These results indicate that participation in mindfulness interventions not only supported increased emotion regulation (i.e., decreased anxiety) but also supported school engagement behaviors (better peer relationships and academic achievement). Fung, Guo, Jin, Bear, and Lau (2016) investigated the effect of the Learning to BREATHE (L2B) program on the emotion regulation skills of 19 ethnically diverse early adolescents (ages 12 to 14) from an urban public school district in the Los Angeles area. The L2B program is a manualized mindfulness program that consists of six 45-minute sessions. The results indicated that participants experienced decreased disruptive behaviors (effect size of 0.29; identified in the large range) and self-reported fewer internalizing problems (effect size of 0.19; identified in the moderate to large range) (Fung et al., 2016). These types of

studies provide preliminary support for MBIs as a promising practice with younger populations.

Summary

School engagement is broadly defined as the cognitive, behavioral, and emotional behaviors that facilitate students' ability to successfully complete school. Although there are a number of surface behaviors (e.g., attendance, rule following, grades) that can be used to measure levels of engagement, these indicators may miss underlying deficits that interfere with adolescents' ability to engage. School engagement behaviors are facilitated by the essential executive functioning skills of attention, cognitive flexibility, and emotion regulation. Specifically, indicators of behavioral engagement require attention (i.e., participation in academic activities) and emotion regulation (i.e., meeting the demands of the environment). Cognitive engagement behaviors such as attention and cognitive flexibility are essential to any higher order thinking tasks. Finally, emotional engagement is directly related to emotion regulation skills to develop positive relationships with both peers and school staff. The relationships between these dynamic constructs is still early in development. The purpose of this study was to further explore whether adolescents experienced changes in their executive function skills of attention, cognitive flexibility, and emotion regulation, as well as other indicators of school engagement (e.g., attendance, behavior), after participating in a 6-week mindfulness intervention.

CHAPTER III

METHODOLOGY

The purpose of this study was to further explore whether adolescents experienced changes in their executive function skills of attention, cognitive flexibility, and emotion regulation, as well as other indicators of school engagement (e.g., attendance, behavior), after participating in mindfulness intervention. This study represented a multiple single-case design with adolescents (N=10) participants completing a six-week mindfulness intervention. The design of this study was organized around the hypothesis that participation in a mindfulness curriculum would contribute to increased ability to demonstrate behaviors consistent with school engagement. The dependent variables measured included behavioral engagement (i.e., attendance, grades, and teacher reports) and cognitive engagement (i.e., attention, cognitive flexibility, and emotion regulation). In addition to pre- and post-outcome measures, progress monitoring was used throughout the intervention to assess for changes in participants' school engagement behaviors.

Context of the Study

This study was conducted in an urban, Southwestern community of approximately 500,000 ethnically diverse citizens. The city is located in a resource poor state with an unusually high number of individuals living below the poverty line (U.S. Census Bureau, 2018). After receiving approval from the Institution Review Board (IRB; see Appendix A), the researcher initially contacted mental health professionals at several independent charter high schools in the community. One of the school social workers at one high

school responded with a high level of interest in the study and thus, the participants in this study represented a convenience sample. Because the school's population was similar to the broader demographics of the larger district, this site was considered an appropriate location for this study. In this high school, approximately 50 percent of the students qualified for free and reduced lunch. The students represented a diverse community with the primary ethnicity being Hispanic (51 percent), followed by White, non-Latino (43 percent), African–American (2.3 percent), Native American (2.0 percent), and Multiple Ethnicities (1 percent). Many of the students were English Language Learners (41.5 percent) and/or received special education services (17.8 percent). Students enrolled in this school through a lottery system.

Participants

The sample for this project was drawn from the students attending a high school in a large urban district in the Southwest region. The student population targeted for this study were considered at-risk for school noncompletion due to a number of different factors (e.g., truancy, involvement with juvenile justice, academic failure, identified mental health concerns, and disruptive behaviors). Recruitment was completed through collaboration with administration and school social workers to identify students in need of support based upon meeting criteria for “at-risk” (e.g., behind academically, emotional or behavioral difficulties, poor attendance). All students referred by the school staff were invited to participate. During the students' study hall, the researcher described the project and intervention, answered questions, and provided them with informed consent forms (a parent consent with youth assent signature line, see Appendix B). Those

students who provided appropriate parental consent were able to participate, resulting in an original group of ten students.

In order to encourage participation in the group, incentives were provided. Each week, all students were able to earn lottery tickets for their participation in group activities as well as reporting on their use of mindfulness outside of the formal group practice. At the end of each session, two students’ names were drawn to receive small prizes (e.g., Gatorade, gel pen, small bag of chips). All lottery tickets were collected and entered into a drawing to win larger prizes at the end of the intervention period (e.g., headphones, set of gel pens, gift cards). A description of age, grade, and participation data for the ten participants is provided in Table 1. The demographical data were available on the weekly printouts with the participant’s grades and attendance that was provided by the school social worker. All participants are identified using pseudonyms to protect their confidentiality.

Table 1

Participant Descriptive Data (N=10)

Name	Age	Grade	GPA	Percent Attendance**	Sessions Attended
Madison	16	11	4.00	94	10
Ethan	17	11*	0.40	93	9
David	17	11	1.89	98.5	10
Paola	17	11	2.61	94	10
Amber	17	11	1.72	98	10
Noah	17	11	2.06	93	6
Edgar	16	11	2.50	99	9
Sofia	17	11*	1.39	94	10
Morgan	17	11*	0.67	70	2
Daniela	17	11	3.0	95	8

*These students were in 11th grade by age, but not by academic credits toward graduation.

**Percent of attendance represents the student’s average attendance rate at the start of the intervention for the academic year.

Instrumentation

The behaviors associated with positive cognitive and behavioral school engagement include the ability to effectively emotionally regulate, participate in the learning environment, maintain attentional control, and problem solve. Therefore, a variety of measures were used to assess these outcomes including a combination of standardized instruments administered before and after the intervention as well as progress monitoring assessments to evaluate changes during the intervention.

The following EF skills were assessed at pre-post intervention: attention/concentration, cognitive flexibility, and emotion regulation. Additionally, a measure of students' development and use of mindfulness skills was administered.

Attention/Concentration Index (WRAML-2). The Attention/Concentration Index from the Wide Range Assessment of Memory and Learning, Second Edition (WRAML-2) is comprised of two subtests. The first subtest is a visual memory task (Finger Windows). On this task, the participant repeats a sequence of movements of increasing length. The second task is a verbal memory task (Number Letter) where the individual is expected to recall an increasing series of letters and numbers that have been presented orally. The scaled scores from each of these subtests is combined and converted to a standard score ($X=100$, $SD=15$) that provides an estimate of an individual's attention and concentration skills.

The reliability for both subtests is strong for adolescents (aged 14-17) (Cronbach's alphas: Finger Windows=.83, Number Letter= .86) (Adams & Sheslow, 2003). On the Attention/Concentration Index, the internal consistency scores for adolescents (aged 14-17) were also robust (Cronbach's alpha= .91). and young adults

(aged 14-24) ranged from .91 to .83 (Adams & Sheslow, 2003). Test-retest reliability was measured, with a re-administration time of frame of 14-401 days and median 49 days, for the two subtests and index was low (corrected $r = .60-.68$).

At pre-intervention, participants in this study had a range of 8-14 on the Finger Windows, and 6-16 on Letter-Number subtests, with an Attention/Concentration Index ranging from 85-115. This range would be considered to be average. At post-intervention, participants subtest scaled scores ranged from 7-14 (Finger Windows) and 8-17 (Letter Number), and an overall index score range of 94 to 131).

Trail-Making Test (TMT). The Trail-Making Test (TMT) was used to measure any changes from pre- to post-intervention in cognitive flexibility. The TMT is a sequencing and task-switching activity composed of two separate forms (TMT-A and TMT-B). On TMT-A, participants are required to simply connect 25 numbered circles in numeric order. On TMT-B, participants are required to shift between alphabetic and numeric items in order (A-1-B-2-C-3 ... etc.). Participants are prompted to complete the task with efficiency and accuracy. If an error is made, participants are prompted to return to the previous correct response and continue. The error is not scored but is reflected in higher completion times (Buck, Atkinson, & Ryan, 2008). Generally, scoring on the TMT is based upon the completion time for each form. Alternative derived scores include the TMT-B – TMT-A and TMT-B/TMT-A ratio (Arbuthnott & Frank, 2000).

The TMT was originally created in the 1950s and was utilized to distinguish between brain damaged and neurologically intact individuals (Bowie & Harvey, 2006). It has become one of the most commonly utilized assessments for motor speed, visuo-spatial skills, sequencing, and cognitive flexibility (on TMT-B) (Bowie & Harvey, 2006;

Buck et al., 2008; Gallant, 2016). Arbuthnott and Frank (2000) investigated the TMT's utility as a measure of cognitive flexibility and found that TMT-B can be conceptualized as a manifestation of attentional control that is needed to maintain set rules while switching between items. Misdraji and Gass (2010) found modest correlations with the TMT-B and working memory tasks. Performance on TMT- B is also related to overall cognitive functioning (Bowie & Harvey, 2006; Nussbaum & Bunner, 2009).

Limited data are available for the reliability of the TMT for nonclinical populations. Tombaugh (2004) completed one of the largest studies (n=680) to create TMT norms, but only collected data from adult populations (aged 18-89). In terms of demographics, individual performance was most affected by the age of the participant in that performance declines with age (Tombaugh, 2004). Tombaugh (2004) created a set of adult norms that located performance into percentile ranges and stratified by age and education (Tombaugh, 2004). The TMT has robust interrater reliability (Bowie & Harvey, 2006). One area of limitation is that there is evidence of practice effects when administered at short intervals (i.e., one to six weeks). Research indicates that an interval of one year is sufficient to avoid practice effects (Buck et al., 2008). Research utilizing alternate forms of the TMT indicate reliability is high as well and ranges from .78 to .92 (Bowie & Harvey, 2006). The TMT has been used in studies with at-risk youth with a range of vulnerabilities including having a diagnosis of ADHD, living in orphanages, or engaging in binge-drinking (Crowe, 1998; Purohit & Pradhan, 2017; Zylowska et al., 2008). In the current study, the TMT was used to measure changes from baseline to post-intervention in cognitive flexibility.

On the TMT-A, participants obtained timed scores (in seconds) from 18.26 to 42.37 (pre-test) and 14.76 to 26.75 (post-test). On the TMT-B, pre-test times ranged from 31.65 to 114.00; while post-test times ranged from 26.43 to 71.35. When TMT-B—A was calculated, pre-test scores ranged from 9.45 to 77.92 and post-test scores ranged from 10.60 to 52.14. Finally, when the TMT-B/A ratio was calculated, pre-test scores ranged from 1.43 to 4.47; post-test scores ranged from -1.08 to 2.12.

Difficulties in Emotion Regulation Scale (DERS). The Difficulties in Emotion Regulation Scale (DERS) was developed to provide a comprehensive measure of emotion regulation difficulties (Gratz & Roemer, 2004). The DERS is a brief self-report questionnaire consisting of 36 items and takes about ten minutes to administer. The scale was originally designed for ages 18 to 60, but research has supported its use with adolescent populations. The Total Score on the DERS provides an estimate of overall emotion regulation and there are six subscales measuring different aspects of emotion regulation: Nonacceptance, Goals, Impulse, Awareness, Strategies, and Clarity. The Nonacceptance scale consists of six items measuring nonacceptance of emotional responses (“When I’m upset, I feel angry with myself for feeling that way.”). The Goals subscale is comprised of five items and assesses difficulty engaging in goal-directed behavior when upset (“When I’m upset, I have difficulty getting work done.”). Next, the Impulse subscale has six items and measures increased impulsivity when emotionally dysregulated (“When I’m upset, I lose control over my behavior.”). The Awareness scale consists of six reverse score items and provides information on general emotional awareness (“I pay attention to how I feel.”). The Strategies subscale has eight items and measures one’s ability to access a variety of emotion regulation strategies when upset

(“When I’m upset, I believe there is nothing I can do to make myself feel better.”).

Finally, the Clarity subscale consists of five items and assesses for general emotional clarity (“I have difficulty making sense out of my feelings.”).

Higher scores are considered to represent greater levels of difficulty with emotional regulation. Items are scored on a 5-point scale from 1 (*almost never*) to 5 (*almost always*). The subscale scores are calculated by summing the total for items within each subscale. There are not standardized norms for this test, instead raw scores are compared to average scores from a nonclinical adolescent sample (Weinberg & Klonsky, 2009). For this study, both subscale and overall scores were utilized to compare baseline self-report to post-intervention ratings. Weinberg and Klonsky (2009) derived a mean score of 78.9 (standard deviation of 23.2; scores within one standard deviation ranging from 55.7 to 102.1). For the current study’s sample, overall baseline scores ranged from 61 to 156 with this sample, and post-test scores ranged from 73 to 133. In this study, scores that fell within one standard deviation compared to the nonclinical sample were considered to be in the Average range. Scores between one to two standard deviations below the mean were considered to be in the Low Average range. Scores one to two standard deviations above the mean were considered to be Elevated. Finally, scores more than two standard deviations above the mean were considered to be Very Elevated.

Originally validated with adult nonclinical populations, the DERS has good test-retest reliability ($\rho=.88, p < .01$) and high internal consistency ($\alpha=.93$; each subscale’s alpha was greater than 0.8) (Gratz & Roemer, 2004). Content validity was established by utilizing the General Expectancy for Negative Mood Regulation Scale (NMR) as a

guideline for the development of test items; along with consulting with experts in the field. Construct validity was demonstrated with correlations with other scales measuring similar constructs. Predictive validity was analyzed by correlating DERS results with self-harming behaviors (Gratz & Roemer, 2004). Test-retest was evaluated by having participants ($n=21$; aged 18-48, mean=25.95) from the original study complete the DERS 4-8 weeks later. Acceptable intraclass correlation coefficient on the subscales ranged from 0.57 to 0.89 with a mean of 0.74. (Gratz & Roemer, 2004). These results are limited by the small sample size. Research assessing for DERS' utility across different racial groups indicated no significant differences (Ritschel, Tone, Schoemann, & Lim, 2015)

The DERS was also validated with two separate adolescent populations (Neumann, van Lier, Gratz, & Koot, 2010; Weinberg & Klonsky, 2009). One study, conducted in the Netherlands, assessed whether the factor structure could be replicated with an adolescent population and whether there were any gender differences (Neumann et al., 2010). Confirmatory factor analysis resulted in low to moderate correlations between the subscales (range $-.12$ to $.54$, mean= $.35$). Internal consistency was adequate to strong (Cronbach's alpha range $.72$ to $.87$). The study also indicated gender differences on the DERS. Female participants reported higher scores on the Clarity, Goals, Nonaccept, and Strategies subscales than males. Males reported higher scores on the Awareness subscale and no differences were reported in the Impulse scale (Neumann et al., 2010). In another study, a large community-based sample of adolescents (aged 13-17) from a single high school in the New York City area was used (Weinberg & Klonsky, 2009). Utilizing Exploratory Factor Analysis (EFA), the researchers replicated the six-factor structure of the original study by Gratz and Roemer (2004) and obtained high

internal consistency with their sample (Cronbach's alpha = .93). Construct validity was established by correlating the DERS results with mental disorders associated with emotion regulation difficulties (i.e. depression, suicidal ideation, anxiety, eating disorders, and substance-use disorders). No gender differences were found on the overall DERS score, but some differences appeared on specific subscales. Females reported higher levels of emotion regulation difficulties on the Goals, Strategies, and Clarity subscales, consistent with the Neumann et al. (2010) study. Weinberg and Klonsky (2009) reported that the Awareness subscale had less robust internal consistency with adolescents (Cronbach's alpha of .77) than had been reported with an adult population. Nevertheless, these studies lend support to the use of the DERS with an adolescent population although the geographic specificity of each of these studies warrants caution in the generalizability to the participants in this study.

Child and Adolescent Mindfulness Measure (CAMM). The Child and Adolescent Mindfulness Measure (CAMM) is a 10-item self-report questionnaire that is designed to measure the development of mindfulness skills in children. It is one of the earliest tools designed to assess trait mindfulness in children and adolescents (Kuby et al., 2015). The items on the CAMM were developed from items on the Kentucky Inventory of Mindfulness Skills (KIMS) for adults (Greco, Baer, & Smith, 2011). The KIMS conceptualizes mindfulness as having four facets: observing (the level of awareness of internal experiences), acting with awareness, accepting without judgement, and describing (the ability to verbally describe internal thoughts, feelings, and sensations) (Greco et al., 2011). The CAMM was developed utilizing three of these four constructs.

The ability to describe internal experiences was omitted due to developmental limitations of children and adolescents to accurately and consistently demonstrate this skill.

On the CAMM, respondents answer ten items on a reverse-scored, five-point scale from zero (*Never True*) to five (*Always True*) and are prompted to indicate how often each sentence is true for them. Items are designed to measure two different aspects of mindfulness including present-moment awareness (“I keep myself busy so I don’t notice my thoughts or feelings”) and nonjudgmental awareness of thoughts (“I stop myself from having feelings that I don’t like”) (Greco et al., 2011). Total scores on the CAMM are calculated by adding up the responses for the ten items. The CAMM is a relatively new measure, but preliminary information on the psychometric properties has indicated adequate reliability and validity (Greco et al., 2011).

The CAMM’s psychometric properties were initially assessed through four studies (Greco et al., 2011). Convergent and incremental validity were assessed and resulted in a Cronbach’s alpha of .81. In the original validation sample of youth in grades 9-10, the mean score was 24.52 (SD=7.50). The internal consistency for the 10-items was acceptable in all four of the studies (alpha= .70 to .85). The CAMM’s content validity was measured through correlations with other established measures hypothesized to measure similar constructs. The CAMM was positively correlated with overall quality of life and negatively correlated with somatic symptoms, internalizing symptoms, externalizing symptoms, thought suppression, and cognitive inflexibility (Greco et al., 2011) suggesting that higher levels of mindfulness were correlated with better life satisfaction and fewer negative experiences. On the original validation sample, the average score was 24.52 with scores between 17.02 and 32.02 within one standard

deviation of the mean. In the current sample, on the pre-test, scores ranged from 13 to 27 with an average score of 20.22. On the post-test, scores ranged from 15 to 28 with a mean of 20.67.

One of the limitations in the initial development of the CAMM was a limited diversity in the original sample. Furthermore, it was not designed to measure change in mindfulness skills after an intervention (i.e., predictive validity). To date, there were no studies assessing the test-retest reliability of the CAMM (Pallozzi, Wertheim, Paxton, & Ong, 2017) and instead, most work has focused on the reliability of the instrument with different populations. Additional studies have contributed to the psychometric properties of the CAMM but were completed with international samples. In Australia, a validity study was completed with non-clinical adolescents (ages 12-15) (Kuby et al., 2015). The researchers found that the CAMM had good internal consistency with this sample (Cronbach's $\alpha=0.84$). Convergent validity was supported through correlation with items on other measures tapping into similar constructs. Overall, higher levels of mindfulness (i.e. score on the CAMM) were associated with lower levels of reported social-emotional distress (Kuby, et al., 2015).

Progress Monitoring Measures

In addition to the standardized measures, this study included a more direct measure of behavior based on teacher report as a method of monitoring change. Three different types of progress monitoring measures were used to assess behavioral aspects of school engagement. To measure on task behavior, emotional engagement, and behavioral expectations, daily teacher reports were collected. School attendance was monitored at baseline and throughout the intervention. Attendance was considered to an indicator of

behavioral school engagement. Finally, student grades were assessed weekly in both their classes where they were performing the best and the class in which they were performing the worst (highest and lowest class grades). During the course of the intervention, teacher reports, grades, and attendance data were collected weekly.

Teacher report. Progress monitoring data were collected daily using a teacher feedback report that was collected before, during, and after the intervention. This feedback consisted of teachers answering three questions about the participants' behavioral engagement, cognitive engagement, and emotional engagement. For example, the behavioral engagement question asked teachers to rate the student's on-task behavior. The emotional engagement question asked the teacher to rate the degree to which the student appeared to like being at school that day. Finally, the behavioral engagement question addressed whether the student met behavioral expectations that day. These questions, available in Appendix C, were created based upon the commonly cited measures of student engagement (i.e. attendance, on-task behavior, affective presentation, and compliance with school rules) (Fredricks et al., 2004). Teachers were asked to respond using a five-point Likert scale ranging from "0" for "Never" to "5" "All of the time" via a Google doc form that was e-mailed to them daily. This information allowed for a more direct measure of behavioral change within the context of the classroom environment. Teachers also indicated whether the student attended the entire class, arrived late, or was absent. A baseline of at least five data points were obtained prior to the start of the intervention.

Attendance. Behavioral school engagement was measured through monitoring of school attendance. Attendance was calculated by the class period. Since there were four

to six periods in a day, daily attendance was calculated by the fraction of the day that a student was present. A full day would be 1.0 with partial attendance reflecting missing a particular class as something fraction less than 1.0. The initial attendance data representing the participant's attendance for the year were calculated in the same manner. During the intervention, attendance data were calculated as a weekly average in order to monitor general attendance trends for each participant. These data points were provided once a week by the school social worker as printouts of each participants official attendance and grades as entered by teachers into the school's tracking software.

Grades. Potential changes in academic performance were monitored through the collection of the weekly attendance and grade reports. Grades were collected along with attendance data from the school's system software (PowerSchool). This system provides a page entitled "Quick Lookup" where the student's attendance, and current semester grades. Along with weekly grades, the participant's grades for the previous quarter/semester and final quarter/semester were also provided on the weekly printouts and reported as a grade point average (see Table 1 for pre-intervention GPA). The grades reported each week were averaged to derive the average grades for each class (i.e. highest and lowest grade). The use of grade monitoring as a means to measure behavioral engagement has been previously implemented (Wang & Holcombe, 2010).

Procedures

Prior to recruiting students, permission was obtained from the school administration and from the University of Northern Colorado's Internal Review Board (Appendix A) and the school administrator (see Appendix B). Once this permission was obtained, student recruitment occurred through collaboration with a school social worker.

As students returned their parental consent forms, a decision was made as to whether these students were eligible to participate. Those who had no history of academic or behavioral/emotional concerns were excluded. Those who met this first cutoff, were asked to schedule a time with the researcher to complete the initial baseline measures. During this individual session, each participant completed the WRAML-2 subtests, Trail Making Test (TMT), DERS, and CAMM.

During the first phase of the study, lasting approximately three weeks, participants continued to attend their regular classes while baseline data were collected. Baseline data consisted of teacher daily reports (minimum of five), record review (attendance and weekly grades), and completion of the pre-intervention measures (WRAML-2 subtests, TMT, DERS, and CAMM). During the second phase of the study, the researcher provided a six-week mindfulness intervention (Mindful Schools, 2015; described below). During this period, on-going progress monitoring data (e.g., daily teacher reports, attendance monitoring, grade reports) were collected on a daily basis and aggregated to a weekly average across classes and days. Originally, the goals of the third phase of the study was to collect follow-up data at least four weeks after the end of the study. However, this was not possible due to the end of school year coinciding with the end of the intervention (post-data were collected during finals week). Data were collected continuously, but in three distinct intervals: before the intervention, during the intervention, and after the intervention.

Intervention: Mindful Schools

The Mindful Schools curriculum (Mindful Schools, 2015) was created by practitioners working with students in Oakland, CA. The curriculum was designed to be

implemented in urban and under-resourced public schools and was selected for this study because of that focus. The Mindful Schools curriculum was designed to be delivered in 15 to 30-minute modules that can be easily integrated into the school environment and adapted to meet the needs of diverse environments (Mindful Schools, 2015).

Group facilitators for the Mindful Schools program are expected to have completed training in the program and this is a necessary condition to access the curriculum. The researcher participated in a six-week training with the Mindful Schools organization (the Mindful Educator's Essentials course). This training is required by Mindful Schools in order to access and utilize the curriculum. The researcher has also previously participated in an eight-week MBSR program as well as maintaining a daily mindfulness practice. The structure of the program plus this specialized training in the curriculum, as well as experiences in other mindfulness programming, allowed the researcher to deliver the program with fidelity.

The curriculum has two different programs: elementary and adolescent. The adolescent curriculum contains 18 lessons and was used for this study. Lessons are structured with an introduction to the topic, brief discussion, mindfulness activity (formal mindfulness practice), and an optional brief journal entry. The mindful activity always begins with participants being prompted to sit in the mindful posture and the ringing of a bell. The bell is also used to signal the beginning and end of the formal mindful practice. The researcher used this format to deliver the curriculum in this study. Due to time constraints of the session, the journaling activity was not completed in these sessions. Another deviation from the Mindful School script was an additional three to five minutes of silent mindfulness practice at the end of each session. This practice was initiated at the

request of the participants. At the end of each session, the researcher would set a timer for this period of silence. The participants were prompted to attune to their breath and notice when their minds wandered. The language utilized was directly taken from previously covered content from the Mindful Schools curriculum.

The curriculum was provided twice a week for 30 minutes over six weeks. The intervention time actually extended for seven weeks due to a break between week one and week two as students were completing state assessments. Two sessions were cancelled due to mandatory school-wide service days. In total, ten sessions were provided during the intervention phase (an additional session occurred after data collection finished). The Mindful Schools curriculum provides eighteen lessons, but only the first nine are considered “required” for fidelity of treatment (Mindful Schools, 2015), therefore, the ten sessions delivered in this study met these requirements (although only seven participants attended nine or more sessions). The sequence of the intervention is presented in Table 2:

Table 2

Intervention Sequence

Name	Tuesday Class	Wednesday Class
Week 1	Emotions/ Mindfulness of Sound	Response vs. Reaction. Breath 1- Anchor
Week 2	Heartfulness	No Class- Service Day
Week 3	Thought watching	Attention to Breath
Week 4	Pleasant/Unpleasant Cognitive Reappraisal	Mindful Eating
Week 5	Connection to Others	No Class- Service Day
Week 6	Past/Present/Future	Body Scan

Although, originally, it was planned that if one of the participants missed more than one session, additional sessions would be offered. However, attendance was generally very good with only two participants missing a number of sessions. In one case, a participant attended only two sessions and her data were not included in the cross-case analysis. Two others attended 6 and 8 sessions but due to limited availability of these participants and the end of the school year, make-up sessions were not scheduled. There was one additional session provided to the entire group after all data collection had been completed. This session was provided at the request of the participants and all, except one, attended the session.

Study Design

The design of this study was a single-case design with ten participants. As noted, the data from one participant could not be included because of the low number of sessions attended. The independent variable was the introduction of a mindfulness-based curriculum. The dependent variables were behavioral indicators of engagement (as measured by daily teacher reports, attendance, and grades), executive functioning (WRAML-2 Attention/Concentration Index, the Trail Making Test, and the DERS). Attention was measured through direct measures of attentional abilities (Attention/Concentration Index from the WRAML-2) and cognitive flexibility (Trail Making Task).

Data Analysis

Data were collected prior to the start of the study, during the intervention, and after completion and were reported for each participant. Progress monitoring data were used to establish a baseline and monitor weekly progress as compared to the baseline.

Each participant's data were analyzed utilizing standard procedures for single-case research design (SCRD); these procedures include visual analysis, level (median), trend, variability, percent exceeding the mean (PEM), and tau-u. Originally, the data analysis was also to include statistical analysis of the data (i.e. t-test), but there is not enough data to assume normality.

Visual Analysis

Visual analysis is the most widely used procedure with analyzing SCRd. To analyze within-phase patterns, this requires the calculation and analysis of the level, trend, and variability of the data set. The *level* is the average of the data and is represented utilizing the median or mean (Kennedy, 2005). The level provides information on the central tendency for the data set facilitates comparison between phases (Kennedy, 2005). The median was utilized in this study.

When utilizing visual analysis, it is important to analyze for the trend of the data. The use of the best-fit model for calculating the trend line was utilized. The trend line is used to visually represent changes of the data over the course of the phase. Furthermore, data were analyzed for the slope and magnitude of the trend. Slope describes the direction of the trend-line (i.e. upward/positive, downward/negative, or flat). Magnitude is the size of the slope and is characterized as either high, medium, or low (Kennedy, 2005, p.198). Finally, the variability of the data was calculated. Variability in data is characterized by the amount that data points are different than the trend-line and is described as high, medium, or low (Kennedy, 2005, p. 201).

In order to interpret the data, analysis of between-phase patterns was completed. This required the calculation of the immediacy of effect and the percent exceeding the

median (PEM). Immediacy effect refers to the amount of change that was observed at the beginning of a new phase and is described through either a change in level or trend (Kennedy, 2005, p. 203). Next, the PEM calculates the amount of data points are the same between phases. Treatment effects were also calculated for the PEM for the following data points: behavioral observations, grades, and attendance rates. The intervention effects are rated highly effective (90 percent), moderately effective (70-89 percent), mild or questionable effect (50-69 percent), or ineffective (below 50 percent).

TauU

TauU is a nonparametric measure of effect size (ES) that can be used to supplement visual analysis and is appropriate for use with small data sets used in single-case research (Vannest & Ninci, 2015). This type of data analysis is designed to address the limitations of using regression analysis when sample sizes are small and with nonoverlap models that lack statistical power (Parker, Vannest, Davis, & Sauber, 2011). The strengths of the TauU are that it is a complete measure (utilizing both overlap and trend data) and controls for positive baseline trends. The TauU effect size measures for the strength of an association between dependent variables and independent variables. TauU was used to analyze the data to analyze nonoverlap and trend data both separately and in combination (Parker et al., 2011). A web-based application was utilized to analyze the data. (www.singlecaseresearch.org/calculators/tau-u). The guidelines for interpreting the ES results were followed. The effect size ranges are 0.0 to 0.2 (small), 0.21 to 0.6 (moderate), 0.61 to 0.8 (large), and 0.81 to 1.0 (very large) (Vannest & Ninci, 2015). The TauU statistic was used to measure effect size on the progress monitoring data (attendance, grades, and daily teacher reports).

Hypotheses

- H1 Participation in a six-week (6 to 10 sessions) mindfulness intervention will increase school engagement as measured by indicators of cognitive engagement (attention, cognitive flexibility, and emotion regulation).
- H2 Participation in a six-week (6 to 10 sessions) mindfulness intervention will increase school engagement as measured by attendance, grades, on-task behavior, and teacher report).

For hypothesis 1, daily teacher reports, attendance, and grades were averaged into weekly means and visually graphed. In order to monitor any academic effects, the lowest and highest grade at the end of each week was calculated. Using the procedures described above for analyzing single subject data, the results for each participant across the different dependent variables were presented. These data were then analyzed across cases to identify trends.

For hypothesis 2, the results from the WRAML-2 Attention/Concentration Index, the TMT, and DERS were analyzed for changes from baseline to post-intervention. It was expected that participants would show greater levels of attention, more cognitive flexibility (as evidenced by decreased ratios at the post-intervention on the TMT), and lower scores on the DERS (both overall and subscales). Results on the DERS were analyzed for change in scores and compared to results from adolescent, non-clinical normative samples as a means of placing results in a larger context.

There was no hypothesis regarding the use of mindfulness (CAMM score), however it provides an important context as to whether participants viewed themselves as gaining skills in mindfulness. The pre- and post-intervention CAMM results were

reported for each participant as descriptive data as an estimate of participant's development of mindfulness traits.

CHAPTER IV

RESULTS

The purpose of this study was to investigate the effectiveness of a six-week mindfulness-based intervention group in increasing school engagement behaviors and executive functioning (attention, cognitive flexibility, and emotion engagement) with students meeting criteria as “at-risk” for school non-completion. Both pre- and post-intervention measures as well as progress monitoring data were used to evaluate changes in participants as related to their participation in the intervention. The results are divided into three sections to facilitate presentation. First, in order to understand the effect for each participant, individual analyses of these data were presented and discussed. Then, cross case analysis of the participants’ data were presented followed by analysis of the aggregate data on the pre-post measures. Trends across participants are highlighted in the second part of this chapter and used to answer the research questions.

Single Case Results

Participant #1 (Madison)

Madison was referred to the group in order to help her manage her anxiety. Academically, she was a successful student and was concurrently enrolled in classes at a local community college. However, as is sometimes the case with high achieving students, Madison struggled with perfectionism and over-regulation of her emotions. Teachers reported that her anxiety negatively impacted her ability to remain focused and stay on-task. Madison was included in the study despite her excellent academic

performance due to the intensity of her anxiety. Madison expressed enthusiasm about participating in the group. She attended every session and was an active participant throughout. She often volunteered to share her experiences with the group. Madison always seemed to be very engaged during sessions that incorporated psychoeducational information about mindfulness and often contributed her own knowledge to the group. When completing the post-intervention CAMM, Madison reported an increase in mindfulness-related behavior (pre-score =22; post-score =26).

Madison's school engagement behaviors (attendance, grades, on-task behavior, emotional engagement, and rule following behavior) were assessed at baseline and throughout the intervention. First, Madison's median baseline attendance rate was 100.0 percent. Her post-intervention median attendance rate was also 100.0 percent (See Figure 1 for a graph of attendance at baseline and during treatment). As she already had a high rate of attendance at baseline, there was little difference in the trend of her attendance (negative, low magnitude). Her intervention attendance rate was negatively affected by a few days of planned absences to participate in a non-school competitive sports event. Between phases analysis indicated no immediacy effect after the onset of the intervention. The PEM, a measure of effect size, for attendance was 0.0 percent in the ineffective range. The TauU score (-0.26; SE=.35) indicated a moderate negative effect size. Again, these data were characterized by a high rate during baseline and anticipated absences during the intervention phase. Her attendance remained high outside of those absences.

Madison's lowest and highest grades were monitored throughout the intervention. Her median highest class grade during baseline was a 98.0 percent and was a 103.0

percent during the intervention. An analysis of the trend over the two phases indicated a moderate positive slope during the baseline phase. This positive trend was largely driven by a very high grade at the beginning of the fourth quarter. The trend during the intervention was flat. There was no immediacy effect observed between the phases. The PEM was 100.0 percent and in the highly effective range. The TauU result was in the moderate range (TauU= 0.58; SE=.41). These results indicated that compared to baseline, Madison's highest grade substantially increased over the course of the intervention.

Next, her median lowest class grade during the baseline phase was an 89.0 percent and a 95.0 percent during the intervention. During the baseline phase, the trend was a positive slope with low magnitude. During the intervention phase, the trend was a positive slope with a medium magnitude. These data had the most variability with one outlier at the beginning of the intervention phase. Otherwise, variability in the grade data on these items was low. The cross-phase analysis indicated no immediacy effect. The PEM on the lowest grade data was 85.7 percent and in the moderately effective range. Similarly, the TauU statistic was in the moderately effective range (TauU= 0.57; SE=.35). In other words, although Madison's grades were already quite high prior to the intervention, she improved her academic performance during the course of the mindfulness sessions.

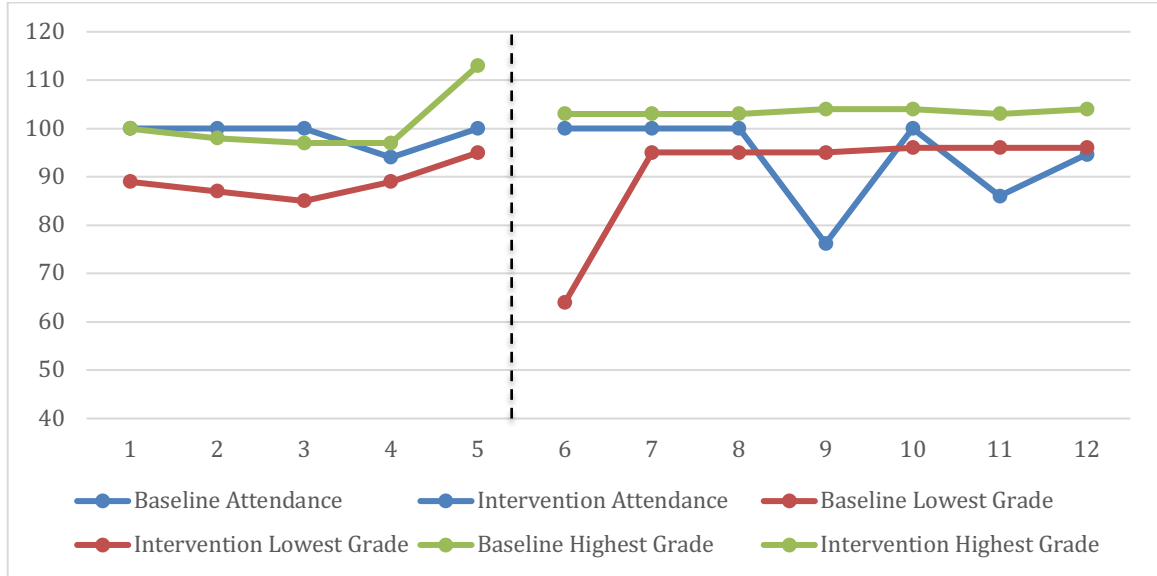


Figure 1. Madison (Participant 1): Attendance and grades

The reports on Madison's daily functioning in the classroom were also analyzed. First, Madison's on-task behavior was reported by her teachers. During the baseline phase, the median of her daily average was a 3.60 out of a possible 4.00 (higher scores indicating better performance). The trend for baseline teacher reports reflected a moderate negative slope. In terms of variability, daily averages ranged from a 2.50 to a 4.00. During the intervention phase, her median score was 4.00. The trend of her intervention ratings was positive and low in magnitude. The variability of daily averages during this phase ranged from 3.00 to 4.00. The between phase analysis revealed some immediacy effect with two of three intervention data points exceeding the last three baseline points. The PEM analysis resulted in an 82.6 percent which is in the moderately effective range. The TauU score was 0.44 (SE=.24) and in the medium effect range. It was clear during the baseline phase that Madison had some days where she struggled remaining on task. However, the general trend during intervention was upward and also indicated a stabilization of her behaviors by the end of the intervention phase.

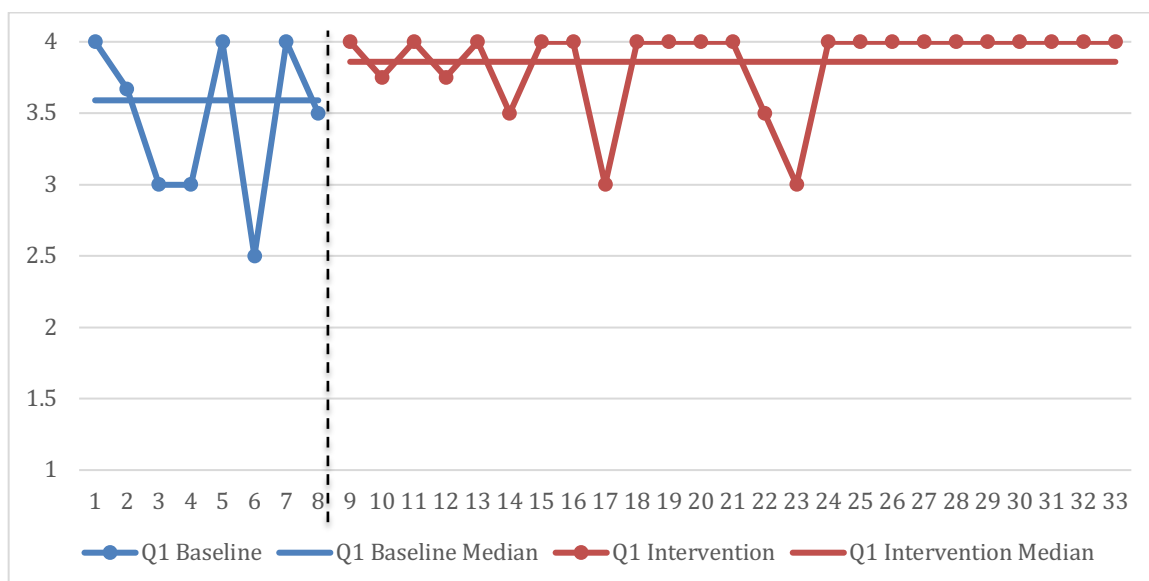


Figure 2: Madison (Participant 1): On-task behavior

Next, Madison's observed emotional engagement was reported by her teachers. During the baseline phase, her median daily average was a 4.00 out of 4.00. The trend of the teacher reports reflected a moderate, negative slope. In terms of variability, daily averages ranged from 2.00 to 4.00. During the intervention phase, her median of daily averages was 4.00, suggesting no change. The trend of her ratings was positive and low in magnitude. The variability of daily averages during this phase ranged from 3.00 to 4.00. The between phase analysis revealed no immediacy effect. Next, the PEM analysis resulted in a 0.0 percent which is in the ineffective range. The TauU analysis, which provides a more sensitive analysis of the data, resulted in a 0.24 (SE=.24) which is in the small effect range. Overall, Madison's observed emotional engagement was high prior to the mindfulness sessions, and she showed a slight, but not statistically meaningful, increase in these behaviors over the course of the intervention.

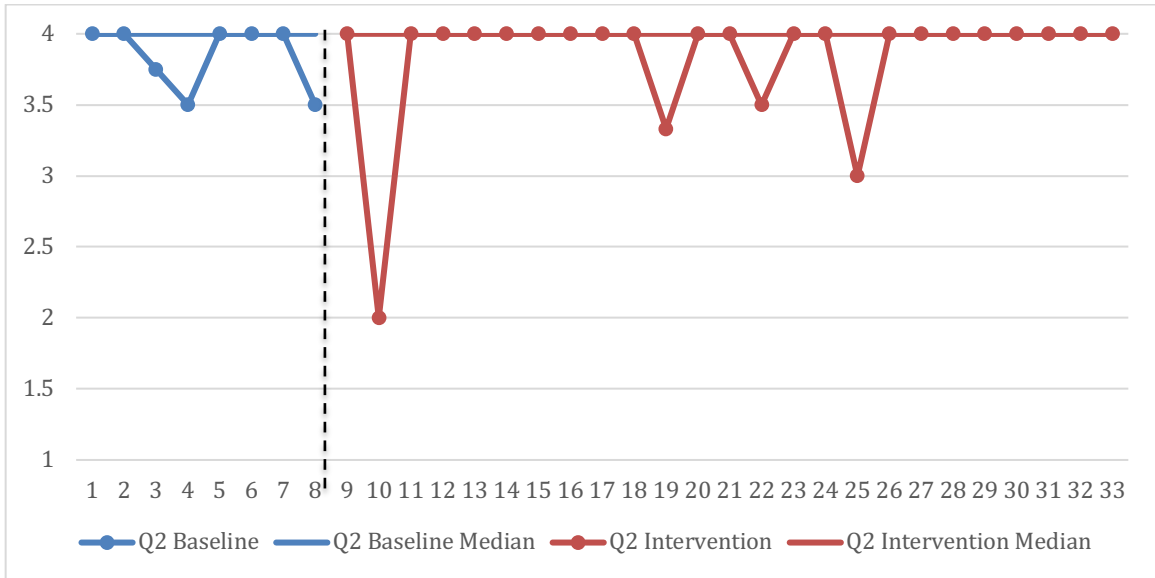


Figure 3. Madison (Participant 1): Emotional engagement behavior

Lastly, Madison's observed adherence to school rules and behavioral expectations was reported by her teachers. During the baseline phase, the median of her daily average rating was 3.71 out of a possible 4.00. The trend of the teacher baseline observations was a medium positive slope. In terms of variability, daily averages ranged from 3.00 to 4.00. During the intervention phase, her median score was 4.00. The trend of her intervention ratings was positive and low in magnitude (almost flat). The variability of daily averages during this phase ranged from 3.33 to 4.00. The between phase analysis revealed no significant immediacy effect of an increase in performance with the onset of the intervention. Next, the PEM analysis resulted in a 91.3 percent which is in the highly effective range. The TauU was in the medium change range (TauU= 0.51; SE=.24). These results indicated a positive change in these behaviors during the intervention. As with the other teacher reports, it is worth noting that Madison stabilized at a high level of rule following performance as the intervention progressed.

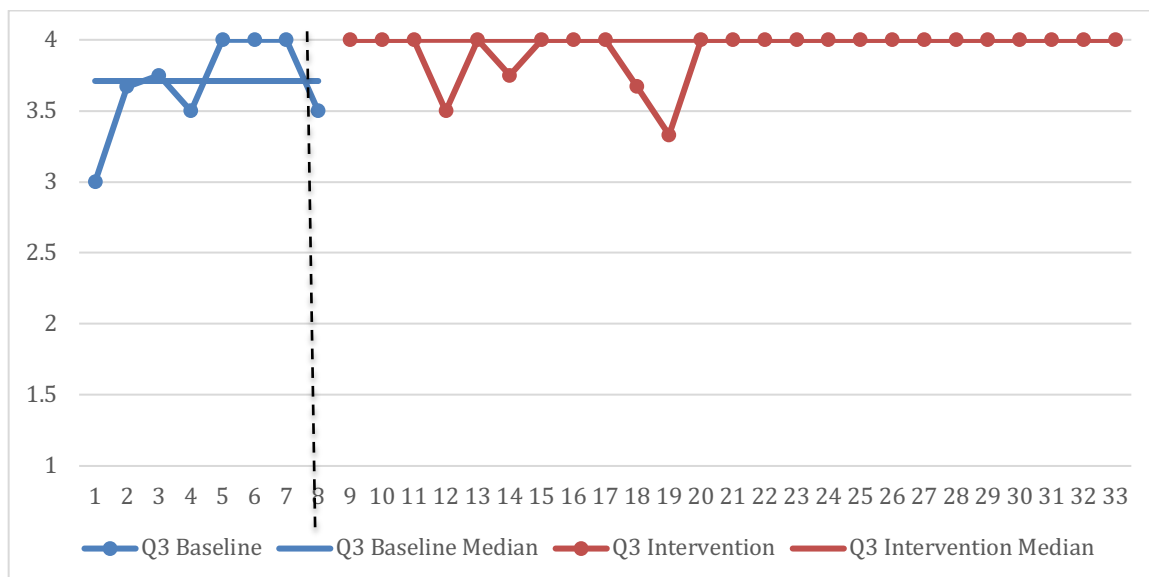


Figure 4. Madison (Participant 1): Rule-following behavior

A pre- to post-intervention analysis of Madison's cognitive engagement as measured through executive functioning tasks was conducted. First, on a measure of attention and concentration (i.e., Attention/Concentration standard score on WRAML-2), Madison obtained a standard score in the Average range at both data collection points (i.e., 109 at pre- and post-intervention) suggesting no change. Next, on an assessment of cognitive flexibility, she obtained a TMT B/A ratio score of 2.56 on the baseline assessment. As noted in Chapter III, this ratio reflects the change in her performance from Part A to Part B, with lower scores representing higher cognitive flexibility skills. On the post-intervention, she obtained a ratio score of 1.67, yielding a difference score of .89. This change in performance suggested increased proficiency in her cognitive flexibility.

On measures of emotion regulation, Madison reported a baseline DERS Total raw score of 82 and a post-intervention raw score of 73. Both of these scores were considered to be in the Average range when compared to a community sample (Weinberg &

Klonsky, 2009), but suggested she was experiencing slightly more success with managing her emotions after participating in the group. After the intervention, Madison reported a decrease in symptoms on several subscales of the DERS (i.e., Nonaccept, Goals, Impulse, Strategies, and Clarity); all scores were in the Average range at both baseline and post-intervention (see Table 3 for a summary of pre- and post-intervention DERS scores). Madison reported one area of increase in ER difficulties on her baseline rating. Her experience of being aware of her emotional state was originally rated at 9 which is considered Low Average but had increased to 11 at post-intervention which was considered Average. This small change suggested that Madison was experiencing more awareness of her emotions. It was also consistent with her reporting of an increase in mindfulness skills on the CAMM. The results are summarized below in Table 3.

Table 3

Madison (Participant 1) DERS results

Test	Baseline	Post-Intervention	Difference
DERS Total	83	73	-10
DERS Nonaccept	15	13	-2
DERS Goals	13	12	-1
DERS Impulse	14	11	-3
DERS Aware	9	11	+2
DERS Strategies	22	17	-5
DERS Clarity	10	9	-1

In summary, Madison's baseline data indicated that she was performing within the at a high level on measures of attendance, grades, and emotion regulation. During the course of the intervention, Madison's performance on all of these measures resulted in increases in her school performance as well as a decrease in difficulties with emotion regulation. Moreover, a positive trend and stabilization of behaviors were observed on the teacher reported measures of school engagement. She did not show any change in her

ability to maintain attention, but she demonstrated an increase in her performance on a task requiring cognitive flexibility.

Participant #2 (Ethan)

Ethan was referred to the group due to his lack of progress toward graduation (GPA at beginning of study was 0.40 out of 4.00, an “F” average). Staff at the school noted that he seemed to have high levels of anxiety and depression; in class, he often appeared withdrawn and distracted. Ethan expressed enthusiasm for participating in the group. He described having difficulties with worrying too much, feeling overwhelmed, and having difficulty maintaining motivation. During the mindfulness groups, he was generally quiet, but he would contribute when prompted and volunteered more regularly during later sessions. He often related feelings of discomfort arising on a daily basis, but also an increased ability to regulate these feeling over the course of the intervention. These feelings were also reflected on the CAMM; Ethan reported an increase in mindfulness-based behaviors by the end of the intervention (pre-score =13; post-score =18).

On measures of school engagement (i.e., attendance, lowest and highest grade), Ethan’s baseline median attendance rate was 100.0 percent. His post-intervention median attendance rate was 100.0 percent (See Figure 5 for a graph of these engagement measures at baseline and during treatment). The trend for baseline data was negative and low in magnitude, but it had some variability. His attendance during the intervention was negative and low in magnitude. His attendance had been stable for most of the treatment phase, but Ethan had one week with very poor attendance (69.3 percent). A visual analysis of the data indicated that while the baseline data showed variability, his

attendance was stable (at 100.0 percent for 5 of the 6 weeks) before experiencing that dip during one week at the end of the intervention. Between phases analysis indicated no immediacy effect at the start of the intervention. The PEM for attendance was 0.00 percent in the ineffective range. Similarly, the TauU result was in the lower end of moderate change range (TauU=.23, SE=.35). Overall, there was little change in Ethan's attendance rates.

His highest and lowest grade were also analyzed for changes in academic performance. His median highest class grade during baseline was 86.0 percent (ranging from 78.0 to 87.0 percent) and was 82.0 percent (ranging from 80.0 to 87.0 percent) during the intervention. An analysis of the trend over the two phases indicated a change in the trend of his highest grade with a medium negative slope in the baseline phase and a medium positive slope during the intervention phase. These results indicated that while his average was lower overall, his academic performance was increasing during the course of the intervention. A cross phase analysis indicated no immediacy effect. Both the PEM (14.3 percent) and TauU (-.31; SE=.35; moderate, negative) indicated no significant change.

His median lowest class grade during the baseline phase was 58.0 percent (ranging from 54.0 to 86.0 percent) and 37.0 percent (ranging from 32.0 to 69.0 percent) during the intervention. During the baseline phase, the trend was a positive slope with low magnitude. During the intervention phase, the trend was a negative slope with a large magnitude. These data had some inconsistency with a large drop at week three (range of 32.0 to 69.0 percent). The between phase analysis revealed no immediacy effect. The PEM on the lowest grade data was 28.6 percent and in the ineffective range. The TauU

statistic was $-.54$ ($SE=.35$) and indicated moderate negative change from baseline to intervention. Overall, while Ethan maintained his highest grade and attendance, he demonstrated a substantial decrease in his academic performance in the course in which he struggled the most. It is noteworthy that the intervention occurred over the course of a term and ended the week before finals. It is likely that Ethan felt that he was unable to pull up that grade enough to pass that class.

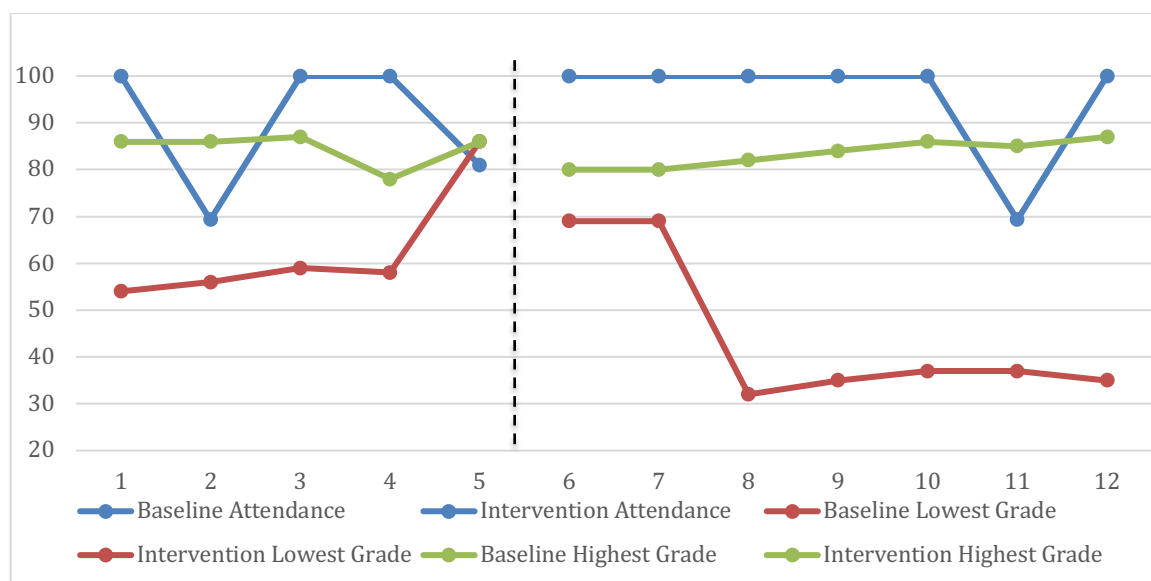


Figure 5. Ethan (Participant 2): Attendance and grades

The teacher reports on Ethan's daily functioning in the classroom were also analyzed. Ethan's on-task behavior was reported by his teachers. During the baseline phase, his median score was 3.00 out of a possible 4.00. The trend for baseline teacher reports reflected a medium negative slope. In terms of variability, daily averages ranged from 1.00 to 3.30. During the intervention phase, his median score was also a 3.00. The trend of the ratings was positive and low in magnitude. The variability of daily averages during this phase ranged from 2.33 to 4.00. The between phase analysis revealed a positive immediacy effect. Finally, the analysis of effect size resulted in a PEM of 23.1

percent (ineffective range) and TauU of .31 (moderate change: SE=.25). A visual analysis of these results indicated that although Ethan had some difficult days remaining on task, on other days his teachers observed much higher levels of on-task behaviors than any shown during the baseline period.

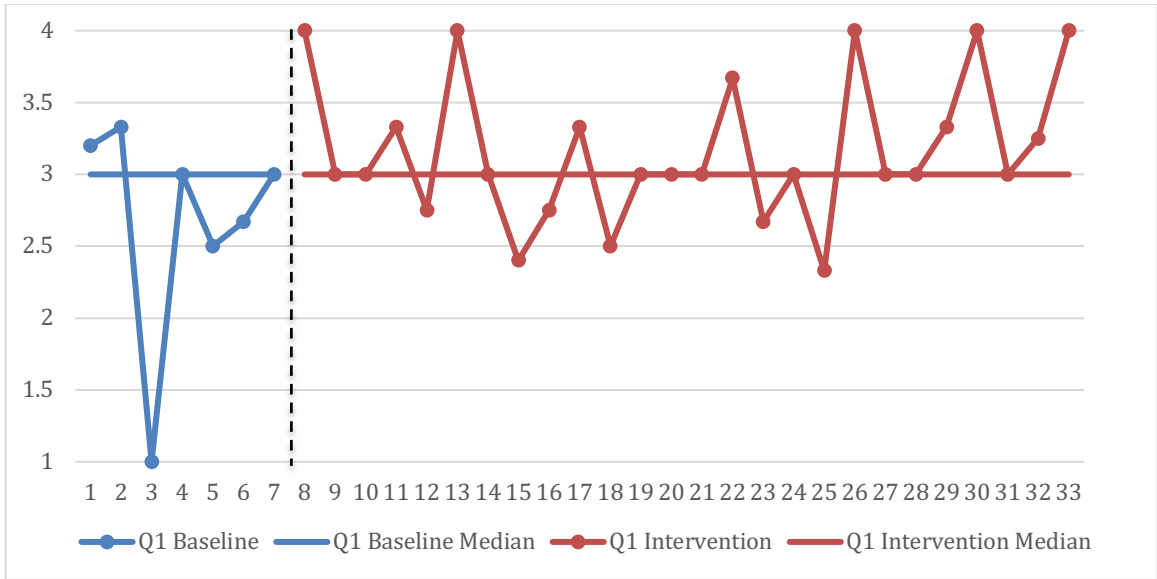


Figure 6. Ethan (Participant 2): On-task behavior

Next, Ethan’s observed emotional engagement was reported by his teachers. During the baseline phase, his median observed emotional engagement in school was 2.00 out of 4.00. The trend of the teacher reports reflected a medium negative slope. In terms of variability, daily averages ranged from 1.0 to 3.0. During the intervention phase, his median score increased to 3.00, suggesting an increase in positive emotional engagement. The trend of his ratings during the intervention phase was positive and medium in magnitude. The variability of daily averages during this phase ranged from 1.5 to 4.0. A visual analysis of the data suggests that Ethan’s emotional engagement was quite variable. This is consistent with his own reports of high mood lability. The between phase analysis reveals an immediacy effect of an increase in performance with the onset

of the intervention. Finally, the PEM analysis resulted in an 84.6 percent (moderately effective) and TauU of .59 (SE=.25; moderate change). Overall, despite variability in his behavior, Ethan's observed emotional engagement improved over the course of the intervention and was able to engage at much higher levels than during the baseline phase.

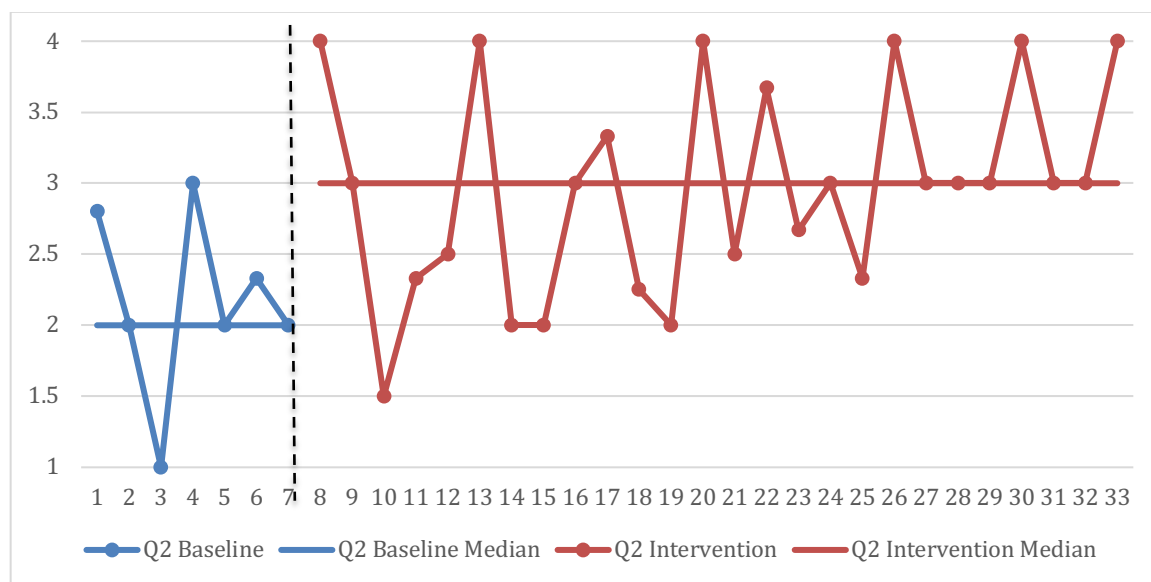


Figure 7. Ethan (Participant 2): Emotional engagement behavior

Lastly, Ethan's ability to follow school rules and behavioral expectations was reported. During the baseline, his median score was 3.33 with a medium, negative trend. In terms of variability, daily averages ranged from 3.00 to 3.80. During the intervention phase, his median score was 3.67. The trend of these ratings was positive and low in magnitude. The variability of daily averages during this phase ranged from 2.75 to 4.00. The between phase analysis revealed an immediacy effect of an increase in performance with the onset of the intervention. Next, the PEM analysis resulted in a 61.5 percent which is in the questionable effectiveness range. The TauU score was also in the moderate effect range (TauU=.26; SE: 0.25). Across all teacher reports, Ethan's school engagement shifted from a negative trend to a positive trend and increase in overall

engagement behaviors. Unfortunately, the variability in his day to day behaviors tended to mask the positive effects.

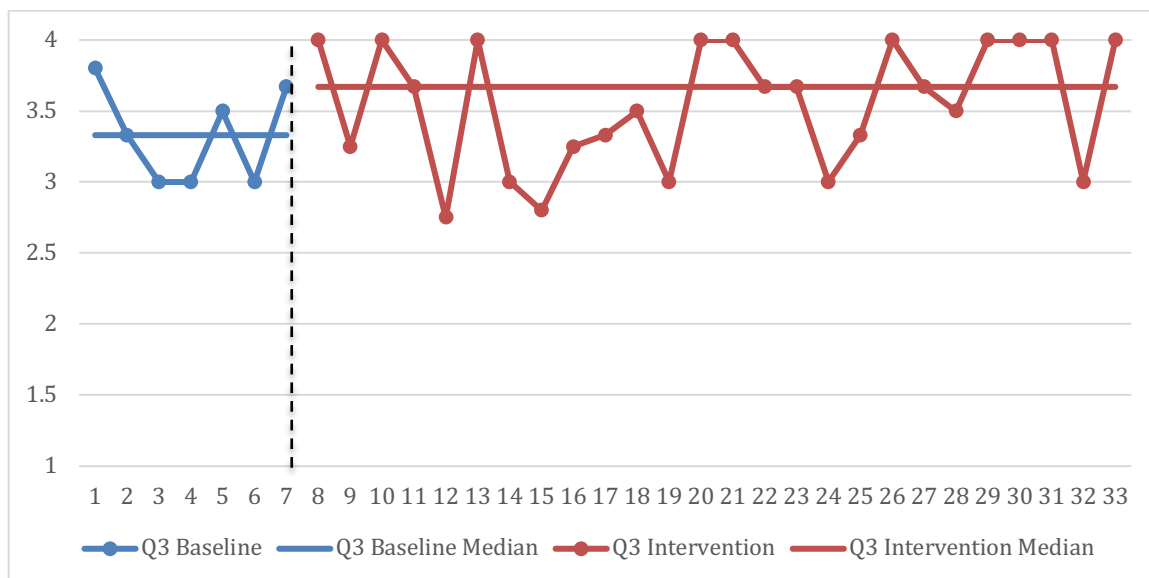


Figure 8. Ethan (Participant 2): Rule-following behavior

Next, the effect of the intervention on Ethan's cognitive engagement was measured through executive functioning tasks completed prior to and after the intervention. First, on a measure of attention and concentration, Ethan obtained a standard score in the Average range in both the baseline and post-intervention assessment (i.e., 103 at both data collection points) suggesting no change. Next, on an assessment of cognitive flexibility, he obtained a TMT B/A ratio score of 2.69 on the baseline assessment. On the post-intervention, he obtained a ratio score of 2.36, yielding a difference score of .33. This change in performance suggested increased proficiency in his cognitive flexibility.

On measures of emotion regulation, Ethan reported a baseline DERS Total raw score of 124 and a post-intervention score of 119. Both of these scores are considered to be in the Elevated range when compared to a community sample (Weinberg & Klonsky,

2009). Although these pre- and post-intervention scores were consistent and indicate ongoing difficulties with emotion regulation, there was a large amount of variability in his reporting on the various subscales of the DERS. Most of the subscales remained fairly consistent, with a range of 0-5 in terms of change except for the area of acceptance of emotional experiences. Ethan consistently reported Very Elevated difficulties in both the Goals and Strategies subscales, Elevated difficulties on the Impulse scale, and Average experiences on the Clarity scale. As noted, the most noteworthy change was on items measuring Ethan’s acceptance of his emotional experiences (Nonacceptance scale). His baseline score of 19 was in the Elevated range, but his post-intervention score of 6 was in the Average range. Conversely, Ethan reported an increase in difficulties with emotional awareness (Awareness). His baseline score of 17 was in the Average range and his post-intervention score of 21 was in the Elevated range. Overall, Ethan reported some noted gains in his ability to accept his emotional experience. The results are summarized below in Table 4.

Table 4

Ethan (Participant 2) DERS results

Test	Baseline	Post-Intervention	Difference
DERS Total	124	119	-5
DERS Nonaccept	19	6	-13
DERS Goals	25	25	0
DERS Impulse	18	23	+5
DERS Aware	17	21	+4
DERS Strategies	33	35	+2
DERS Clarity	12	9	-3

In summary, Ethan’s data indicated that participating in the mindfulness-based intervention had no impact on his attendance and highest grade performance. His performance in his most challenging class decreased over the course of the intervention

and flatlined as the end of the semester neared. His ability to regulate his emotions remained in the Elevated range before and after the completion of the intervention. He did, however, report an increase in his ability to accept his emotions, a core feature of mindfulness. On the CAMM, he also reported an increase in mindfulness traits. During the intervention, Ethan shifted from a negative trend to a positive trend on the teacher measures of school engagement and an increase in his emotional engagement was observed. His performance on executive functioning measures indicated no change in his ability to maintain attention, but he demonstrated a slight increase in his cognitive flexibility.

Participant #3 (David)

David was referred to participate in the group due to high levels of anxiety that his teachers believed negatively impacted his ability to complete his work efficiently. School staff described David as a very quiet and thoughtful student, but internally distracted (i.e. he appeared to get stuck in his own thoughts). He often relied on others to help him remain organized and on-task. David presented as very quiet and withdrawn when the group first began to meet. Over the weeks, he increasingly participated in the group discussions and shared his struggles with anxiety. David frequently reported utilizing the newly learned mindfulness skills outside of the group with high efficacy. On the CAMM, compared to his peers, David reported a high level of mindfulness at the beginning of the intervention and reported a consistent level after the intervention (pre-score =27; post-score =27).

In regard to his attendance, David had a high baseline and post-intervention median attendance rate of 100.0 percent. There was little variability in his attendance

with David obtaining 100.0 percent attendance in 11 of the 13 weeks of data collection (baseline range 89.3-100.0 percent; intervention range 96.4-100.0 percent). The trend on his attendance during baseline was negative at a medium magnitude; during the intervention, the trend was flat. The between analysis indicated no impact of the intervention on attendance (no immediacy effect; PEM=0.0 percent; TauU=.09, SE=.35).

In terms academic performance, David's median highest grade during baseline was 81.0 percent with scores ranging from 77.0 to 84.0 percent. The trend was positive and low in magnitude. During the intervention, his median high grade increased to an 85.0 percent with weekly average ranging from 82.0 to 96.0 percent. There was a positive intervention immediacy effect with two of the first three data points exceeding the last three baseline points, but the trend during the intervention was low and negative (almost flat). The PEM was 100.0 percent and in the highly effective range. The TauU score indicated a large effect (TauU=0.83; SE=.35). Taken together, the data indicated a positive change in his highest grade score.

Next, his median lowest grade during baseline was 70.0 percent with scores ranging from 64.0 to 80.0 percent. The trend during baseline was positive with medium magnitude. During the intervention, his median low grade was 76.0 percent with scores ranging from 67.0 to 77.0 percent. The trend for these data was positive and low in magnitude. When comparing the two phases, there was no intervention effect, the PEM was 42.86 (ineffective range), and TauU scores indicated little change (TauU=.20; SE=.35). Overall, David's attendance and lowest grade did not change much, but he had meaningful increase in his highest grade.

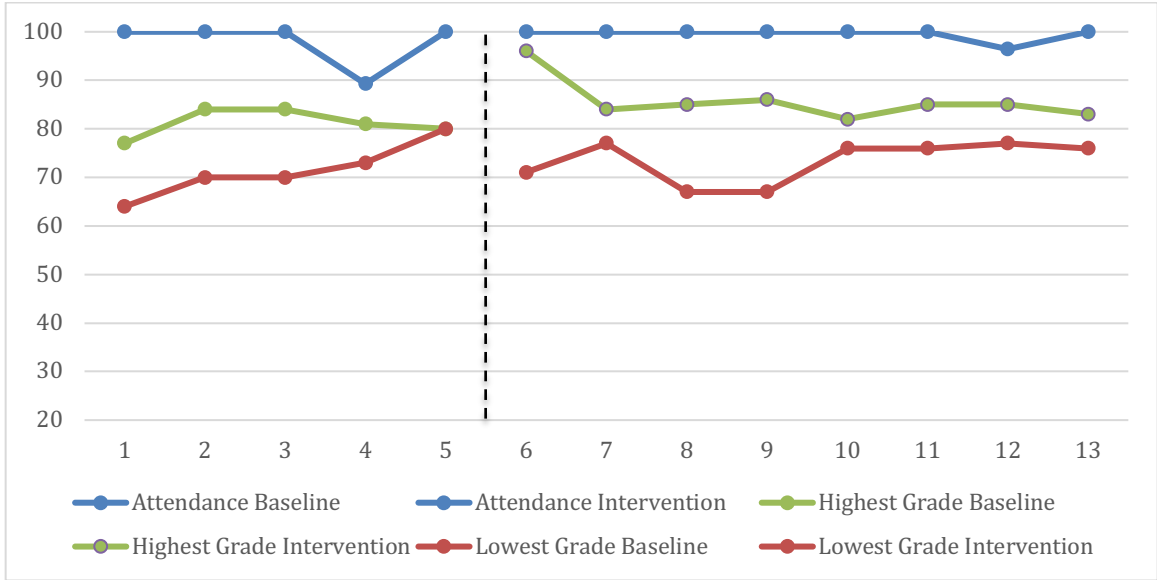


Figure 9. David (Participant 3): Attendance and grades

The teacher progress monitoring reports on David’s school engagement behaviors were also analyzed. During the baseline phase, David’s median on-task behavior score was 3.33 out of a possible of 4.00. The trend of these data was negative with a medium magnitude. His scores ranged from 2.67 to 4.00. During the intervention phase, the median score of his observed on-task behavior increased to 3.67 (scores ranging between 3 and 4) with the data trending upward at a low magnitude. Between phase comparison indicated a positive immediacy effect, a PEM of 68.0 percent (questionable effect range), and TauU in the moderate change range (TauU=.48; SE=.23). A visual analysis of these results showed that David’s ability to remain on task was variable during the baseline and early part of the intervention, but he experienced some stabilization of these behaviors near the end of the intervention. Taken together, David’s on-task behavior increased over the course of the intervention.

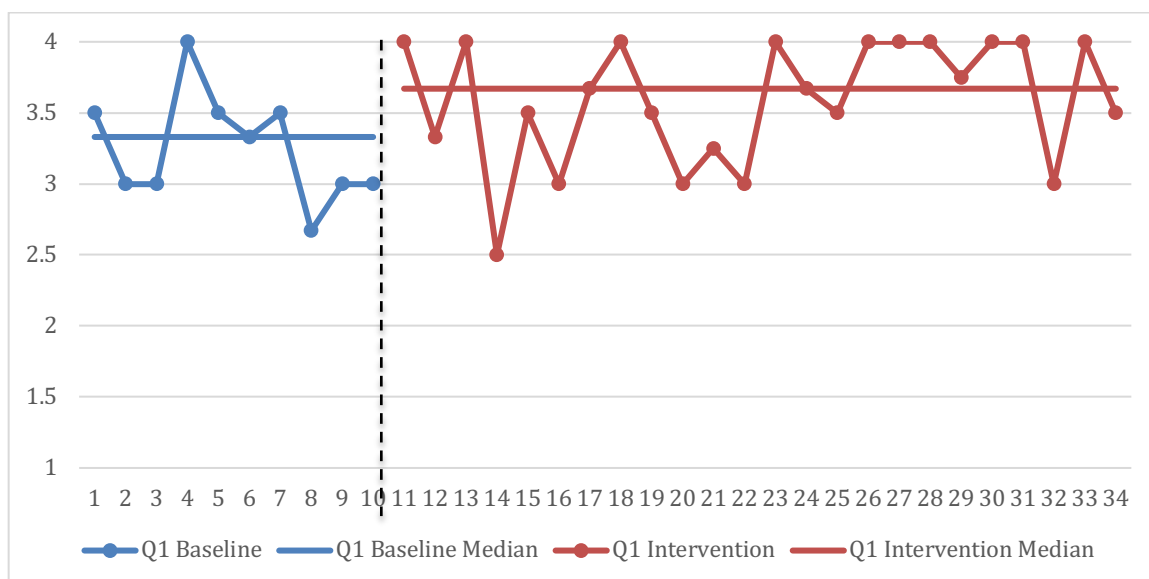


Figure 10. David (Participant 3): On-task behavior

Next, David's emotional engagement was observed and rated by his teachers. During the baseline phase, his median emotional engagement score was rated 3.50. The trend of the teacher reports reflected a low positive slope. In terms of variability, daily averages ranged from 3.00 to 4.00. During the intervention phase, his median score increased to a 4.00, suggesting an increase in positive emotional engagement. The trend of his ratings during the intervention phase was positive and low in magnitude. Similar to his on-task behavior ratings, his emotional engagement seemed to stabilize at a consistent high rate as the intervention progressed. The variability of daily averages during the intervention phase ranged from 3.00 to 4.00. The between phase analysis revealed an immediacy effect of an increase in performance with the onset of the intervention. Finally, the PEM analysis resulted in a 68.0 percent which is in the questionable effect range. The TauU score was indicated a medium change from baseline to intervention (TauU=.40; SE=.23). Overall, David demonstrated consistent emotional engagement in school prior to participating in the mindfulness group, but he increased in these behaviors

over the course of the intervention. These results are consistent with his reports of increased emotion regulation and presence.

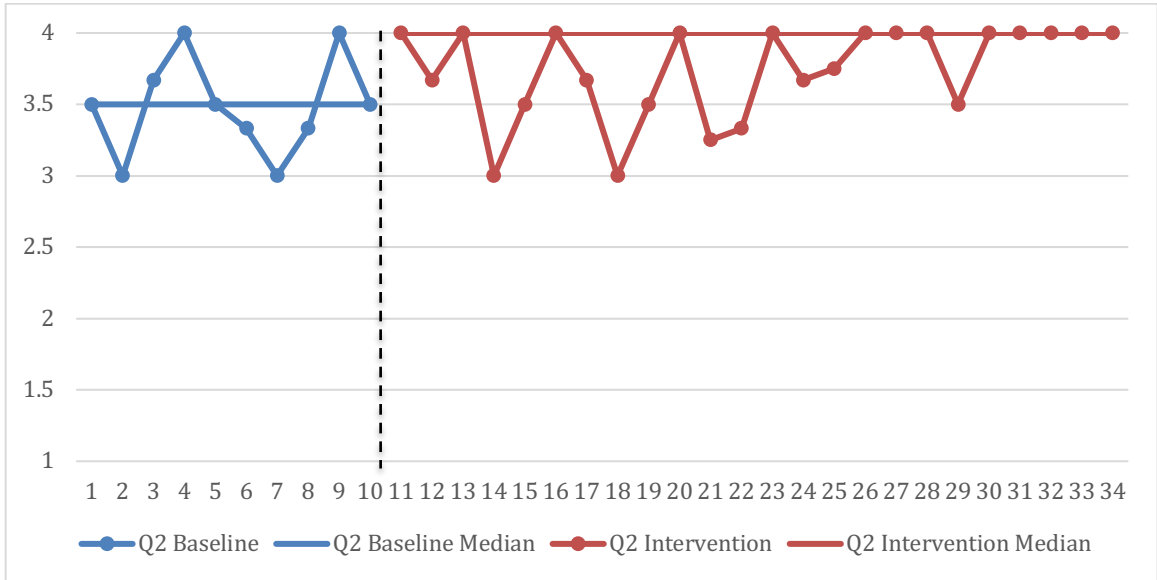


Figure 11. David (Participant 3): Emotional engagement behavior

The last area reported by teachers was David’s ability to follow school rules and meet behavioral expectations. During the baseline phase, his median score was a 4.00. The trend of the teacher baseline observations was a low negative slope. In terms of variability, daily averages ranged from 3.44 to 4.00. During the intervention phase, his median score was also 4.00. The trend of his ratings was positive and low in magnitude. The variability of daily averages during this phase ranged from 3.00 to 4.00. The between phase analysis revealed no immediacy effect, the PEM analysis resulted in a 0.00 percent, and the TauU indicated little change in his performance (TauU=.26; SE=.23). Across all teacher reports, with varying magnitude, David’s school engagement shifted from a negative trend to a positive trend and increase in overall engagement behaviors.

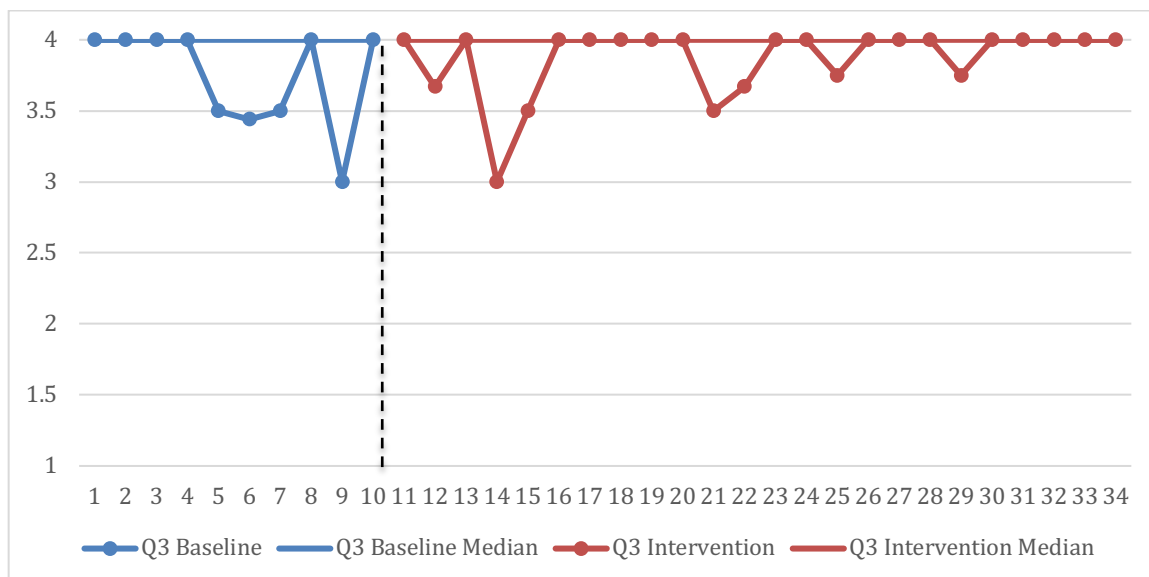


Figure 12. David (Participant 3): Rule-following behavior

Next, the effect of the intervention on David's cognitive engagement as measured through executive functioning tasks was assessed. First, on the WRAML's attention and concentration index, David obtained a standard score in the High Average range in both the baseline and post-intervention assessment (ss= 115 baseline and 112 post-intervention) suggesting no change in these skills. Next, on the assessment of cognitive flexibility, he obtained a TMT B/A ratio score of 2.61 on the baseline assessment. On the post-intervention, he obtained a ratio score of 1.96, yielding a difference score of .65. This change in performance suggested increased proficiency in his cognitive flexibility.

On a measure of emotion regulation, David reported a baseline total raw score of 69 on the DERS which is considered to be in the Average range (Weinberg & Klonsky, 2009). He reported all subscales to be in the Average range as well. Unfortunately, David's ability to regulate his emotions did not improve over the course of the intervention and in fact, he reported greater difficulties with emotion regulation by the end of the intervention. On the post-intervention assessment, he reported a DERS Total

raw score of 80. This score is still in the Average range, but much higher than his first report. Of note, the Goals domain (ability to engage in goal-directed behavior) moved from the Average range to the Elevated range. All other areas remained in the Average range. These results are summarized in the table below.

Table 5

David (Participant 3) DERS results

Test	Baseline	Post-Intervention	Difference
DERS Total	69	80	+11
DERS Nonaccept	10	10	0
DERS Goals	13	20	+7
DERS Impulse	8	10	+2
DERS Aware	16	14	-2
DERS Strategies	14	17	+3
DERS Clarity	9	9	0

In summary, David’s data indicated that participating in the mindfulness-based intervention had little impact on his attendance and lowest grade performance. According to the effect size measure (PEM and TauU), there was a positive effect on his highest grade. The results from the teacher observations indicated that David’s behaviors across all three indicators improved during the course of the intervention, but he had the greatest increase in his on-task behaviors. According to his self-report, his ability to regulate his emotions remained in the Average range before and after the completion of the classes. He did, however, report an increase in his experiencing emotional dysregulation in relation to goal-setting. On the CAMM, he also reported no increase in mindfulness traits. His performance on executive functioning measures indicated no change in his ability to maintain attention, but he demonstrated an increase in his cognitive flexibility skills.

Participant #4 (Paola)

Paola was referred to participate in the mindfulness group due to high levels of anxiety and work avoidance. Her teachers reported that while Paola was always present in class, she rarely completed work. Teachers spoke highly of Paola's capabilities, but they also expressed frustration with her lack of engagement during academic instruction. Paola was quiet during the mindfulness groups, but she would occasionally share her use of newly learned mindfulness skills to help manage difficult moments. In particular, she reported enjoying the practice of heartfulness (i.e. sending kind thoughts to others and yourself). On the CAMM, Paola reported a decrease of mindfulness skills/behaviors at the end of the intervention (pre-score =27; post-score =17).

Paola's baseline median attendance rate was 100.0 percent. Her post-intervention median attendance rate was also 100.0 percent. There was little difference in the trend of her attendance across both phases (positive, very low magnitude). During baseline, there was little variability in the data (ranged from 94.2 percent to 100.0 percent), but during the intervention phase her weekly attendance averages ranged from 89.3 percent to 100.0 percent. Between phases analysis indicated no immediacy effect. The PEM for attendance was 0.0 percent in the ineffective range. The TauU also indicated no change (TauU= -.09; SE=.35).

Paola's median highest class grade during baseline was 85.5 percent with no trend in the data. There was little variability in the data with a range of 85.0 to 86.0 percent. Paola's median highest grade was 92.0 during the intervention phase. There was more variability during this phase with her highest weekly grade average ranging from 67.0 to 99.0 percent. The trend of the data during this phase was a medium positive trend. The

between phase analysis indicated a decrease in academic performance at the beginning of the intervention. The PEM on this measure was 71.4 percent and in the moderately effective range. The TauU score also indicated a medium level change between baseline and intervention (TauU=.43; SE= .38). Overall, the trend, PEM, and TauU data suggested a positive change in her highest grade as the intervention progressed.

Next, Paola’s median lowest class grade during the baseline phase was 19.0 percent with a range between 9.0 percent to 59.0 percent. The trend in the data was positive with a medium magnitude, mostly due to one outlier point. During the intervention phase, Paola’s median lowest grade increased to 76.0 percent and ranged between 59.0 percent to 83.0 percent. The trend in this phase was low and positive. Between phase analysis revealed a positive immediacy effect. The effect size measures resulted in a significant positive change (PEM=100.0 percent, highly effective range; TauU=0.97, very large effect range; SE=.35). Overall, Paola’s grades improved over the course of the intervention.

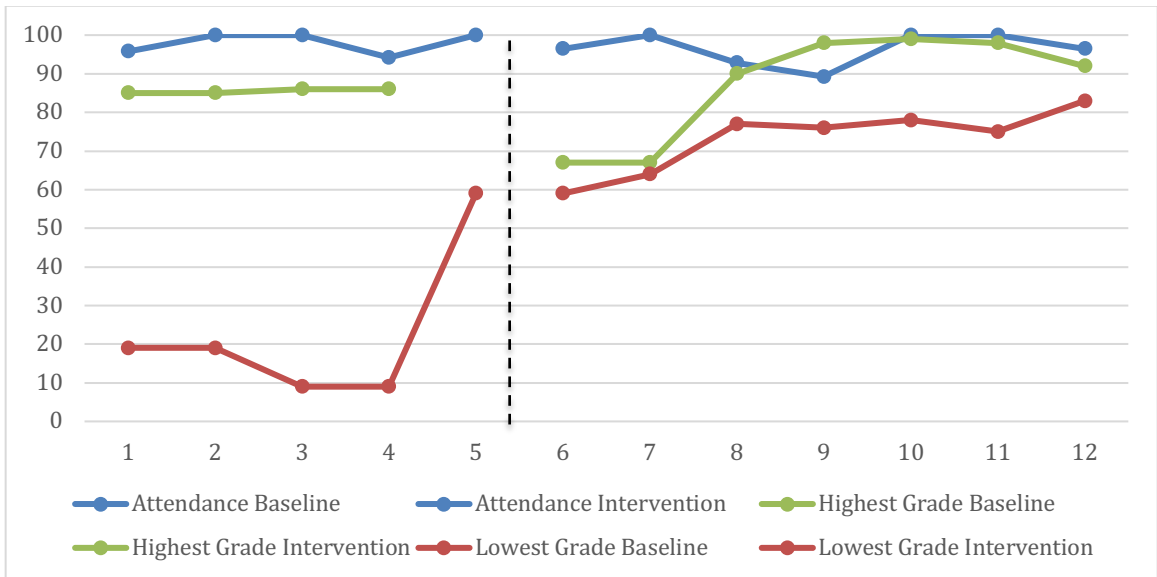


Figure 13. Paola (Participant 4): Attendance and grades

Next, Paola's on-task behavior was reported by her teachers. During the baseline phase, her median score was 3.67 out of a possible 4.00. The trend for baseline teacher reports reflected a flat slope. In terms of variability, daily averages ranged from 3.00 to 4.00. During the intervention phase, her median score increased to 4.00. The trend of her ratings was positive and low in magnitude (almost flat). The variability of daily averages during this phase ranged from 3.00 to 4.00. The between phase analysis revealed a positive immediacy effect. The PEM analysis resulted in a 60.0 percent which is in the questionable effectiveness range. The TauU resulted in a score in the small change range (TauU=.15; SE= .23). A visual analysis of these results indicated that while Paola had a small increase of on-task behaviors during the intervention phase, these changes were not statistically significant.

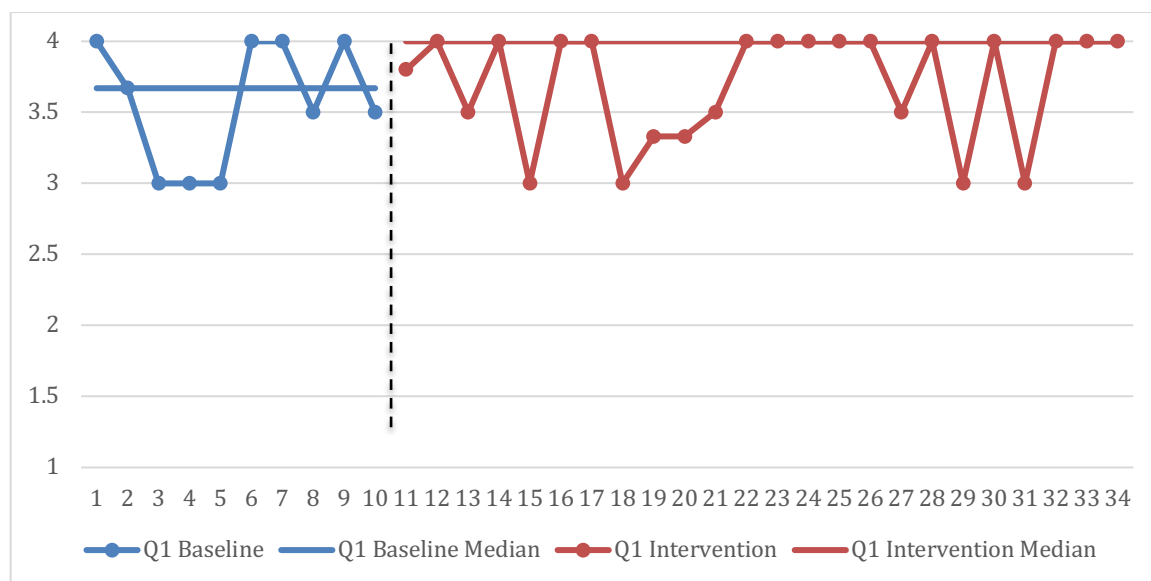


Figure 14. Paola (Participant 4): On-task behavior

Next, Paola's observed emotional engagement was reported by her teachers. During the baseline phase, her median score was 3.50 out of 4.00. The trend of the teacher reports reflected a medium positive slope. In terms of variability, daily averages

ranged from 3.00 to 4.00. During the intervention phase, her median score increased to 3.80, indicating an increase in these behaviors. The trend of these ratings was negative and low in magnitude (almost flat). The variability of daily averages during this phase ranged from 3.00 to 4.00. The between phase analysis revealed no immediacy effect with the onset of the intervention. Finally, the PEM analysis resulted in a 60.0 percent which is in the questionable effect range, and the TauU result was also indicative of limited change (TauU=.16; SE=.23). Overall, Paola's observed emotional engagement was high prior to the mindfulness sessions and decreased over the course of the intervention. These results are consistent with her self-report on the DERS (discussed below) of more difficulties with emotion regulation by the end of the intervention.

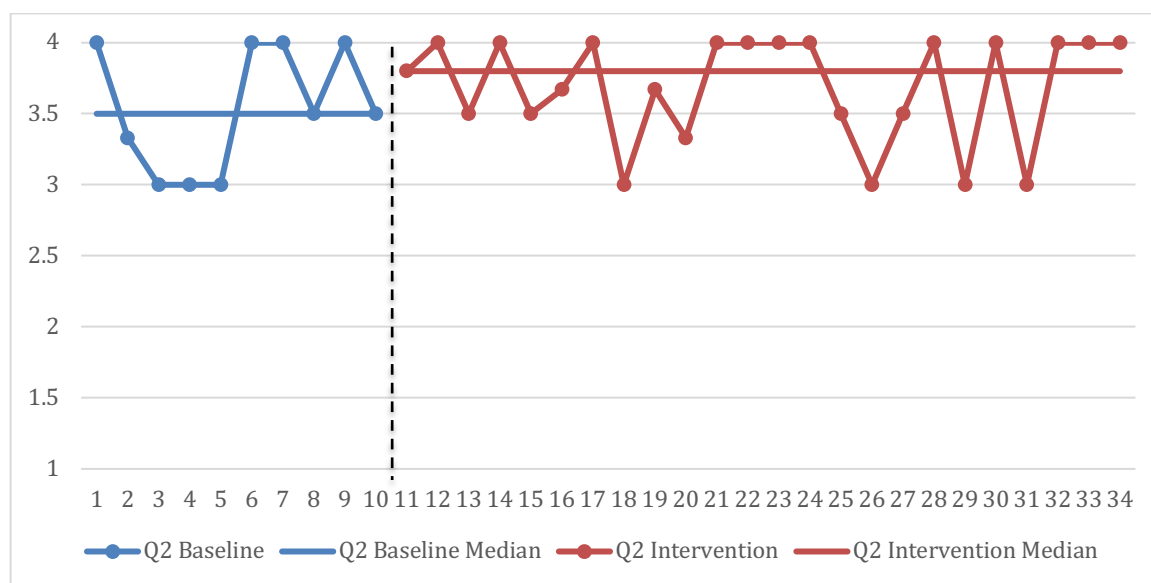


Figure 15. Paola (Participant 4): Emotional engagement behavior

Paola's observed adherence to school rules and behavioral expectations was reported on by her teachers. During the baseline phase, her median score was 4.00. The trend of the teacher baseline observations was a medium positive slope. In terms of

variability, daily averages ranged from 2.00 to 4.00. During the intervention phase, her median score was 3.76. The trend of her ratings was positive and low in magnitude (almost flat). The variability of daily averages during this phase ranged from 3.00 to 4.00. The between phase analysis revealed no immediacy effect on rule following behavior with the onset of the intervention. Next, the PEM analysis resulted in a 0.0 percent which is in the ineffective range. The TauU= was a .12 (SE=.23) and in the small change range. A visual analysis of the data indicated that Paola's behavior did stabilize at a high rate as the intervention went on (11 of the last 14 points were a 4.00). These results indicated that Paola's rule following behavior stabilized over the course of the intervention.

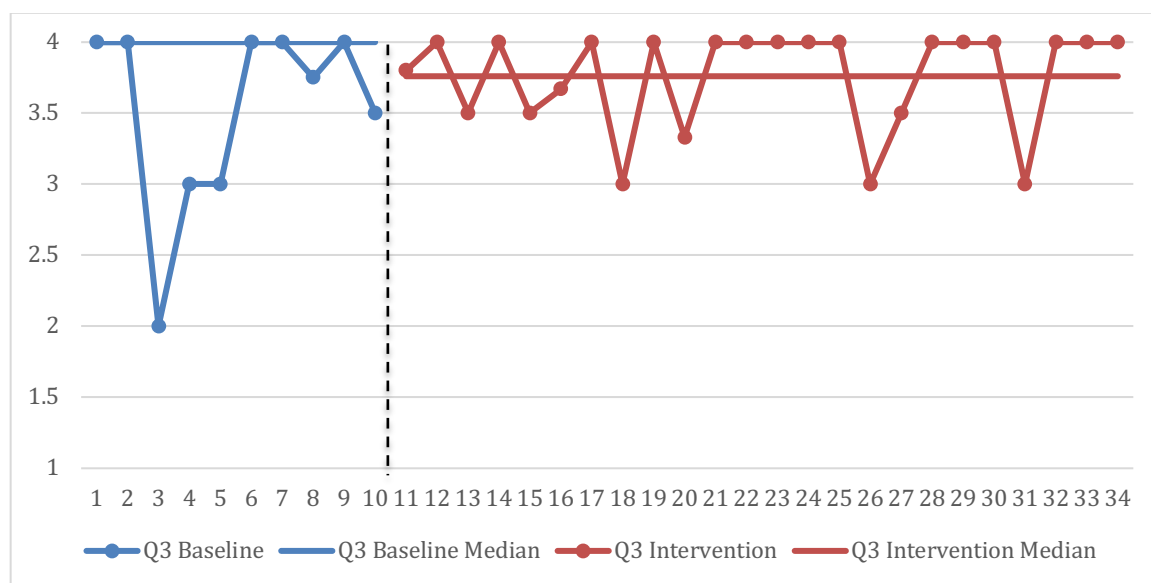


Figure 16. Paola (Participant 4): Rule-following behavior

Next, the effect of the intervention on Paola's cognitive engagement was assessed pre- and post-intervention. First, on the measure of attention and concentration, Paola obtained a standard score in the Average range in both the pre- and post-intervention assessment (standard scores of 100 and 97, respectively) suggesting no change. Next, on the assessment of cognitive flexibility, she obtained a TMT B/A ratio score of 1.43 on the

baseline assessment. On the post-intervention, she obtained a ratio score of 2.51, yielding an increased score of 1.08. This change in performance suggested decreased proficiency in her cognitive flexibility.

On the DERS, Paola reported a baseline DERS Total raw score of 100. This score is on the high end of the Average range (Weinberg & Klonsky, 2009). There were several areas that she reported Average emotion regulation skills: acceptance of emotional experiences, impulsivity, and clarity of emotional experiences. Several areas were also in the Elevated range: goal-related behaviors, awareness of emotions, and use of regulation strategies. These results indicated that while her overall score was in the Average range, she was experiencing some difficulties with emotion regulation. After the intervention, Paola reported an increase in symptoms. Her total DERS score after the intervention was 133. This score is in the Very Elevated range. She reported a stark increase in difficulties with acceptance of emotional experiences (score=17, Elevated range), goal setting (score=25, Very Elevated range), impulsivity (score=25, Very Elevated range), and clarity of emotional experiences (score=19, Elevated range). Her awareness of her emotional experiences and use of strategies to manage emotions remained stable, but in the Elevated range. These results indicate that Paola's ability to regulate emotions decreased during the course of the mindfulness group. The results are summarized below in Table 6.

Table 6

Paola (Participant 4) DERS results

Test	Pre- Intervention	Post- Intervention	Difference
DERS Total	100	133	+33
DERS Nonaccept	6	17	+11
DERS Goals	20	25	+5
DERS Impulse	16	25	+9
DERS Aware	24	24	0
DERS Strategies	24	23	-1
DERS Clarity	10	19	+9

In summary, Paola's data indicated that participating in the mindfulness-based intervention had a positive impact on her grades. The results also indicated that there was no impact on her attendance, emotional engagement, rule-following behavior, or attention. Her self-report of her ability to manage her emotions decreased as well as a loss of mindfulness-based skills. Her teachers also noted a decrease in her emotional engagement over the course of the intervention. She did make gains in her on-task and rule following behavior. Her performance on executive functioning tasks resulted in maintaining of attention skills and a decreased in cognitive flexibility.

Participant #5 (Amber)

Amber was referred to the group in order to help her manage her anxiety and distractibility. Amber was well-liked by teachers and peers. She struggled, however, to maintain passing grades in her classes. Amber expressed a great deal of enthusiasm about participating in the group. She almost always contributed her thoughts and experiences to the group discussions. Amber expressed curiosity about the neurological mechanisms that are at work with mindfulness practices. Amber enjoyed the group so much that she requested that the researcher continue to offer the training as an "elective" class. Amber's

self-report of mindful awareness was fairly stable with a slight decrease reported at the end of the intervention phase (pre-score =21; post-score =19).

Amber's baseline median attendance rate was 91.6 percent. The data trend was low and positive with daily averages ranging from 87.5 to 100.0 percent. During the intervention phase, her median attendance rate increased to 100.0 percent. The intervention trend was flat with daily averages ranging from 91.67 to 100.0 percent. Between phase analysis indicated a positive immediacy effect. PEM was 100.0 percent and in the highly effective range. The TauU score was .71 (SE=.35) and in the large change range. Overall, the data strongly indicated a positive change in Amber's attendance.

Next, her median highest class grade during baseline was 85.0 percent with the data trending in a positive direction with a low magnitude. Her weekly highest grade showed little variability and ranged from 85.0 to 90.0 percent. During the intervention phase, she had a median highest grade of 98.0 percent with grades trending negative with a low magnitude. Her highest weekly grade ranged from 90.0 percent to 100.0 percent. An analysis of the trend over the two phases indicated a positive change in performance. Both measures of effect size indicated a noticeable change in performance (PEM=100.0 percent, highly effective range; TauU=.96, SE=.38, very large change range). Amber's median lowest class grade during the baseline phase was 46.0 percent and 60.0 percent during the intervention. During the baseline phase, the trend was a positive slope with medium magnitude with weekly lowest grades ranging from 43.0 to 67.0 percent. During the intervention phase, the trend was a positive slope with a medium magnitude. She had a high amount of variability with weekly lowest grades ranging from 47.0 to 78.0

percent. Between phase analysis indicated no immediacy effect. The PEM on the lowest grade data was 100.0 percent and in the highly effective range. The TauU was a .64 (SE=.38) and in the large effect range. In other words, Amber demonstrated increased performance in her attendance and grades during the intervention phase indicating a positive response to participation in the mindfulness group.

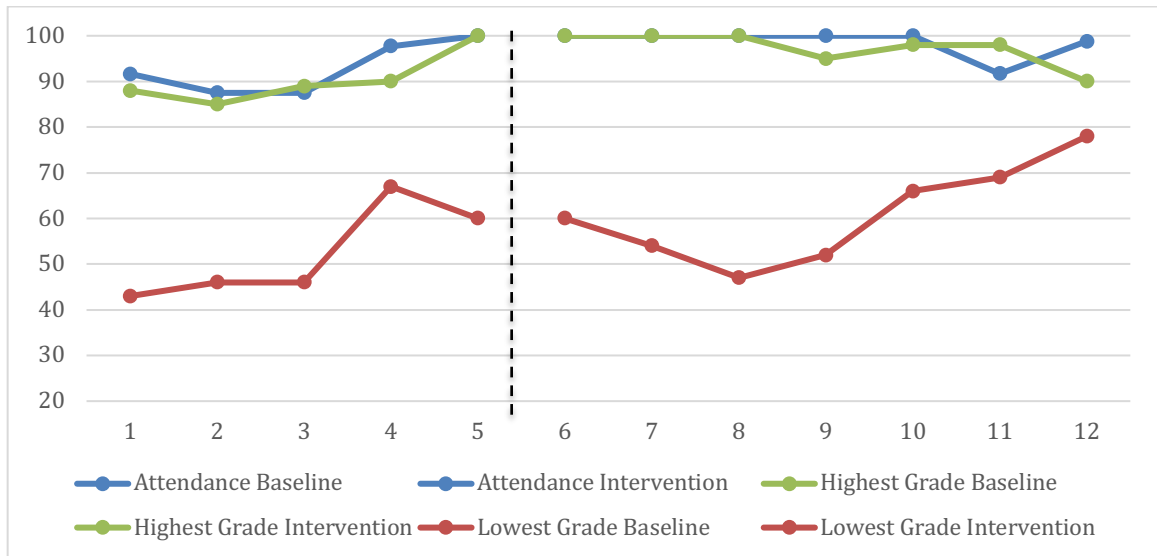


Figure 17. Amber (Participant 5): Attendance and grades

In regard to Amber's on-task behavior, she obtained a median baseline score of 4.00 out of a possible 4.00. The trend for baseline teacher reports reflected a low negative slope. In terms of variability, daily averages ranged from 3.50 to 4.00. During the intervention phase, her median score was 4.00. The trend of these ratings was positive and low in magnitude. The variability of daily averages during this phase ranged from 3.00 to 4.00. The between phase analysis reveals a positive immediacy effect. Finally, the PEM analysis resulted in a 0.0 percent which is in the ineffective range. Similarly, the TauU indicated no change occurred (TauU=.07; SE=.23). A visual analysis of these

results indicates that while Amber had some difficult days remaining on task during the first half of the intervention, she stabilized during the second half of the intervention.

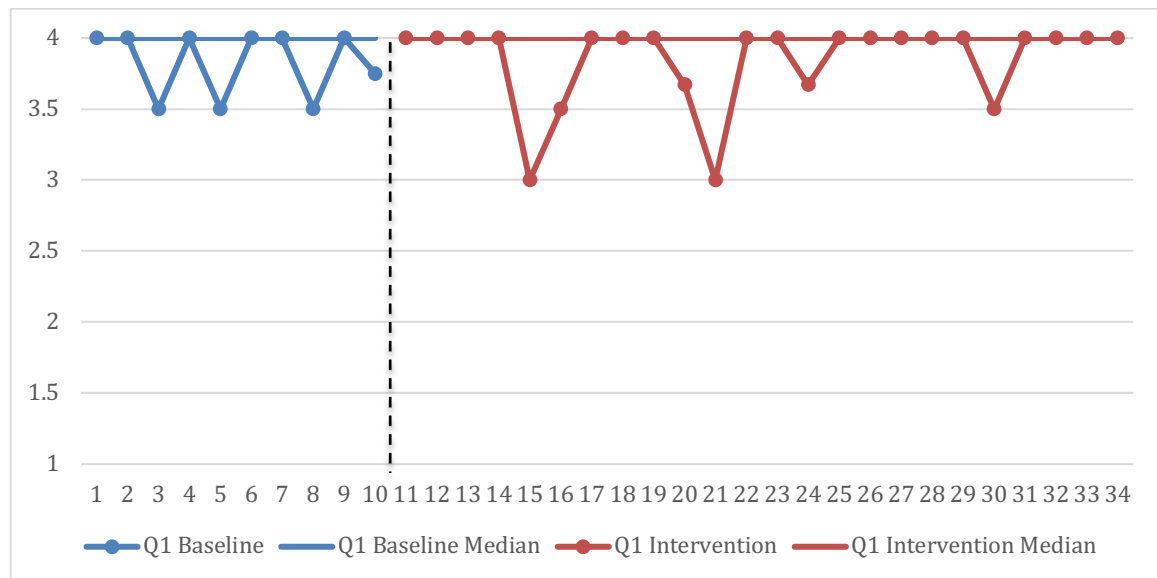


Figure 18. Amber (Participant 5): On-task behavior

Next, Amber's observed emotional engagement was reported by her teachers. During the baseline phase, her median score was 4.00 out of 4.00. The trend of the teacher reports reflected a medium negative slope. In terms of variability, daily averages ranged from 3.00 to 4.00. During the intervention phase, her median score was 4.00. The trend of her ratings was positive and low in magnitude. The variability of daily averages during this phase ranged from 3.00 to 4.00. The between phase analysis revealed a positive immediacy effect with the onset of the intervention. Finally, the effect size analysis indicated little significant change (PEM=0.0 percent, ineffective range; TauU=.28, SE=.23; moderate change range). A visual analysis of the results suggests a stabilization of high emotional engagement as the intervention progressed. Overall, Amber's demonstrated emotional engagement was high prior to the mindfulness sessions, but she did increase in the consistency behaviors over the course of the intervention.

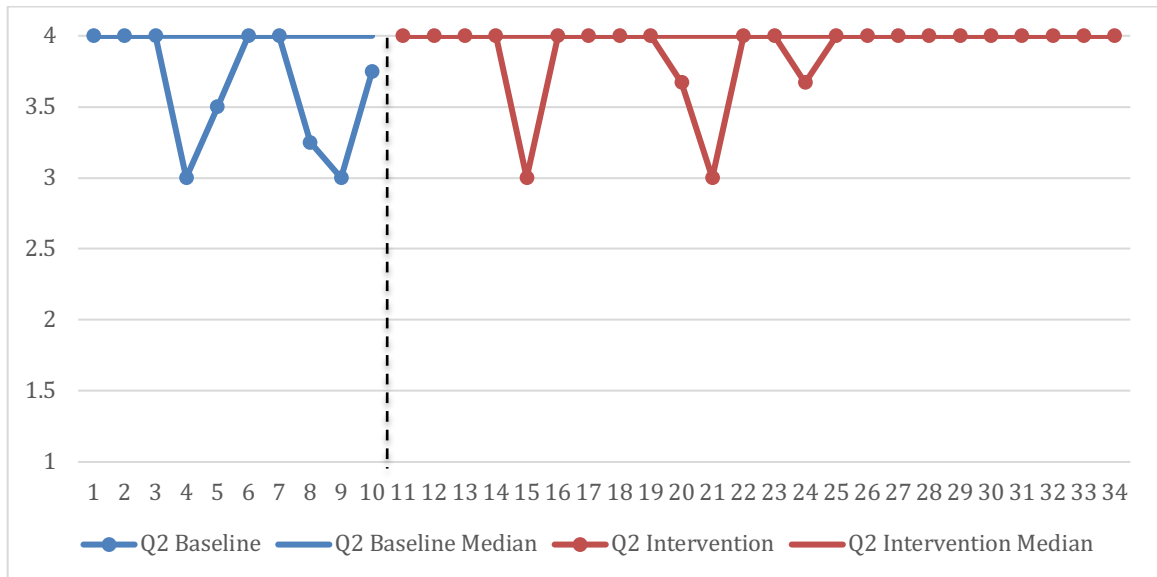


Figure 19. Amber (Participant 5): Emotional engagement behavior

Lastly, Amber's observed adherence to school rules and behavioral expectations was reported on. During the baseline phase, her median score was a 4.00 out of a possible 4.00. The trend of the teacher baseline observations was a medium negative slope. In terms of variability, daily averages ranged from 3.50 to 4.00. During the intervention phase, her median score was 4.00. The trend of her ratings was flat. The variability of daily averages during this phase ranged from 3.67 to 4.00. The between phase analysis revealed a positive immediacy effect, PEM of 0.0 percent (ineffective range), and TauU of .13 (SE=.12; small change). As with the other teacher reports, Amber's school engagement behaviors were high in baseline and stabilized over the course of the intervention.

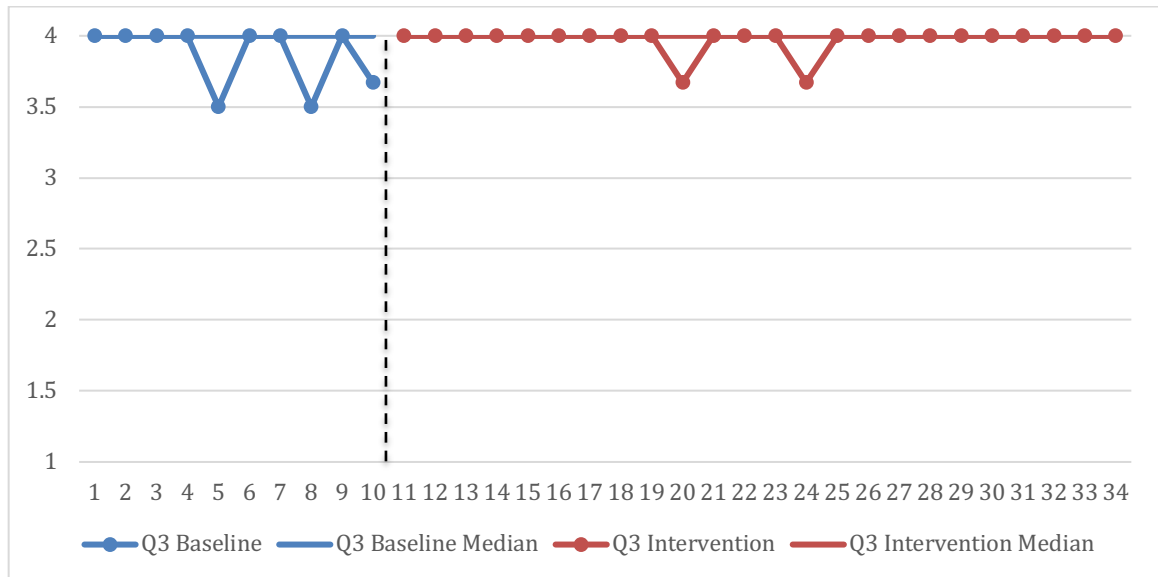


Figure 20. Amber (Participant 5): Rule-following behavior

Next, the effect of the intervention on Amber's cognitive engagement as measured through executive functioning tasks were assessed prior to the intervention and after the completion of the intervention. First, on a measure of attention and concentration, Amber obtained a score in the High Average range in the baseline assessment earning a standard score of 117. She obtained a standard score of 131 on the post-intervention assessment. This score is in the Superior range and suggested an increase in her attentional skills. Next, on the assessment of cognitive flexibility, she obtained a TMT B/A ratio score of 1.79 on the baseline assessment. On the post-intervention, she obtained a ratio score of 2.84, yielding an increased score of 1.05. This change in performance suggested decreased proficiency in her cognitive flexibility.

On the DERS, Amber reported a baseline DERS Total raw score of 86 and a post-intervention score of 80. Both of these scores were in the Average range (Weinberg & Klonsky, 2009), but suggested she was experiencing slightly more success with managing emotions. Across all of the subscales, Amber reported Average scores in both

the pre- and post-intervention responses. These results suggested that Amber did not experience difficulties prior to the intervention, nor did she experience and changes in these internal experiences. The results are summarized below in Table 7.

Table 7

Amber (Participant 5) DERS results

Test	Pre- Intervention	Post-Intervention	Difference
DERS Total	86	80	-6
DERS Nonaccept	15	14	-1
DERS Goals	16	16	0
DERS Impulse	11	12	+1
DERS Aware	13	12	-1
DERS Strategies	18	17	-1
DERS Clarity	10	9	-1

In summary, Amber's data indicated that participating in the mindfulness-based intervention had a positive impact on her attendance, grades, attention skills, and school engagement behavior. She reported no change in her emotion regulation skills and mindfulness-related skills. She decreased in her performance on a task measuring cognitive flexibility.

Participant #6 (Noah)

Noah was referred to the group due to his difficulty with maintaining attention and multiple failing grades. His teachers described Noah as a very likable student with strong cognitive abilities, but he struggled to stay on-task and motivated in the classroom. In particular, he was easily distracted by his peers. Noah presented as an affable and likable young man. Noah expressed that his interest in mindfulness led him to participate in the group. He also acknowledged that he is easily distracted and can become emotionally dysregulated. During groups, Noah was always willing to share his reflections and experiences, but often needed support to remain on-task and prevent him

from taking several other group members off-task. Noah accepted these reminders with good humor and affirmed his intention to support the experience of all the group members. Compared to other participants, Noah reported a high level of mindfulness prior to the intervention and experienced a decrease in these cognitions by the end of the intervention (pre-score =27; post-score =20).

Noah's median baseline attendance rate was 93.0 percent with a range from 87.5 percent to 95.8 percent. His intervention median attendance rate was 95.8 percent with a range from 87.5 percent to 100 percent. During baseline, the trend was positive and medium in magnitude. The trend during the intervention phase was low and positive. Between phase analysis indicated a small positive immediacy effect. The PEM for attendance was 57.1 percent in the ineffective range. The TauU was also in the small change range (TauU=.11; SE=.35).

Next, his median highest class grade during baseline was 86.0 percent with a high variability rate (range 83.0 to 100.0 percent). The trend in the data was positive and medium in magnitude. His highest median grade was 98.0 during the intervention with slightly more variability in weekly averages (ranging from 92.0 to 100.0 percent). The trend shifted to negative with a low magnitude. Between phase analysis revealed a positive immediacy effect. The PEM was 100.0 percent and in the highly effective range. The TauU score was .66 (SE=.35) and in the large effect range. Noah's highest grade significantly improved during the intervention.

His median lowest class grade during the baseline phase was a 67.0 percent with a range in scores from 63.0 percent to 84.0 percent. The trend in the data was a medium positive slope. During the intervention phase, the median lowest grade was a 60.0 percent

with a high variability rate ranging from 44.0 percent to 90.0 percent. During the intervention phase, the trend was a negative slope with a medium magnitude. The PEM on the lowest grade data was 42.9 percent and in the ineffective range. The TauU was $-.23$ ($SE=.35$) and in the moderate, negative, change range. In other words, the data indicated that he improved his highest academic performance during the course of the mindfulness sessions, but he had little progress in his attendance and lowest-grade.

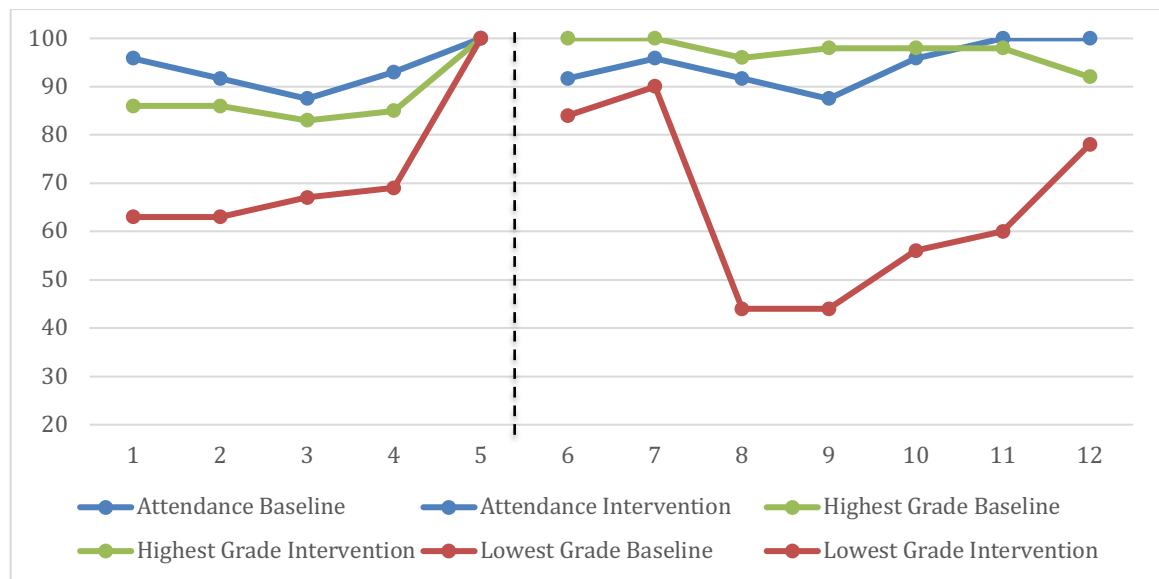


Figure 21. Noah (Participant 6): Attendance and grades

The teacher reports on Noah's daily functioning in the classroom were also analyzed. First, Noah's on-task behavior was reported by his teachers. During the baseline phase, his median score was a 3.00 out of a possible 4.00. The trend for baseline teacher reports reflected a medium positive slope. In terms of variability, daily averages ranged from 2.25 to 3.33. During the intervention phase, his median score was also 3.00. The trend of his ratings was positive and medium in magnitude. The variability of daily averages during this phase ranged from 2.50 to 4.00. The between phase analysis revealed a mild negative immediacy effect. Finally, the PEM and TauU analysis resulted

in no significant effect (PEM=26.9 percent; TauU=-.07, SE=.25). A visual analysis of these results indicated that Noah made little progress in improving his on-task behaviors during the intervention.

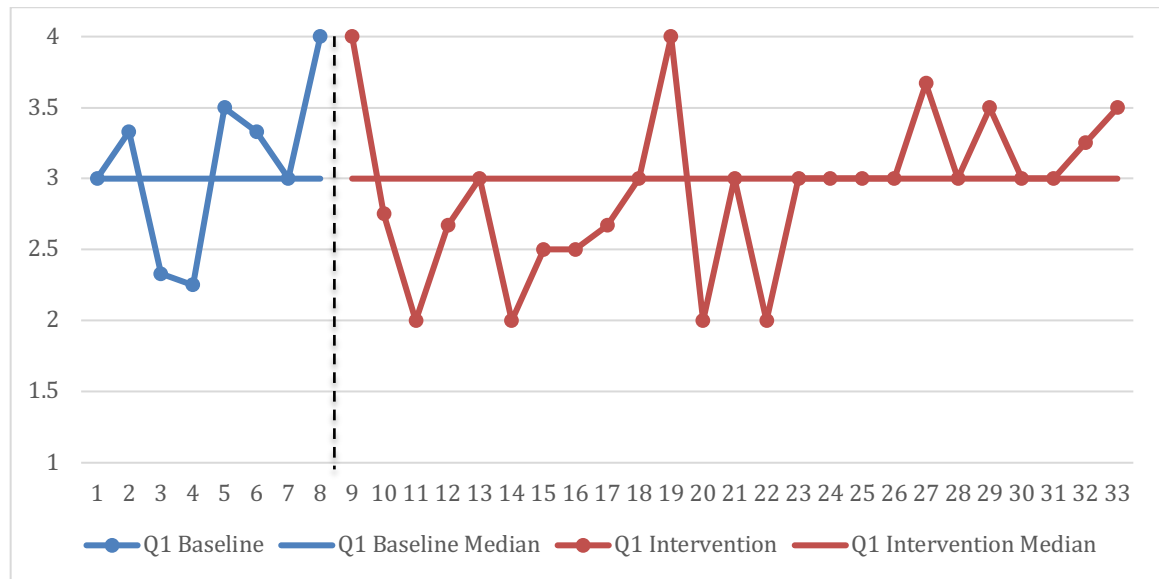


Figure 22. Noah (Participant 6): On-task behavior

Next, Noah's observed emotional engagement was reported by his teachers. During the baseline phase, his median score was 3.00 out of 4.00. The trend of the teacher reports reflected a high positive slope. In terms of variability, daily averages ranged from 2.33 to 3.75. During the intervention phase, his median score was 3.00. The trend of his ratings was negative and low in magnitude. The variability of daily averages during this phase ranged from 2.00 to 4.00. The between phase analysis revealed no immediacy effect. Finally, the PEM analysis resulted in a 38.5 percent (ineffective range) and TauU was -.03 (SE=.25; small change range). Overall, Noah's observed emotional engagement was inconsistent across both baseline and intervention phases.

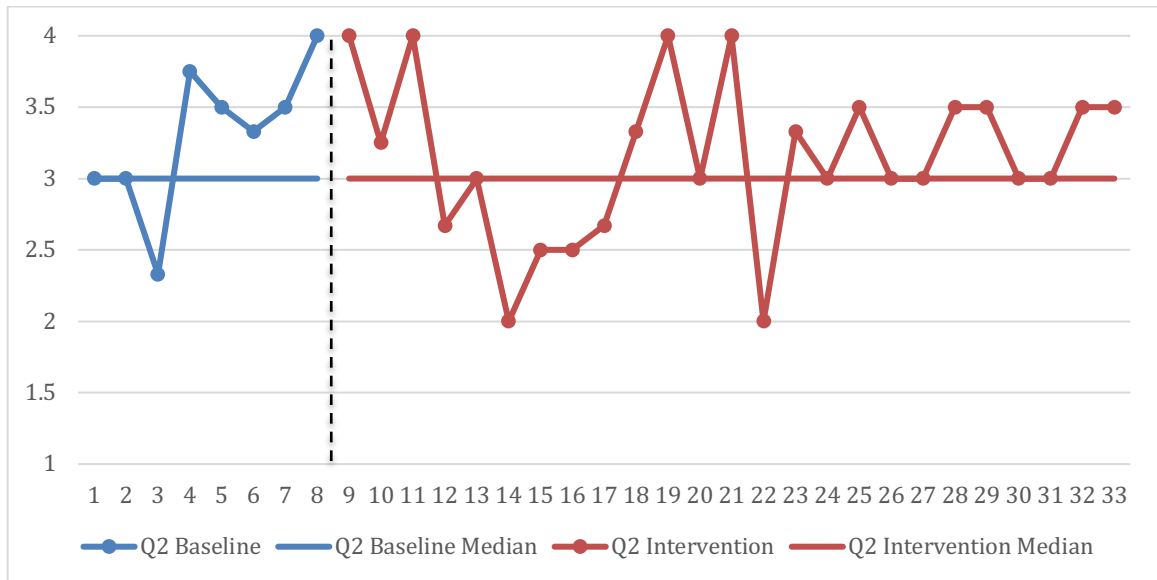


Figure 23. Noah (Participant 6): Emotional engagement behavior

Next, Noah's observed ability to follow school rules and meet behavioral expectations was reported on. During the baseline phase, his median score was 3.33 out of a possible 4.00. The trend of the teacher baseline observations was a low positive slope. In terms of variability, daily averages ranged from 2.33 to 3.75. During the intervention phase, his median score was 3.50. The trend of his ratings was positive and medium in magnitude. The variability of daily averages during this phase ranged from 2.0 to 4.0. The between phase analysis reveals no immediacy effect with the onset of the intervention. Next, the PEM analysis resulted in 57.7 percent which is in the questionable range. The TauU was .15 (SE=.25) and in the small change range. While Noah was inconsistent in his rule following behavior, he did make some limited growth in this area.

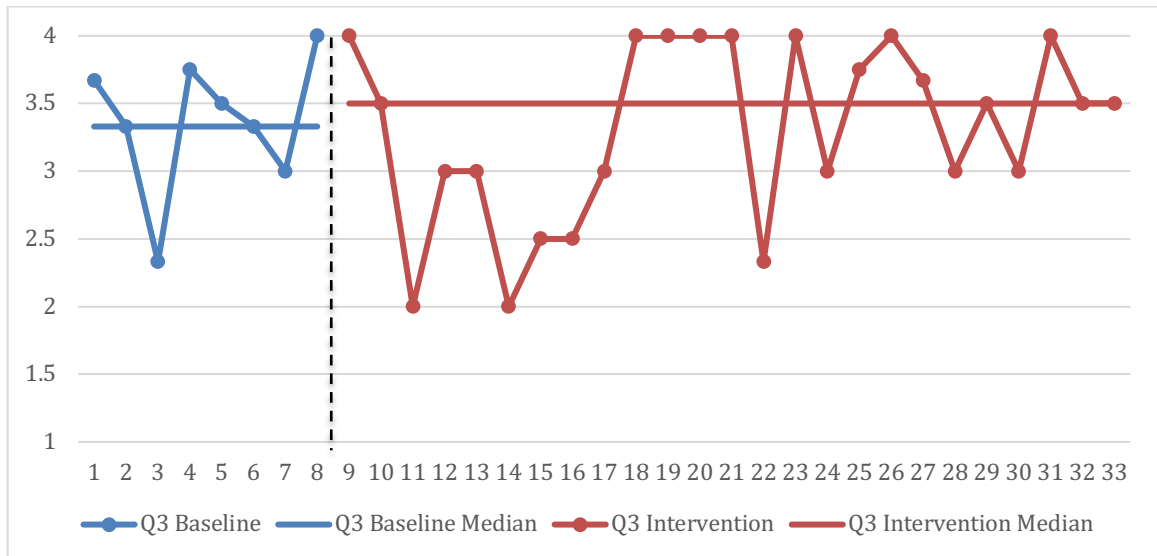


Figure 24. Noah (Participant 6): Rule-following behavior

The effect of the intervention on Noah's cognitive engagement as measured through executive functioning tasks was assessed. First, on a measure of attention and concentration, Noah achieved a standard score in the Average range ($ss=91$) on the baseline evaluation. On the post-intervention assessment, he obtained a standard score of 112 in the High Average range suggesting an increase in his attention skills. Next, on an assessment of cognitive flexibility, he obtained a TMT B/A ratio score of 4.47 on the baseline assessment. On the post-intervention, he obtained a ratio score of 3.25, yielding a difference score of 1.22. This change in performance suggested increased proficiency in his cognitive flexibility. Overall, Noah's scores resulted in increased executive functioning skills.

On measures of emotion regulation, Noah reported a baseline DERS Total score of 61 and a post-intervention score of 78. Both of these scores are in the Average range (Weinberg & Klonsky, 2009). All of the subscales were also in the Average range both pre- and post-intervention. One area of note is the strategies subscale (a measure of

access to emotion regulation skills). While both responses are in the Average range, he reported a 9-point increase in these difficulties, nearly doubling his score from an 11 to a 20. Overall, Noah reported consistent abilities to manage his emotions, but he may have experienced increased difficulties and/or awareness of his need for strategies in managing these emotions. The results are summarized below in Table 8.

Table 8

Noah (Participant 6) DERS results

Test	Pre- Intervention	Post-Intervention	Difference
DERS Total	61	78	+17
DERS Nonaccept	8	14	+6
DERS Goals	13	9	-4
DERS Impulse	8	11	+3
DERS Aware	13	13	0
DERS Strategies	11	20	+9
DERS Clarity	8	11	+3

In summary, Noah's data indicated that participating in the mindfulness-based intervention had little to no impact on his attendance and lowest grade performance. His performance in his most successful class increased over the course of the intervention. His ability to regulate his emotional remained in the Average range before and after the completion of the classes. He did, however, report a decreased ability to access strategies to manage emotions, a goal of mindfulness-based interventions. On the CAMM, he also reported a decrease in mindfulness traits. He demonstrated consistent behaviors on daily measures of school engagement. He did, however, show growth in his executive functioning skills.

Participant #7 (Edgar)

Edgar was referred to the group due to concerns related to failing several of his second quarter classes. School staff described Edgar as a respectful and conscientious

student. Edgar stated that he wanted to improve his ability to regulate his emotions as he often experienced his feelings as overwhelming and “out-of-control.” He described getting stuck in a mood for long periods of time and lacking any strategies to work through these emotions. He was generally quiet during discussions, but when he did share his thoughts, he was reflective and insightful. Edgar reported a slight increase in mindfulness skills at the end of the intervention (pre-score =14; post-score =15).

In regard to his attendance, Edgar’s median baseline attendance rate was 100.0 percent. There was no trend and no variance in his attendance rate. His post-intervention attendance median rate was 100.0 with a low positive trend and a range of weekly average rates between 79.2 to 100.0 percent. Between phases analysis indicated no immediacy effect. The PEM for attendance was 0.0 percent in the ineffective range. Similarly, the TauU indicated no change (TauU=-.14, SE=.35).

Next, his median highest class grade during baseline was an 88.0 percent. There was little variability in the data (averages of 88.0 to 90.0 percent) and the trend was flat. Edgar’s median highest grade during the intervention was 100.0 percent with a low positive trend. Variability of data ranged from 87.0 to 100.0 percent. Analysis of between phase changes indicated no immediacy effect. The PEM was 71.4 percent and in the moderately effective range. The TauU was consistent with medium level of change (TauU=.49, SE=.35). These results revealed a substantial increase in his highest grade over the course of the intervention.

His median lowest class grade during the baseline phase was 71.0 percent and 70.0 percent during the intervention phase. During the baseline phase, the trend was a negative slope with low magnitude with a range of average weekly scores ranging

between 68.0 to 72.0 percent. During the intervention phase, the trend was a positive slope with a low magnitude with a range of average weekly scores between 60.0 to 77.0 percent. There was no immediacy effect. The PEM on the lowest grade data was 28.6 percent and in the ineffective range. The TauU was also in the small change range (TauU=.20, SE= .35). In other words, participating in the mindfulness group may have had some positive effect on Edgar's highest grade increase, but no impact on his attendance or lowest grade.

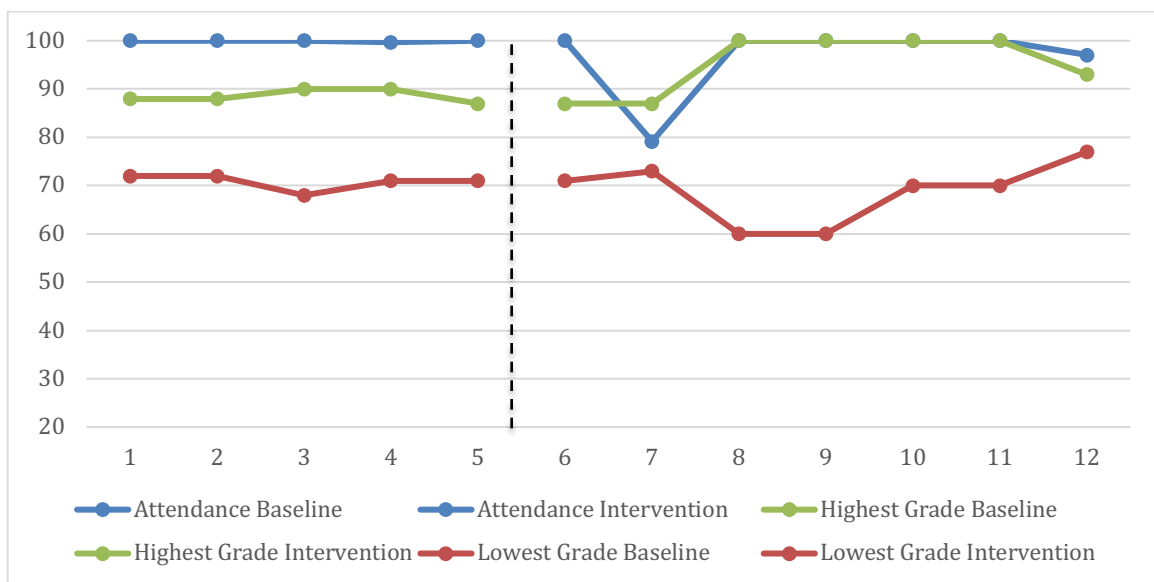


Figure 25. Edgar (Participant 7): Attendance and grades

During the baseline phase, Edgar's median on-task behavior score was 3.00 out of a possible 4.00. The trend for baseline teacher reports reflected a medium negative slope. In terms of variability, daily averages ranged from 2.33 to 4.00. During the intervention phase, his median score was also 3.00. The trend of his ratings shifted to positive and low in magnitude. The variability of daily averages during this phase ranged from 2.75 to 4.00. The between phase analysis reveals a positive immediacy effect. Finally, the PEM

analysis resulted in a 39.3 percent which is in the ineffective range; the TauU also indicated little notable change ($\text{TauU}=.17$; $\text{SE}=.23$). A visual analysis of these results indicated that while Edgar had a few difficult days remaining on task, the general trend during intervention was slightly upward by the end of the intervention phase.

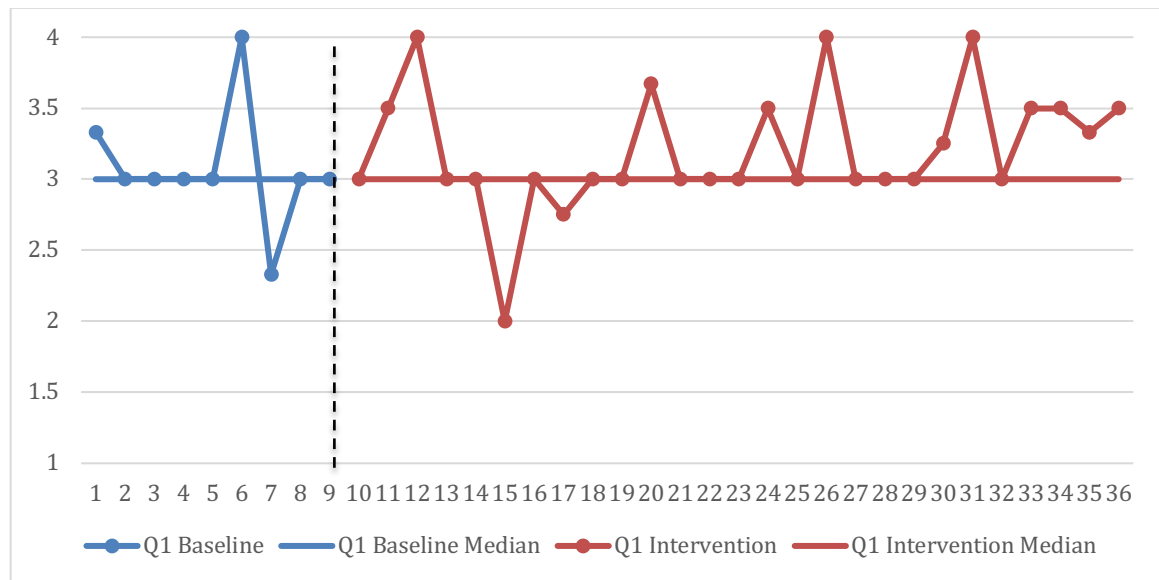


Figure 26. Edgar (Participant 7): On-task behavior

Next, Edgar's observed emotional engagement was rated by his teachers. During the baseline phase, his median score was 3.42 out of 4.00. The trend of the teacher reports reflected a medium negative slope. In terms of variability, daily averages ranged from 2.67 to 4.0. During the intervention phase, his median score was 3.00, suggesting an overall slight decrease in emotional engagement. The trend of his ratings, however, was positive and low in magnitude (almost flat) and indicated an that the behavior increased over the course of the intervention. The variability of daily averages during this phase ranged from 2.00 to 4.00. The between phase analysis reveals an immediacy effect of an increase in performance with the onset of the intervention. Finally, the effect size measures also indicated no change ($\text{PEM}=39.3$ percent; $\text{TauU}=-.12$, $\text{SE}=.23$). Overall,

Edgar's observed emotional engagement was high prior to the mindfulness sessions, but he did have mild increase in these behaviors over the course of the intervention.

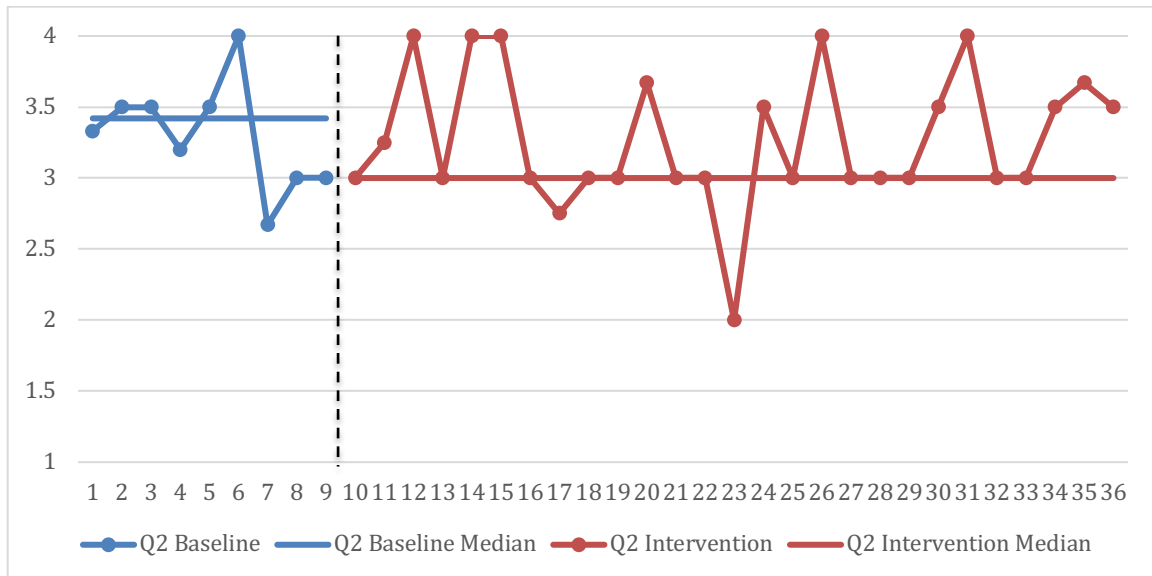


Figure 27. Edgar (Participant 7): Emotional engagement behavior

Next, Edgar's ability to follow school rules and meet behavioral expectations was rated. During the baseline phase, his median score was 3.50 out of a possible 4.00. The trend of the teacher baseline observations was positive and medium in magnitude. In terms of variability, daily averages ranged from 3.00 to 4.00. During the intervention phase, his median score was 3.59. The trend of his ratings was flat. The variability of daily averages during this phase ranged from 3.00 to 4.00. The between phase analysis revealed a positive immediacy effect. Next, the PEM and TauU analysis resulted in scores in the ineffective range (PEM=50.0 percent; TauU=.17, SE=.23). A visual analysis of this data indicated inconsistent behavior from Edgar in this domain.

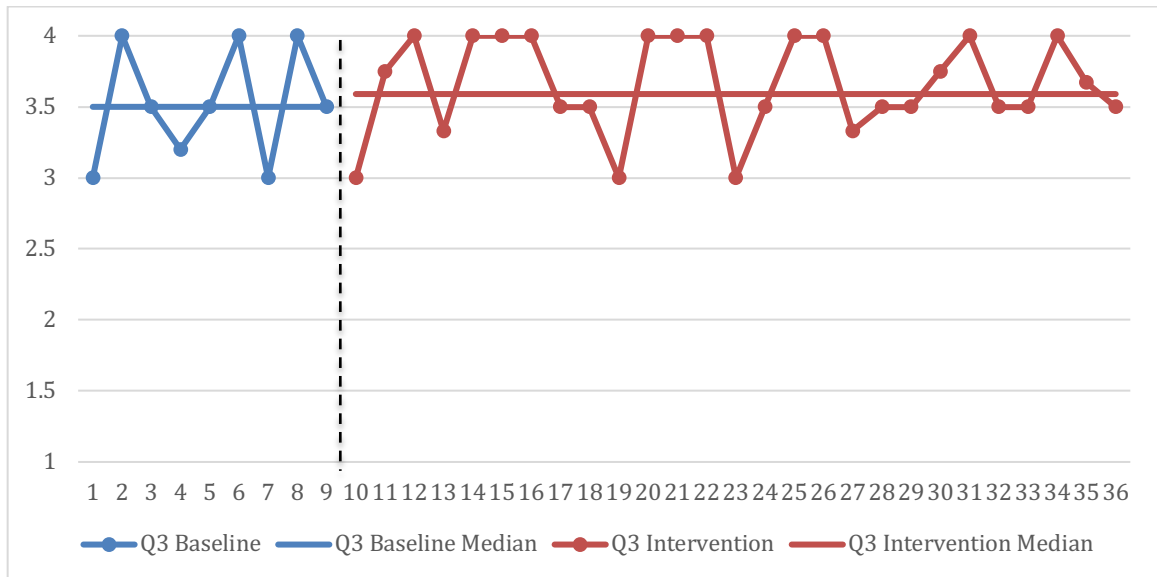


Figure 28. Edgar (Participant 7): Rule-following behavior

Next, any changes in Edgar's cognitive engagement was measured through executive functioning tasks. First, on a measure of attention and concentration, Edgar obtained a standard score in the Low Average range (standard score=85) in the baseline assessment and in the Average range (standard score = 97) on the post-intervention assessment. These results indicate an improvement in his attentional capacities. Next, on the assessment of cognitive flexibility, he obtained a TMT B/A ratio score of 2.70 on the baseline assessment. On the post-intervention, he obtained a ratio score of 2.41, yielding a difference score of .29. These changes in performance suggested increased proficiency in attention and cognitive flexibility.

In regard to emotion regulation, Edgar endorsed a baseline DERS Total raw score of 156 This score is in the Very Elevated range (Weinberg & Klonsky, 2009). Edgar endorsed several DERS subscales in the Very Elevated range: goal-directed behavior, acceptance of emotional experiences, impulse control, use of strategies to manage emotions, and clarity of emotional experiences. He reported an average level of

awareness of his emotions. In the post-assessment, he reported a DERS Total raw score of 105. This score represents a 51-point decrease and is in the Elevated range. Several scales that were initially in the Very Elevated range were reported to be in the Average range on the post-assessment: acceptance of emotional experiences, goal-directed behaviors, and clarity of emotional experiences. His use of strategies to manage his emotions decreased into the Elevated range. His awareness of emotions remained in the Average range. Overall, Edgar reported gains in his ability to accept his emotional experiences after participating in the mindfulness group. The results are summarized below in Table 9.

Table 9

Edgar (Participant 7) DERS results

Test	Pre- Intervention	Post- Intervention	Difference
DERS Total	156	105	-51
DERS Nonaccept	22	16	-6
DERS Goals	25	13	-12
DERS Impulse	30	20	-10
DERS Aware	19	15	-4
DERS Strategies	39	26	-13
DERS Clarity	21	14	-7

In summary, Edgar's data indicated that participating in the mindfulness-based intervention had a positive impact in his ability to manage his emotions with his self-reported emotion regulation scores going from the Very Elevated range to the Average range across several domains. He also had improvement in his highest grade as well as executive functioning skills. There was little change in his attendance, lowest grade, on-task behavior, emotional engagement, or rule following behavior.

Participant #8 (Sofia)

Sofia was referred to the group due to her lack of progress toward graduation (1.39 GPA or “F” average). School staff described Sofia as an outgoing student with peers and staff, but less engaged with the academic content. Sofia presented as very outgoing and friendly. She was friends with several of the group participants. She was often reserved during the group discussions, but she would describe her use of mindful eating on a regular basis. Like Amber, Sofia requested that the mindfulness group continue after the study was complete. Sofia reported a slight decrease in mindfulness skills on the CAMM (pre-score =17; post-score =16).

Sofia’s baseline median attendance rate was 93.9 percent. The trend in her attendance was positive and low in magnitude. Variability in weekly attendance averages ranged from 79.2 percent to 93.9 percent. Her median intervention attendance rate was 95.8 percent. The data trended in a negative slope of medium magnitude. Weekly attendance averages ranged from 70.8 percent to 100.0 percent. Between phases analysis indicated no immediacy effect with onset of the intervention. The PEM for attendance was 57.1 percent and in the questionable effect range. The TauU was also insignificant (TauU= 0.00; SE=.35).

Next, her lowest and highest grade were monitored. Her median highest class grade during baseline was an 82.0 percent and was an 87.0 percent during the intervention. During baseline, the data displayed a medium negative trend with a range of 74.0 to 82.0 percent. During the intervention phase, the data trended in a low positive slope with a range of 76.0 to 95.0 percent. There was a positive immediacy effect observed. The PEM was 85.7 percent and in the moderately effective range. The TauU

was also in the medium effect range (TauU=.49, SE=.35). Sofia's median lowest class grade during the baseline phase was 56.0 percent and 52.0 percent during the intervention. During the baseline phase, the trend was a negative slope with medium magnitude with low variability (range: 51.0 to 62.0 percent). During the intervention phase, the trend was a positive slope with a low magnitude and low variability (range: 50.0 to 55.0 percent). The PEM and TauU indicated a negative change to her lowest grade (PEM=0.0 percent; TauU=-.43, SE=.35). In other words, Sofia demonstrated improvement in her highest grade, but no growth in attendance and a decrease in her lowest grade.

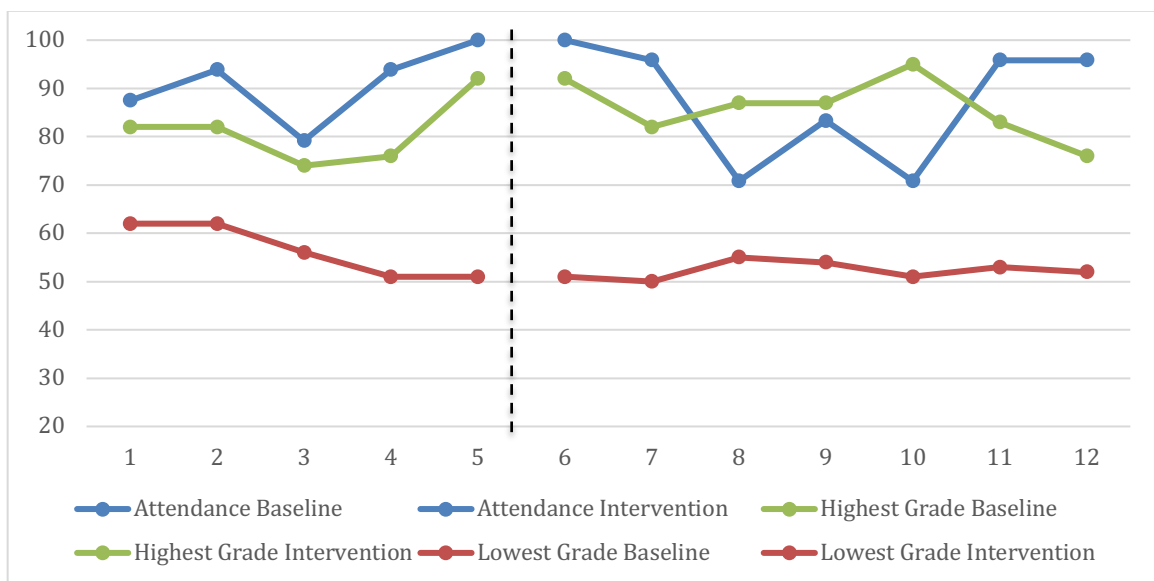


Figure 29. Sofia (Participant 8): Attendance and grades

First, Sofia's on-task behavior was reported by her teachers. During the baseline phase, her median score was 3.00 out of a possible 4.00. The trend for baseline teacher reports reflected a high positive slope. In terms of variability, daily averages ranged from 1.50 to 3.33. During the intervention phase, her median score was also 3.00. The trend of her ratings was positive and low in magnitude. The variability of daily averages during

this phase was high and ranged from 1.00 to 4.00. The between phase analysis revealed no immediacy effect. Finally, the effect size measures indicated no significant change in this behavior (PEM=22.2 percent; TauU=.01; SE=.24). A visual analysis of these results indicated that Sofia's on-task behavior was highly variable during both the baseline and intervention phase.

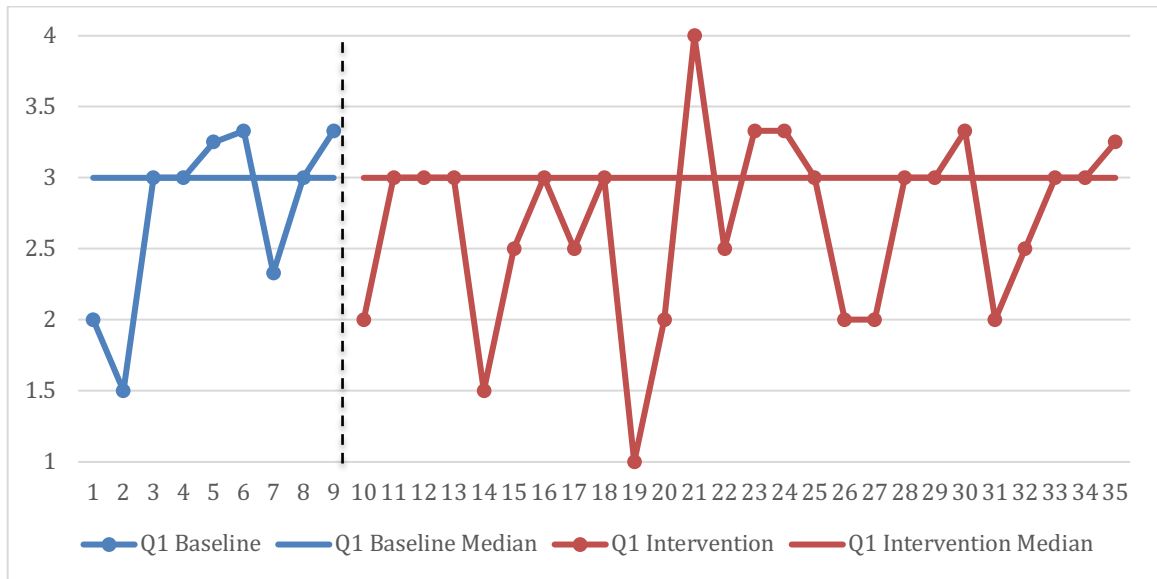


Figure 30. Sofia Participant 8): On-task behavior

Next, Sofia's observed emotional engagement was reported by her teachers. During the baseline phase, her median score was a 3.00 out of 4.00. The trend of the teacher reports reflected a high positive slope. In terms of variability, daily averages ranged from 2.00 to 3.67. During the intervention phase, her median score was 3.00. The trend of her ratings was positive and low in magnitude. The variability of daily averages during this phase ranged from 1.50 to 4.00. The between phase analysis revealed no immediacy effect and the effect size measures revealed no significant change (PEM=37.0 percent; TauU=-.1, SE=.24). Overall, Sofia's observed emotional engagement was increasing during baseline and was inconsistent during the intervention phase.

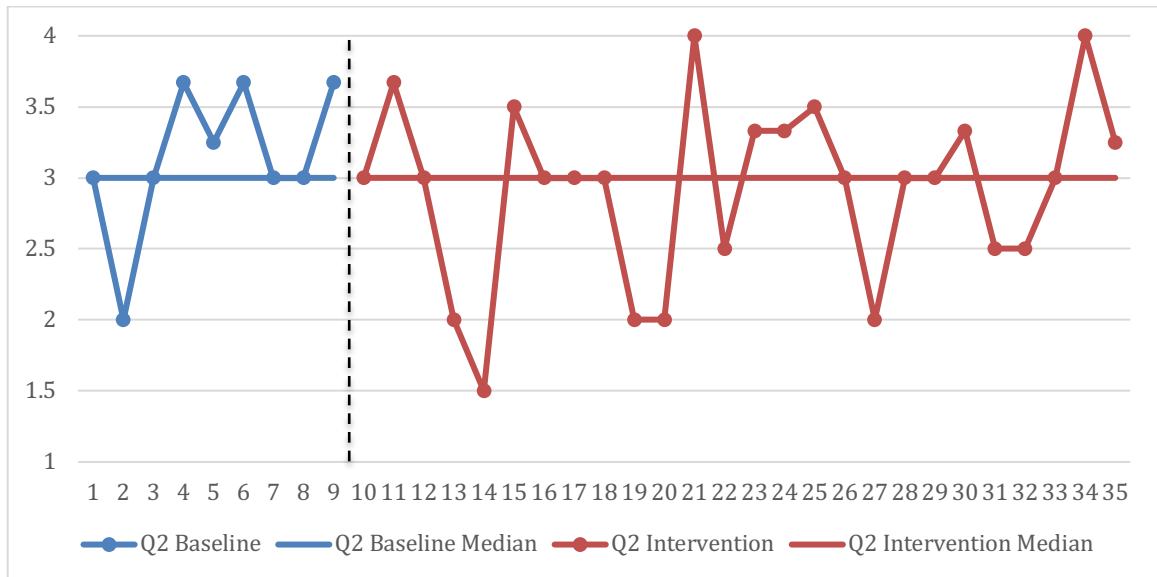


Figure 31. Sofia (Participant 8): Emotional engagement behavior

Lastly, Sofia's baseline rule-following behavior median score was 3.59 out of a possible 4.00. The trend of the teacher baseline observations was a medium positive slope. In terms of variability, daily averages ranged from 3.00 to 3.67. During the intervention phase, her median score was 3.50. The trend of her ratings was negative and low in magnitude (almost flat). The variability of daily averages during this phase ranged from 2.00 to 4.00. The between phase analysis reveals no immediacy effect of an increase in performance with the onset of the intervention. Next, the PEM analysis resulted in a 48.1 percent which is in the ineffective range. The TauU was also in the small change range (TauU=.09, SE=.24). As with the other teacher reports, it is worth noting that Sofia's engagement behaviors were increasing then remained inconsistent throughout the intervention.

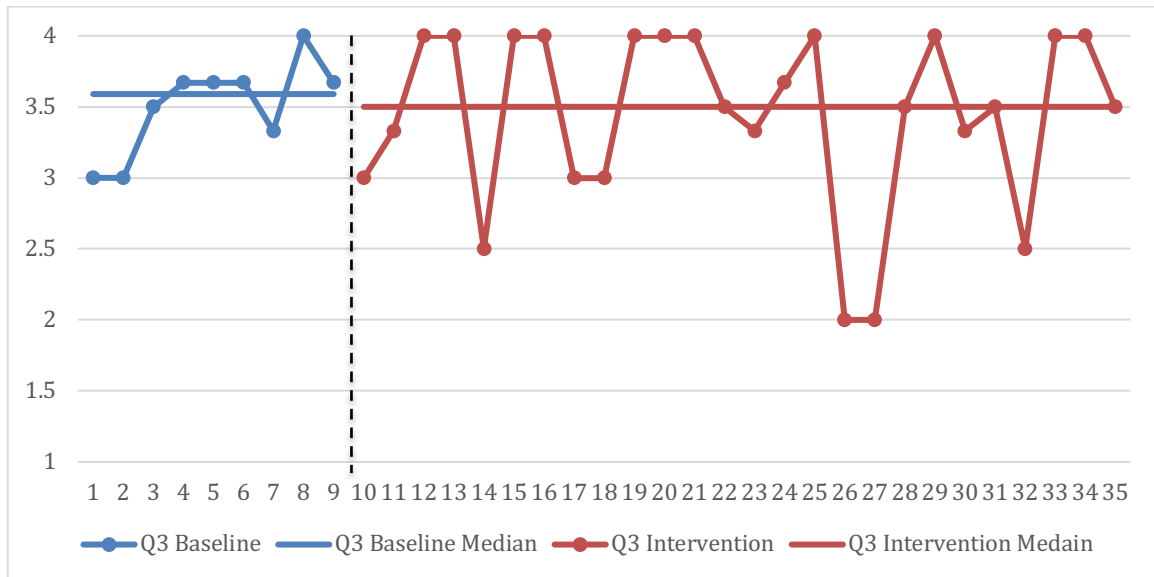


Figure 32. Sofia (Participant 8): Rule-following behavior

The effect of the intervention on Sofia's cognitive engagement as measured through executive functioning tasks was assessed. First, on a measure of attention and concentration, Sofia obtained a standard score in the Average range in both the baseline and post-intervention assessment (standard score of 91 at baseline; 94 at post-intervention) suggesting no change. Next, on an assessment of cognitive flexibility, she obtained a TMT B/A ratio score of 3.67 on the baseline assessment. On the post-intervention, she obtained a ratio score of 1.55, yielding a difference score of 2.12. This change in performance suggested increased proficiency in her cognitive flexibility.

On the DERS, Sofia reported a baseline DERS Total score of 104. This score was in the Elevated range when compared to a community sample (Weinberg & Klonsky, 2009). She reported several scales in the Elevated range: acceptance of emotions, goal-directed behaviors, and use of strategies to manage emotions. All other scales were in the Average range. On the post-intervention assessment, she reported a DERS Total score of 98. This score was in the Average (on the border of Elevated). Most scores remained

constant with the exception of goal directed behavior, which decreased from Elevated to Average. These results suggest that Sofia experienced a mild decrease in her emotion regulation difficulties. The results are summarized below in Table 10.

Table 10

Sofia (Participant 8) DERS results

Test	Pre- Intervention	Post- Intervention	Difference
DERS Total	104	98	-6
DERS Nonaccept	19	19	0
DERS Goals	21	16	-5
DERS Impulse	10	8	-2
DERS Aware	15	19	+4
DERS Strategies	25	24	-1
DERS Clarity	14	12	-2

In summary, Sofia's data indicated that participating in the mindfulness-based intervention had no impact on his attendance and lowest grade performance. Her performance in her most successful class increased. Her ability to regulate her emotions increased, particularly in engaging in goal-directed behaviors. She reported no change in her mindfulness-related thoughts. Her performance in school engagement behaviors remained inconsistent throughout the intervention. Her performance on executive functioning measures indicated no change in her ability to maintain attention, but she demonstrated an increase in her cognitive flexibility.

Participant #9 (Morgan)

Morgan was referred to participate in the group due to concerns about grades, attendance, and emotional stability. According to school staff, she struggled with managing her emotions on a regular basis. In particular, Morgan struggled with high levels of depression that manifested as avoidance, self-harming, and self-destructive behaviors. Morgan reported that she was eager to be in the group and had learned some

mindfulness skills through the Dialectical Behavior Therapy group in which she had participated. At the onset of the study, she reported mindful awareness on the lower side when compared to other participants (pre-intervention CAMM score =16). Morgan, however, was only able to attend the first two sessions. Her daily school attendance dropped to less than 50 percent. Due to her absence from the majority of the group sessions, Morgan's data were not utilized in the cross-case analysis of study results. She was not available for follow-up data. Despite her limited participation in the group sessions, Morgan's data were included in the individual case studies as she did complete the baseline and first two weeks of the intervention.

On other measures of school engagement (i.e., attendance, lowest and highest grade), Morgan's baseline median attendance rate was 70.2 percent. The trend in the data resulted in a medium positive slope with a range between 53.85 percent to 84.62 percent. Her post-intervention attendance rate was 54.33 percent. The trend in the data was medium negative slope with a range between 15.38 percent and 84.62 percent. Between phases analysis indicated no immediacy effect. The PEM for attendance was 0.00 percent in the ineffective range. Her average highest class grade during baseline was a 58 percent and was a 53.25 percent during the intervention. The baseline trend was negative and low in magnitude with a range 54 and 61 percent. The intervention trend data was negative and high in magnitude with a range between 26 and 100 percent. The PEM was 25 percent and in the ineffective range. Her average lowest class grade during the baseline phase was a 3.25 and a 28 percent during the intervention. During the baseline phase, the trend was a negative slope with low magnitude with a range between 3 and 4 percent. During the intervention phase, the trend was a negative slope with a medium magnitude

with a range between 2 and 65 percent. The PEM on the lowest grade data was 87.5 percent and in the moderately effective range.

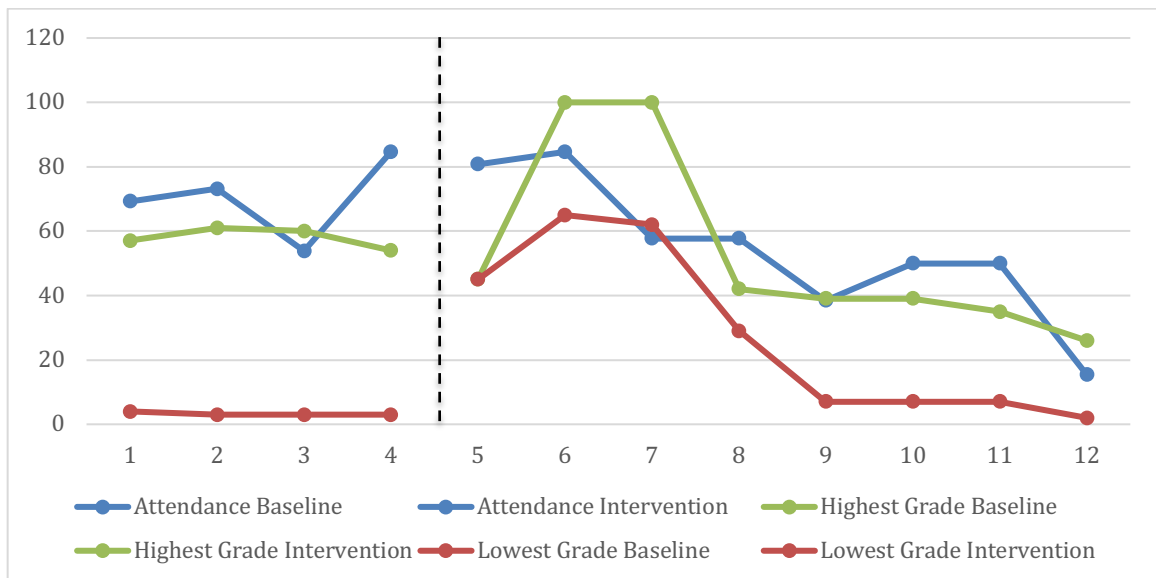


Figure 33. Morgan (Participant 9): Attendance and grades

Next, the effect of the intervention on Morgan's cognitive engagement as measured through executive functioning tasks were assessed prior to the intervention. First, on a measure of attention and concentration, Morgan obtained a standard score in the Average range (standard score=100) suggesting no change. Her performance on the TMT could not be analyzed due to the second datum piece is missing. In regard to emotion regulation, prior to the start of the intervention, Morgan reported an overall emotion regulation score in the Elevated range. She reported her ability to accept her emotions, engage in goal-oriented behaviors, and attunement with her affective states to be in the Elevated range. In the Very Elevated range, she reported difficulty with managing her impulses and limited access to effective emotion regulation strategies. She did, however, report consistently being able to pay attention to her feelings. The results from the DERS are presented below in Table 11.

Table 11

Morgan (Participant 9) DERS results

Test	Pre- Intervention	Post- Intervention	Difference
DERS Total	118	-	-
DERS Nonaccept	17	-	-
DERS Goals	24	-	-
DERS Impulse	24	-	-
DERS Aware	9	-	-
DERS Strategies	30	-	-
DERS Clarity	14	-	-

Participant #10 (Daniela)

Daniela was referred to participate in the mindfulness group due to high levels of anxiety and withdrawal behaviors. The school team had recently met with her guardian to discuss her anxiety and strategies for providing additional support. The mindfulness group was recommended as one of these supports. Daniela presented as a very reserved young woman. During sessions, she rarely participated in the group discussions or with her peers. According to her CAMM, Daniela reported an increase in her mindfulness skills by the end of the intervention (pre-score =14; post-score =28).

Daniela joined the intervention immediately prior to the onset of the intervention phase. Due to this timing, a limited amount of progress monitoring baseline data were collected. For attendance, her end of the third quarter attendance rate of 95.2 percent was utilized. Her intervention median attendance rate was 87.5 percent. The trend in her intervention data was positive and medium in magnitude. The variability ranged from 60.7 to 96.4 percent. Between phases analysis was not completed due to the lack of baseline data. Her median highest class grade during the baseline phase was a 92.0 percent (also computed utilizing the end 3rd quarter mark) and was 96.0 percent during the intervention. An analysis of the trend over the intervention phase indicates a medium

positive trend with a range between 84.0 to 100.0 percent. Her median lowest class grade during the baseline phase was a 77.0 percent (end 3rd quarter grade). During the intervention phase, her lowest median grade was 68.0 percent. The trend was a positive slope with a medium magnitude with a range between 37.0 to 77.0 percent.

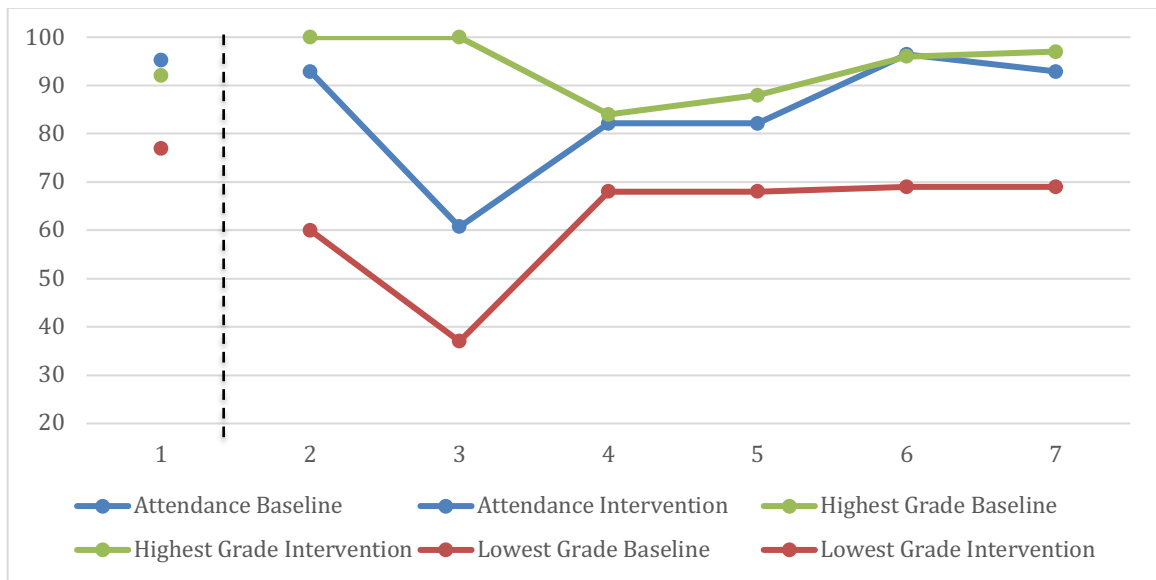


Figure 34. Daniela (Participant 10): Attendance and grades

The reports on Daniela's daily functioning in the classroom during the intervention were also analyzed (no baseline data were available due to late enrollment in the intervention). During the intervention phase, her median for on-task behavior was 3.00 out of a possible 4.00. The trend for intervention data reflected a medium positive slope. In terms of variability, daily averages ranged from 2.00 to 4.00. Next, Daniela's observed emotional engagement was reported by her teachers. During the intervention phase, her median score was 3.25. The trend of her ratings was positive and medium in magnitude. The variability of daily averages during this phase ranged from 2.00 to 4.00. Lastly, Daniela's observed adherence to school rules and behavioral expectations was reported on. During the intervention phase, her median score was 4.00. The trend of her

ratings was positive and medium in magnitude. The variability of daily averages during this phase ranged from 3.00 to 4.00. Overall, Daniela consistently demonstrated an increase in school engagement behaviors during the intervention phase.

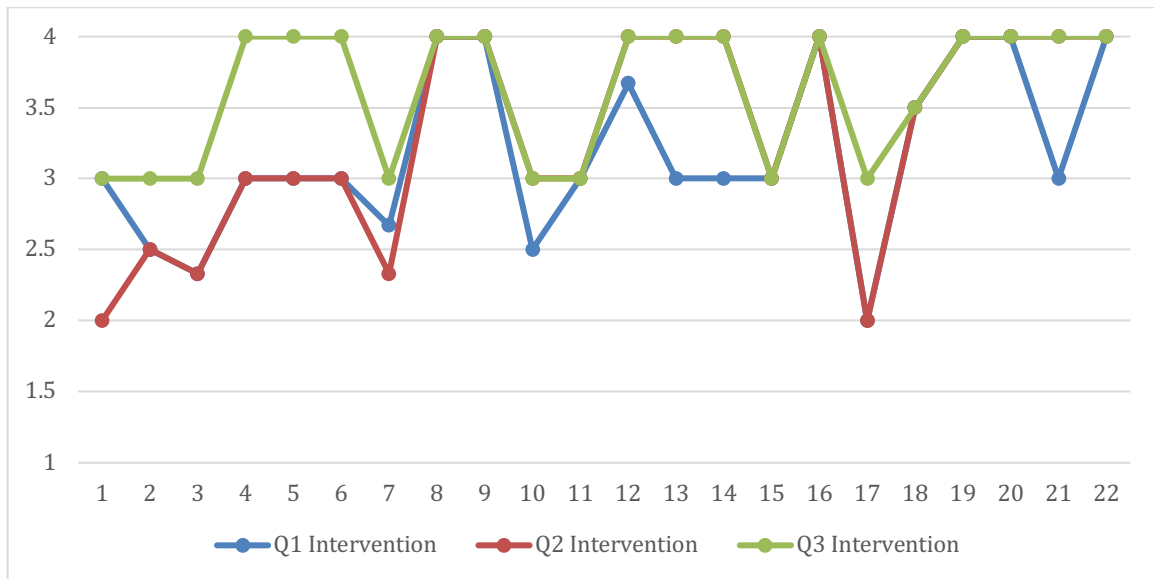


Figure 35. Daniela (Participant 10): Intervention

Next, the effect of the intervention on Daniela's cognitive engagement as measured through executive functioning tasks were assessed prior to the intervention and after the completion of the intervention. First, on a measure of attention and concentration, Daniela obtained a standard score in the Average range in both the baseline and post-intervention assessment, but there was an 18-point change (baseline standard score= 91, post-intervention=109), suggesting an increase in attention skills. Next, on an assessment of cognitive flexibility, she obtained a TMT B/A ratio score of 2.96 on the baseline assessment. On the post-intervention, she obtained a ratio score of 3.71, yielding a difference score of .75. This change in performance suggested a decrease proficiency in her cognitive flexibility.

On the baseline DERS Total score was in the Elevated range (score of 100). She reported several scales in the Elevated range: acceptance of emotions, goal-directed behaviors, and use of strategies to manage emotions. All other scales were in the Average range. On the post-intervention assessment, she reported a DERS Total score of 87. This score is in the Average. Most scores shifted to the Average range with the exception of the acceptance of emotions which was Elevated. These results suggest that Daniela experienced a decrease in her emotion regulation difficulties. The results are summarized below in Table 12.

Table 12

Daniela (Participant 10) DERS results

Test	Pre-Intervention	Post-Intervention	Difference
DERS Total	100	87	-13
DERS Nonaccept	21	19	-2
DERS Goals	22	16	-6
DERS Impulse	9	12	-3
DERS Aware	15	19	+4
DERS Strategies	23	22	-1
DERS Clarity	10	7	-3

In summary, without baseline data on the progress monitoring measures, it is more difficult to draw conclusion as to the effect of the intervention, but her attendance, highest grade, and lowest grade improved over the course of the intervention. Moreover, her teachers reported consistent improvement in observed school engagement behaviors. Her performance on the attention task increased as well. Cognitive flexibility performance was not improved. Daniela's data indicated that participating in the mindfulness-based intervention had a positive effect on her mindful awareness development and emotion regulation skills.

Cross-Case Analysis of Pre-Post Data

The results from the progress monitoring data were mixed. Due to missing data, Morgan (participant #9; dropped out of intervention) and Daniela (participant #10; joined intervention group after baseline date was collected) were not able to be included in this analysis. In regard to attendance changes from baseline to intervention, three improved their attendance rate, and five remained constant (had median of 100.0 percent during both baseline and intervention). Next, the majority (seven) of participants improved their highest grade while one decreased slightly. With lowest grade average, four improved and four decreased. The teacher daily reports trended positively. In regard to on-task behaviors, three participants increased their on-task behaviors and five maintained similar averages. On the measure of emotional engagement, five increased, one maintained, and two decreased in these behaviors. Finally, rule-following behavior improved with five of the participants while three maintained similar levels from baseline to intervention.

The results for all the pre- and post-test administrations were also mixed. On the WRAML-2: Attention/Concentration Index, four participants improved in their performance, and five performed similarly on both the pre- and post-intervention assessment. The results from the TMT (cognitive flexibility) indicated the greatest positive effect with six participants having an improvement in performance. Three participants decreased in their performance. On the DERS, four participants reported a decrease in emotion regulation challenges, one reported no change, and four reported an increase in challenges. See Table 13 for a summary of these data.

Behavioral Engagement

Progress monitoring data on attendance, grades (lowest and highest), on-task behavior, emotional engagement, and adherence to school rules/expectations were collected for each participant.

Table 13

Participants Cross-Case Pre-Post Data (Attendance/High Grade/Low Grade)

Participants	Attendance		High Grade		Low Grade	
	Pre	Post	Pre	Post	Pre	Post
Madison	94.0	96.15	98.0	104.6	87.0	96.0
Ethan	92.33	93.79	84.25	83.75	56.25	50.0
David	97.32	99.6	81.5	85.1	69.25	74.1
Paola	97.5	95.8	85.5	85.63	14.0	67.25
Amber	91.08	98.81	88.0	97.68	50.5	60.75
Noah	92.0	95.31	85.0	97.75	65.5	67.5
Edgar	99.23	97.03	89.0	94.25	70.75	69.0
Sofia	88.82	89.06	78.5	86.75	57.75	52.13

Note: Data for Morgan and Daniela were not analyzed due to missing data.

Attendance. Based upon the median from each phase, the results from the attendance data revealed no significant change from baseline to intervention. For five of the nine analyzed participants, their median baseline attendance rate was at the ceiling of 100.0 percent and all five maintained that level of attendance during the intervention. Three of the remaining participants increased their median attendance rate. One participant's increase was statistically significant (PEM in very effective range; TauU in medium effect range). The cross case analysis for effect size resulted in a TauU of .08 (SE=.12; 95 percent confidence interval .16-.33; $p = .51$). Overall, there was a clear trend of improved attendance but only one participant showed significant improvement. The

high baseline attendance rate likely limited the potential effect of the intervention on this measure.

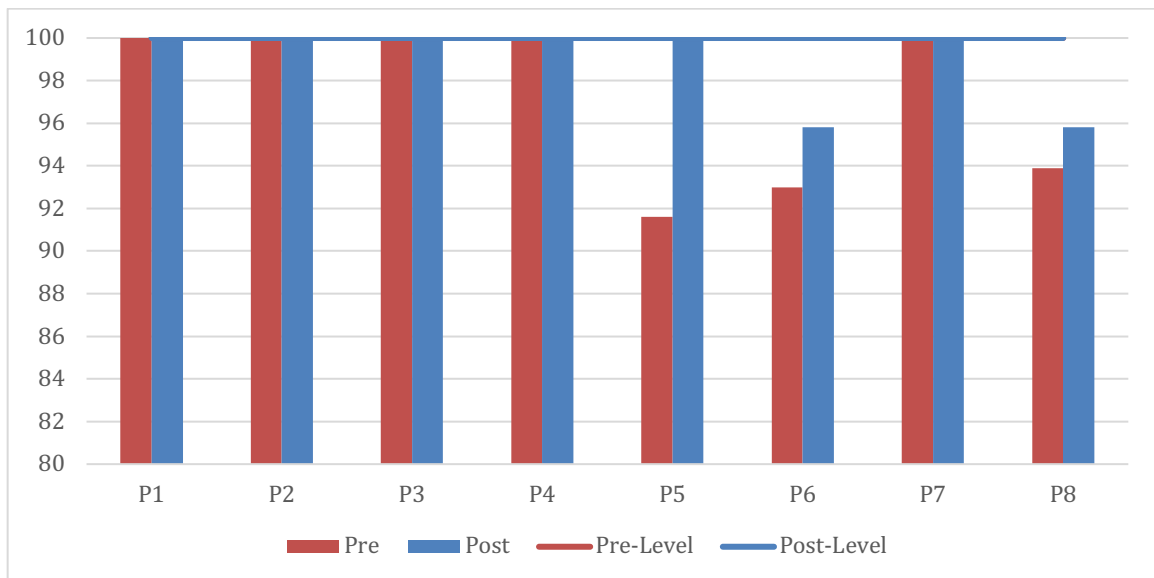


Figure 36. Cross-case analysis of attendance

Highest grade. The baseline high median grade for the eight participants was an 85.8 percent. The intervention median grade was a 95.0 percent. This change in the level indicated an improvement in the highest grades of participants. Seven of the eight participants increased in their highest grades. Six of the participants demonstrated growth that was statistically significant based on the effect size analysis. The cross-case analysis for effect size resulted in a TauU of .51 (SE=.13; 95 percent confidence interval .26-.76; $p = .0001$). These results were in the medium effect size range and indicated that the intervention had a positive impact on the highest grades of the participants.

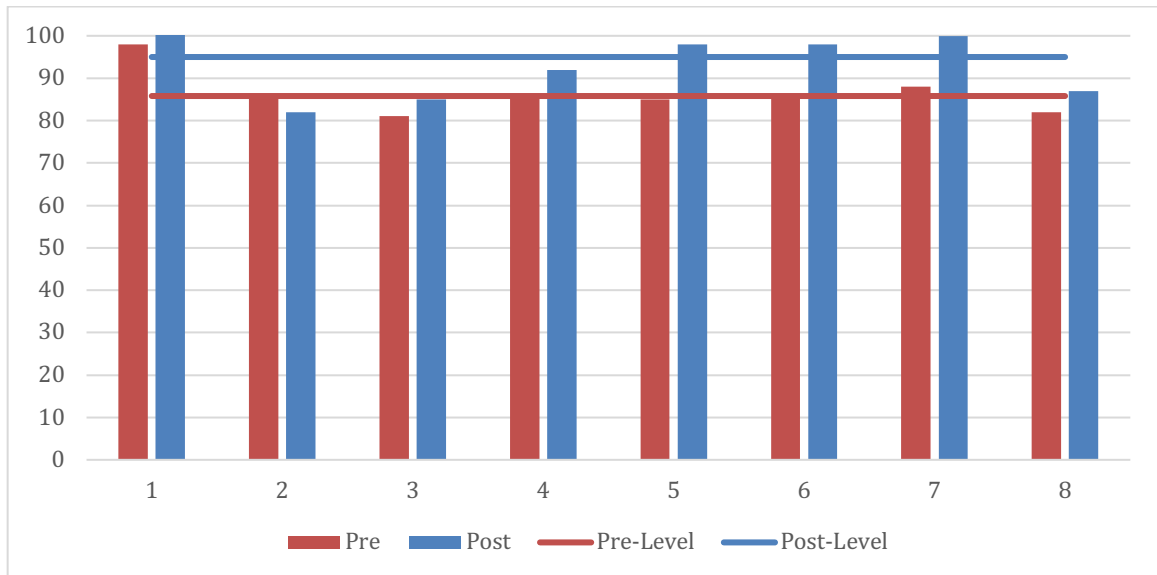


Figure 37. Cross-case analysis highest grade

Lowest grade. The baseline median low grade for the eight participants was a 62.5 percent. The intervention median grade was a 65.0 percent. These results indicated a slight improvement in academic performance. A visual analysis of the results revealed that four of the participants increased their lowest grade from baseline to intervention. For four of the participants, this growth was also statistically significant based upon their individual effect size analysis (see single case results). A cross-case analysis of the entire group utilizing the TauU statistic resulted in a small change effect size (TauU=.12; SE=.13; $p=.34$). While several participants had improvement, the overall improvement rate was marginal.

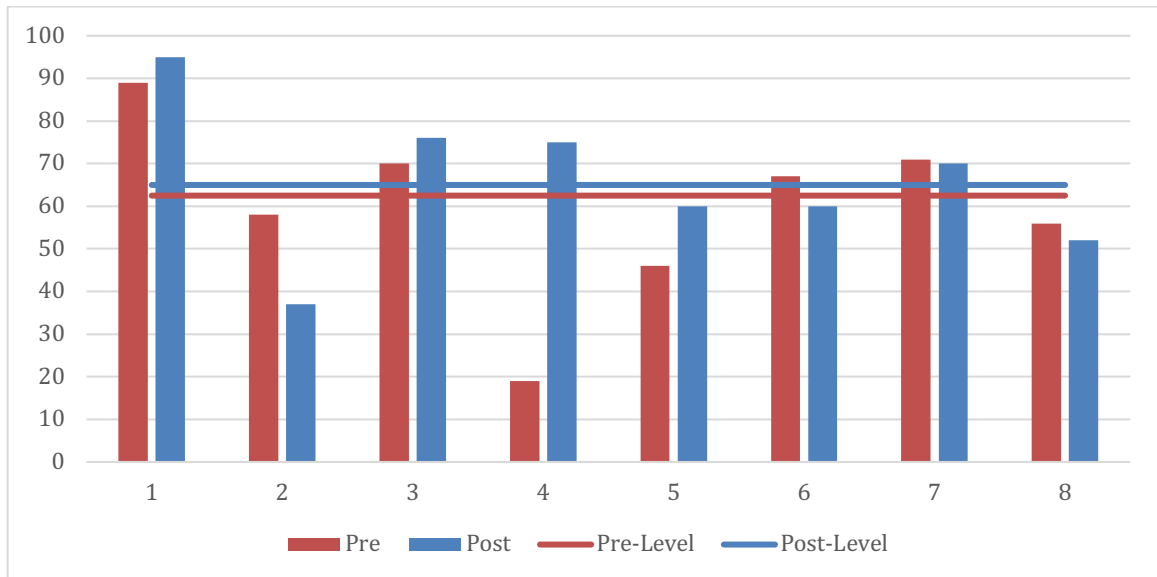


Figure 38. Cross-case analysis lowest grade

On-task behavior. The cross-case analysis of on-task behavior resulted in a baseline median of 3.17 out of 4.00. The intervention median increased to 3.34. A visual analysis of the median scores revealed that three of the participants improved their performance from baseline to intervention. According to the effect size statistic (TauU), two had significant changes in their performance. Five of the participants' median scores remained constant from baseline to intervention, including one that was at the ceiling of possible scores. Between phase analysis utilizing the Tau-U resulted in a score of .20 (SE=.08; $z=2.23$; $p=.02$), indicating a significant positive change across participants in the area of on-task behavior.

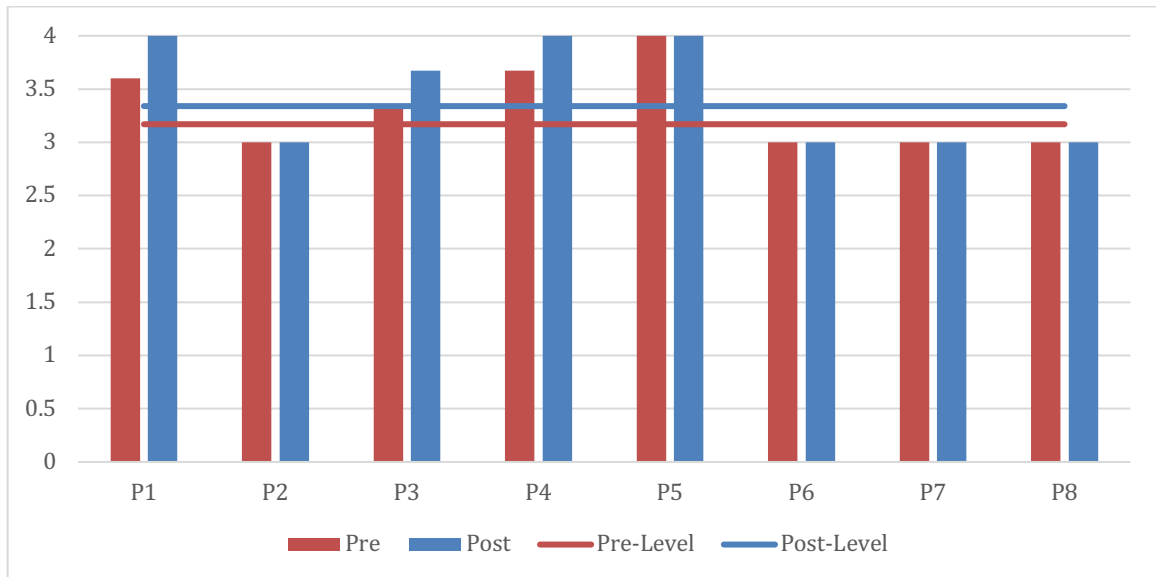


Figure 39. Cross-case analysis of on-task behavior

Rule-following behavior. The cross-case analysis of rule-following behavior resulted in a baseline median of 3.65 out of 4.00. The intervention median increased to 3.84. A visual analysis of the median scores revealed that four of the participants improved their performance from baseline to intervention. According to the effect size statistic (TauU), one had significant change in their performance. three of the participants' median scores remained constant from baseline to intervention, and all were performing at the ceiling of the possible scores. Only one participant's median score decreased from baseline to intervention. Between phase analysis utilizing the Tau-U resulted in a score of .21 (SE=.08; $z=2.51$; $p=.01$), indicating a moderate positive change across participants on rule-following behavior.

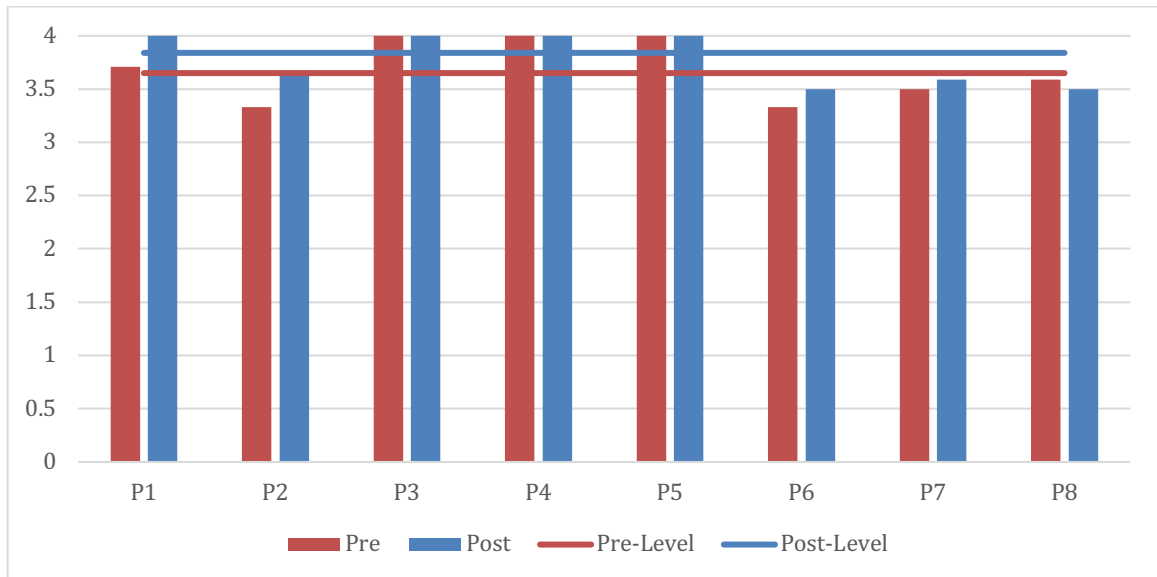


Figure 40. Cross-case analysis of rule-following behavior

Cognitive Engagement

The second hypothesis posited that participation in a mindfulness intervention would increase executive functioning skills that support cognitive engagement, specifically attention, cognitive flexibility, and emotional regulation. These data points were gathered utilizing the pre-post test model. For this analysis, nine participants' data were available. Morgan, participant #10, was the only participant with no post-intervention data and was excluded from this analysis.

Attention. The pre-intervention average on the WRAML-2 median standard score for the nine participants was 100. The post-intervention median increased to 109. These results indicated an improvement in attentional abilities after participation in the mindfulness group. Five of the participants' performances increased (four by more than ten points), two remained constant, and two slightly decreased.

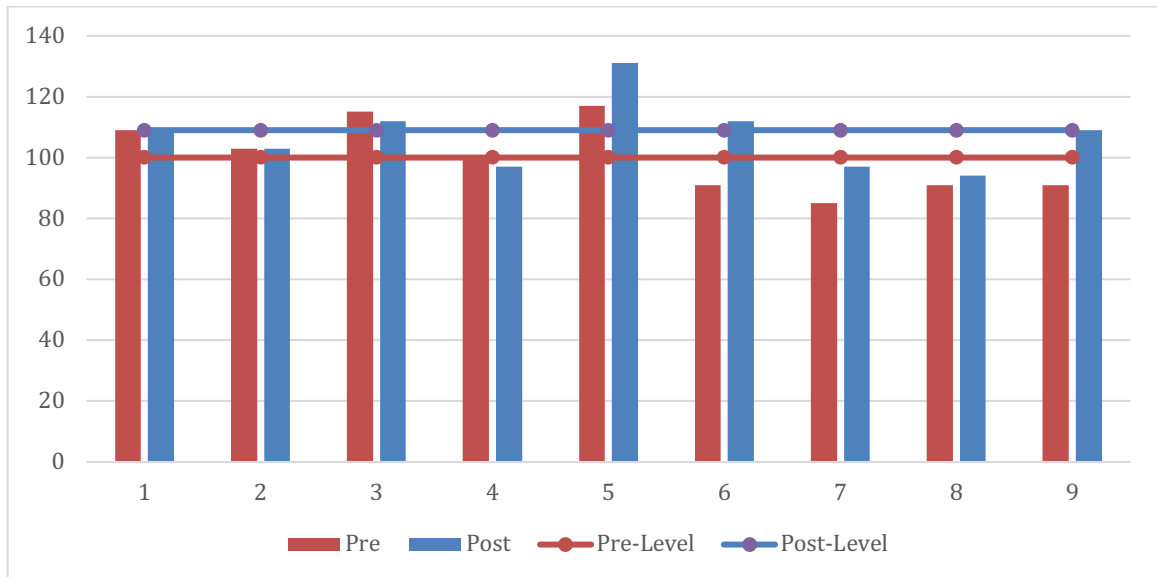


Figure 41. Cross-case analysis of WRAML-2 Attention/Concentration Index

Cognitive Flexibility. The pre-intervention median score on the TMT B/A ratio score for the nine participants was 2.69. The post-intervention median decreased to 2.41. These results indicated an improvement in cognitive flexibility. Visual analysis of the cross-case data revealed that six of the nine participants demonstrated an increase in cognitive flexibility skills, as evidenced by a lower ratio. Three participants' performance indicated a decrease in these skills.

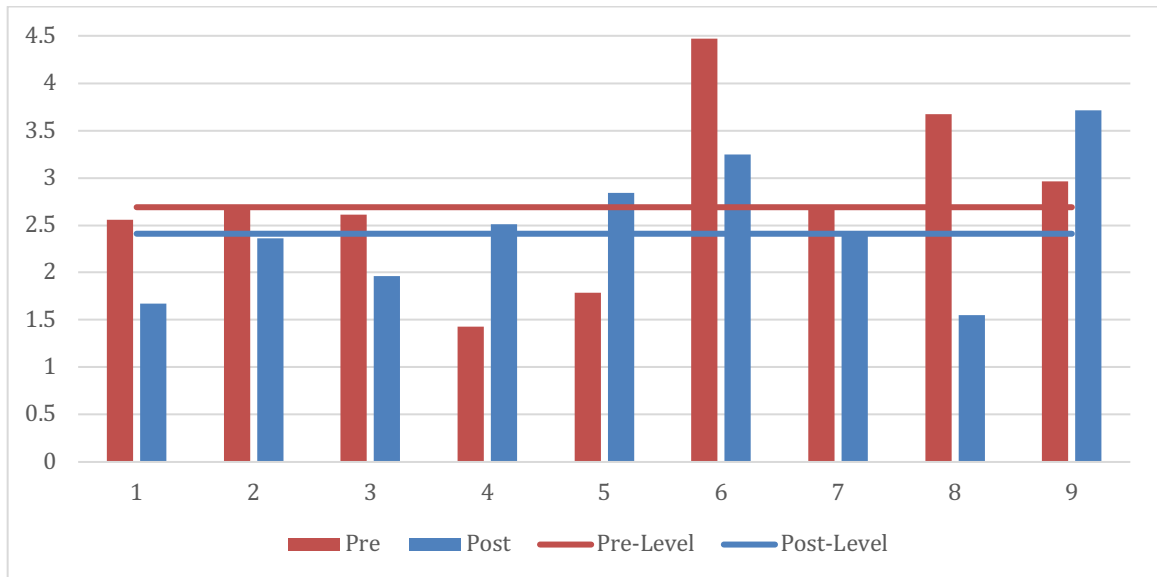


Figure 42. Cross-case analysis of TMT B/A ratio results

Emotion regulation. An analysis of the overall DERS score from pre-intervention to post-intervention indicated an overall decrease in emotion regulation difficulties. The pre-intervention median from the nine participants who completed the intervention was a 100. The post-intervention assessment median decreased to an 87. A visual analysis of the results revealed that six of the participants reported an overall decrease in emotion regulation difficulties, and three reported an increase.

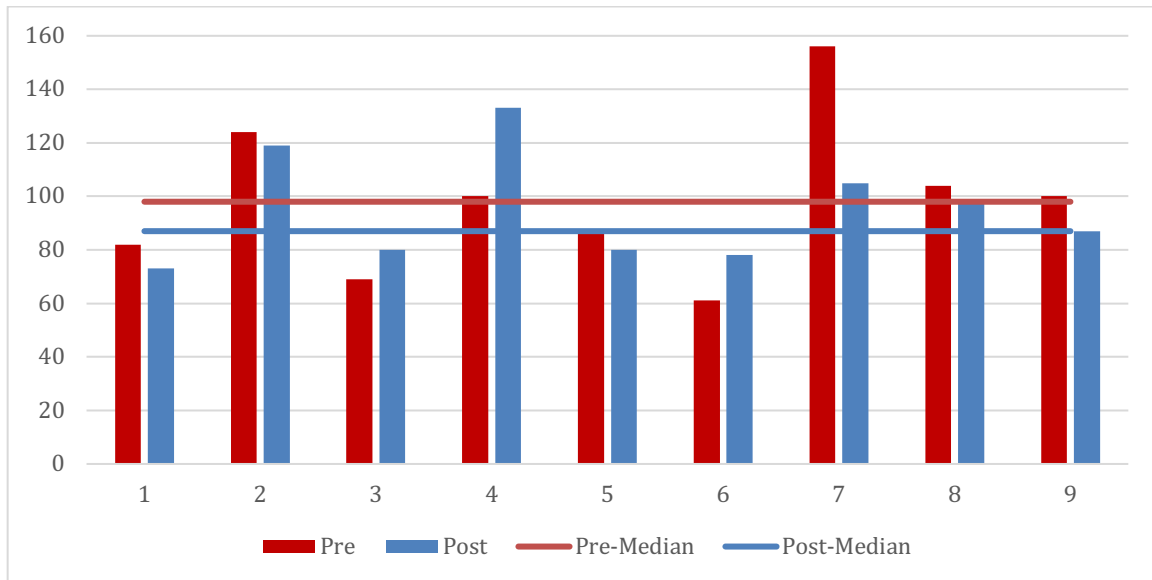


Figure 43. Cross-case analysis of DERS overall score

Summary of Findings

Overall, the results of this study suggested that participation in a mindfulness-based intervention improved behavioral engagement, although only the participants' highest grade was significant. Results from progress monitoring of attendance, on-task behaviors, emotional engagement, and rule-following behavior did not result in an effect size needed to infer generalized results.

The results from the executive functioning assessments revealed that in both the areas of cognitive flexibility and attention, the majority of participants experienced an increase in performance. Overall, the results were mixed with more variability with cognitive flexibility than attention. These results suggest that cognitive flexibility may be more directly impacted by participation in mindfulness-based interventions. Finally, the emotion regulation results indicated a decrease in emotion regulation difficulties, but the variability (i.e. several participants reported a large increase in emotion regulation difficulties) in the results make these results less meaningful.

CHAPTER V

DISCUSSION

School engagement has been the focus of many researchers as it has been connected to increased academic achievement and school completion, a primary emphasis of educational legislation (Henry, Knight, & Thornberry, 2012; Sinatra, Heddy, & Lombardi, 2015). Moreover, students who fail to complete high school due to disengagement have increased rates of substance abuse, incarceration, and violent behavior (Henry et al., 2012). Populations that are most at risk of school noncompletion are students from low SES households, ethnic minorities, identified with an educational disability, those experiencing mental health issues (anxiety, depression, disruptive behavior disorders), and having low academic achievement (Christle et al., 2005). Although some of these variables are unalterable (SES, disability status), school engagement interventions that focus on alterable variables (e.g., academic achievement, attendance, school climate) have been associated with positive outcomes (Appleton et al., 2008).

For this study, the tripartite model of school engagement proposed by Fredricks et al. (2004) was used as the framework for investigation. In this model, school engagement is conceptualized into three dimensions: behavioral, cognitive, and emotional engagement with each having different indicators associated with engagement. For example, attending school is a marker for behavioral engagement. A mindfulness-based intervention was selected as an intervention to improve school engagement across these

three areas as there is a growing body of research indicating its effectiveness in supporting many of these skills (e.g., emotion regulation, attention).

In terms of risk factors related to school engagement, several participants in this study were ethnic minorities and/or from low SES households, however, the risk factors of low academic achievement and/or mental health issues were most salient. In fact, one participant was doing well academically, but experienced high levels of anxiety which was the primary reason she was recommended for the mindfulness group. Owens et al. (2012) found that students who self-reported higher levels of anxiety and depression performed more poorly in school, possibly due to poorer working memory processes. School-based mindfulness interventions have been effective in reducing adolescent's anxiety (Beauchemin et al., 2008), making it a promising practice. Although no research was found supporting the use of mindfulness for school engagement, this intervention has been used to address many of the concerns that might be associated with or serve as an underlying cause for student disengagement.

This study was designed to assess the effectiveness of a mindfulness intervention (Mindful Schools) in improving different aspects of school engagement, including executive functioning processes, among students considered to be at-risk for poor school outcomes. It was hypothesized that indicators of behavioral engagement (attendance, grades, classroom behavior) and cognitive engagement as measured by executive functioning (self-report on emotion regulation; direct measures of attention/concentration and cognitive flexibility) would be improved after the intervention. To assess potential effects, a combination of standardized instruments, teacher report, and existing data (i.e.,

grades, attendance) were assessed before and after the intervention, as well as during the six-week intervention.

Changes in Behavioral Engagement

When compared to baseline, the results, across the measured behavioral variables (i.e., attendance, grades, and teacher rating of engagement) ranged from positive to neutral after the mindfulness group. Although most participants stayed the same or showed slight improvements, there were a few incidents of a significant decline during the intervention phase. In regard to the effect of the mindfulness-based intervention on behavioral engagement, the most important finding was related to improvement in participants' highest grades (grades for those courses in a given semester where the participant was earning the highest grade). Although the highest grades improved (effect size in the medium range), the same was not true for participants' lowest grades.

In the courses in which participants were earning their lowest grade, there was individual improvement in about half of the cases. This level of improvement was not large enough to demonstrate a significant effect size. It was interesting to note that all of the lowest grade subjects were in math and science courses, with the greatest decreased in performance occurring in math courses. As mathematics is a cumulative subject, it is possible that their difficulty with mastering the skills from earlier in the year negatively affected their ability to improve upon their performance. It is also possible that participants recognized that they were not going to pass the class and simply gave up. Further research is warranted on the timing of this intervention. For example, it would be interesting to explore whether mindfulness groups provided in the beginning of the

school year promoted positive growth and early success in these subjects (as opposed to trying to overcome a low grade).

Previous research on the relationship between mindfulness and academic outcomes have supported a positive correlation and the results of this study are at odds with other work demonstrating improvement in math and/or science scores after mindfulness interventions (Bakosh et al., 2018; Schonert-Reichl et al., 2015). One possible reason for this difference in outcomes may be that many of these previous studies were conducted with elementary age students. As science and math become more complex and builds upon earlier mastery, students may struggle to keep up if there are gaps in their knowledge.

However, other recent research related to academic performance and mindfulness-based practices has resulted in inconsistent outcomes (Bakosh et al., 2018; Waters, Barsky, Ridd, & Allen, 2015). For example, mindfulness-based interventions resulted in significant improvements in reading and science in elementary students (Bakosh et al., 2018; Bakosh, Snow, Tobias, Houlihan, & Barbosa-Leiker, 2016). Similarly, Beauchemin et al. (2008) found improved academic performance with students identified with a learning disability. Other studies, however, have found no change in academic achievement with mindfulness-based interventions (Frank, Kohler, Peal, & Bose, 2017). In the current study, it was not clear why one set of grades showed positive changes, but not the other. It may be possible that given the timing of this study (towards the end of the trimester and school year), students knew that certain grades could not be raised enough to reach a passing grade.

In regard to observable measures of behavioral engagement in the classroom (i.e., on-task behavior, emotional engagement, and rule-following), the results were variable. Overall, the teacher observations trended towards positive changes throughout the intervention, although not reaching a significant effect size across cases. Rule-following behavior showed the greatest increases, followed by on-task behavior, and then emotional engagement. The research exploring the effectiveness of mindfulness interventions with on-task behavior is mixed. While Felver, Frank, and McEachern (2014) found significant increases in academically engaged on-task behavior, other studies have resulted in less robust outcomes (Carboni, Roach, & Fredrick, 2013).

Prior to the intervention and during the implementation of the mindfulness program, teachers rated participants highly in the areas of on-task behavior, emotional engagement, and rule-following behavior leaving little room for improvement. Similarly, attendance rates were very high prior to the intervention (average median attendance was 97.08 percent) with little positive change with the exception of one participant who demonstrated significant improvement. The high rates of attendance were consistent with teacher reported levels of emotional engagement among participants. Teachers reported that they perceived many of the participants as being connected to the school as evidenced by their regular attendance and following of behavioral expectations. The greatest area of difficulty was engaging in the academics (i.e., completing work). It is possible that the other measures of behavioral engagement did not yield significant results due to a ceiling effect in the other behavioral engagement indicators (i.e. a student cannot get above 100 percent attendance rates). It is also possible that the progress monitoring tool used in this study was not sensitive enough to detect changes in behavior

or that providing teachers with more direction on completing the forms would change these ratings. Overall, the results from the behavioral engagement indicators only demonstrated noteworthy changes in one of the six measured areas (highest grade performance).

Changes in Cognitive Engagement

In regard to the hypothesis that participation in a mindfulness-based intervention would improve skills that support executive functioning skills related to cognitive engagement, the results were generally positive with all nine participants improving in either the attention task or the cognitive flexibility task and two improving in both areas. The underlying skills assessed were attention, cognitive flexibility, and emotion regulation. These skills were identified as areas to target since they have been linked with cognitive engagement (Fredricks et al., 2004) and mindfulness practices (Felver et al., 2014; Purohit & Pradhan, 2017). Although most participants demonstrated a trend toward better emotion regulation, attention/concentration, and cognitive flexibility, it was not a consistent trend. Further, the sample size was too small to conduct any type of meaningful statistical test to determine significance.

Specific to changes in participants' attentional abilities, the results were divided with half of the participants improving (an increase of at least ten standard score points) and half remaining stable. In the present study, attention was assessed through both auditory and visual tasks with no noted differences among participants' performance regardless of the presentation (i.e., auditory versus visual). Previous research on mindfulness-based interventions with children and adolescents has demonstrated improved attention skills (Felver, et al., 2017; Flook et al., 2010; Napoli et al., 2005;

Tarrasch, 2018). In these studies, changes in attention were measured through parent/teacher rating scales or computerized attention tasks (primarily the Attention Network Task and Computerized Continuous Performance Task). These measures may be more sensitive to change than the standardized measure (i.e., WRAML-2 subtests) that was used in the present study. Standard scores are designed to be more stable and generally are not sensitive to incremental changes in performance.

Next, in regard to changes in cognitive flexibility, the results from the TMT resulted in the most consistent positive outcome. Six of the participants improved in their ability to complete this task indicating an increase in cognitive flexibility. At this time, the research on mindfulness interventions with youth and executive functioning outcomes is not fully established and may represent a more promising line of inquiry (Mak et al., 2018). The only other study with youth utilizing the TMT also found statistically significant results (Purohit & Pradhan, 2017). The results from this study contribute to a small, but growing body of evidence supporting an increase in cognitive flexibility skills after participating in mindfulness-based interventions. However, a certain degree of caution is warranted when interpreting the results from this study. Typically, the test-retest period for a TMT type task is a minimum of six weeks and even though these students were re-tested outside that timeframe (~12-13 weeks), it is still possible that the improved functioning was the result of practice effects. Therefore, it is not clear whether these results might reflect familiarity with the task, improved cognitive flexibility, or a combination of both. Future research may be directed towards exploring potential practice effects that occur after that minimum timeframe.

Since emotion regulation plays an important role in cognitive engagement, the final measure in this area was selected to assess for the participants' internal experience of emotion regulation throughout the day. Emotion regulation has been identified as an essential requirement for school engagement (Broderick & Metz, 2016; Frank et al., 2017). Overall, the results were stable with little significant shift. There were two outliers with one individual showing a substantial increase in regulation skills and another, a substantial decrease in these skills. It is possible that the two outlier scores may reflect other variables in the participants' life that were impacting their daily emotion regulation functioning.

These results are consistent with the available research on mindfulness and emotion regulation. Although some studies have found a significant relationship between mindfulness and increased emotion regulation, these results have not been consistently reported across the research (Broderick & Metz, 2009). For example, Metz et al. (2013) found significant effects on the overall DERS score and two of the subscales (STRATEGIES and CLARITY) utilizing the Learning to BREATHE (L2B) program. Also utilizing the L2B curriculum, Fung et al. (2018) in an RTC study with minority adolescents found increased emotion regulation with depressed participants. The L2B program may result in changes in emotion regulation due to the structure of that curriculum which includes longer sessions (50-minutes, weekly home practices with provided audio). These differences represent a higher dosage of time spent engaging in mindfulness practices that then results in greater changes in emotion regulation. Since the majority of the participants in this study had emotion regulation scores in a range that were comparable to a typical sample population, they may not have shown the same

amount of change as participants in other studies, such as Fung et al. (2018) whose participants had difficulties in this area. Moreover, due to a population's tendency to regress toward the mean when re-tested, it is difficult to interpret the meaning of these results without a comparison control group.

It is important to place adolescent emotion regulation within both a neurodevelopmental and environmental context. First, like all of the executive functioning skills, emotion regulation is not fully established within the adolescent brain until young adulthood (Broderick & Metz, 2016). In particular, the development of emotion regulation during adolescence is quite varied. Studies of the variability of the emotional experiences of adolescence demonstrated that emotional states can be quite erratic even through the course of a single day (Larson, Moneta, Richards, & Wilson, 2002). Therefore, it may be difficult to adequately measure or establish significance in a typically developing adolescent population because of the variability in their experiences across time periods.

Implications of the Findings

As the research on the use of mindfulness in schools continues to grow and evolve, several themes are emerging that are relevant to the current study. First, the efficacy of mindfulness has been most meaningfully established as a universal intervention to support the overall social and emotional functioning of students (e.g., Renshaw et al., 2017). Mindfulness interventions, however, are still early in the research process and cannot yet be considered an evidence-based intervention for many commonly targeted skills such as academic achievement and disruptive behaviors (Renshaw et al., 2017). Many programs, including the Mindful Schools curriculum, are designed to be

implemented in a general education setting (Felver et al., 2013; Renshaw et al., 2017). That is, mindfulness may be most effective at promoting ongoing wellness among youth rather than serving as an intervention to change problematic patterns of behavior. Along that vein, in the current study, the largest effect was observed in the increase of participants' highest grades, possibly suggesting that the intervention supported or built upon already existing strengths.

There is also a body of research supporting the use of mindfulness to address specific skills and/or social-emotional needs in a small group setting. It is unclear, however, what are the required intervention elements for these interventions to consistently produce results (Felver & Jennings, 2016; Renshaw et al., 2017). For example, what dosage is required (Dunning et al., 2019; Sanger & Dorjee, 2015)? Does the age and/or gender of participants result in different outcomes (Carsley et al., 2018; Kallapiran, Koo, Kirubakaran, & Hancock, 2015)? And, importantly, given the lack of school resources, what are the training needs of facilitators (Sanger & Dorjee, 2015)? If mindfulness-based interventions could support and increase school engagement behaviors, this would present school psychologists and other mental health service providers with a very accessible intervention to support vulnerable students. Mindfulness-based interventions could easily be implemented in classrooms by staff (teachers, social workers, psychologists, counselors) and can require little formal training.

The second relevant theme is the relationship between mindfulness and executive functioning skills. The relationship between mindfulness and overall executive functioning skills has been one of the most researched (Shin, Black, Shonkoff, Riggs, & Pentz, 2016). When significant findings occur, participants with behavioral difficulties

have the strongest responses (Flook et al., 2010; Leyland, Emerson, & Rowse, 2018). However, without a control group, it is not possible to determine how much students might have changed across the time of the study. In the current study, the most robust findings related to a potential increase in cognitive flexibility. These results were particularly interesting as previous research has not found a relationship between dispositional mindfulness and cognitive flexibility with adolescents (Riggs, Black, & Ritt-Olson, 2015). These results suggest that the practice of mindfulness may be associated with the development of these skills.

Overall, several of the assessed constructs resulted in positive trends, but the findings did not result in statistical significance. For example, participation in the intervention corresponded with an increase in school engagement behavior according to trends in progress monitoring during intervention. Participants' teachers reported positive trends in behavioral engagement and emotional engagement. For many of these participants, these behaviors were already high (i.e. happening "most of the time") but trended toward a rating of "all of the time" by the end of the semester for several participants. Similar to the increase in the highest grade, it is possible that the participation in the group supported the growth in areas of strength. It is also possible that the questions and structure of the rating scales were not sensitive enough to capture behavioral changes. For example, perhaps the addition of direct observation of on-task behavior would provide more nuanced information on these behaviors. Nevertheless, the use of progress monitoring through the daily teacher ratings represented a contribution to the literature. To date, the majority of studies on mindfulness with children and youth have utilized pre/post-assessment models. The use of the daily progress monitoring

allowed for the tracking of the participant's response over the course of the intervention and may hold promise as a method for program evaluation as mindfulness programs are implemented with more frequency in school-based settings.

Limitations of the Study

The most significant limitation to this study, and much of the mindfulness research with youth, was the lack of a control group. Although initially planned, due to a change in the location of the intervention and the nature of the selection criteria (i.e. students in need of supports), a control group was not utilized. Therefore, it is not possible to determine if the performance of these participants differed from their peers. For example, it is not unusual for students' academic engagement to decline toward the end of the school year. According to the teacher reports, the performance of these participants actually resulted in either stabilization or an increase in engagement behaviors during this timeframe. The inclusion of a control group would allow for greater context in which to interpret these results and the success of the mindfulness intervention.

The timing of the intervention (end of the academic year) represented a limitation in another way. There was no possibility of conducting a follow-up assessment in order to determine whether positive effects were maintained after the end of the intervention. Additionally, there was only one interventionist and it is possible that these findings might not be replicated or could differ across different group facilitators. The short duration between the pre- and post-assessment on some of the measures also limits the confidence in which the positive changes can be attributed to the mindfulness intervention and not the product of practice effects. For example, on the TMT, while the time between pre- and post-assessments was greater than the minimum six to seven-

week window between administrations, it was well below the recommended year to ensure the absence of the practice effects. Finally, as with all studies with small sample sizes, there is a limitation to the generalizability of the results.

Future Directions

One important recommendation for future research would be to investigate the use of progress monitoring to measure changes in the study-specific outcomes related to mindfulness-based interventions in order to collect more information on variables such as dosage, intervention format, and timing of the intervention. For example, some researchers have advocated for daily practice in order to obtain sufficient dosage (Dunning et al., 2019), but others have not considered this to be necessary to obtain significant results. If participants are engaging in daily practice sessions (often utilizing recorded guided meditations provided by the researchers), the dosage would be higher than an intervention that only requires participation during the group sessions. With progress monitoring, researchers and clinicians would have a more sensitive tool to assess potential changes and make determinations about which aspects of the intervention seemed to result in the strongest outcomes. This information would provide much needed information on the conditions in which mindfulness-based interventions are likely to be most effective.

Although teacher report is a recognized as an effective method of gathering data on school engagement behaviors (Appleton et al., 2008; Fredricks et al., 2004), it is possible that these reports are subject to placebo effect. That is, if teachers know a student is receiving an intervention, they may believe they see improvement even when none exists. Therefore, another recommendation is to conduct direct behavioral

observations to accompany teacher reports as another data point to assess for change. These additional data points would provide important objective data on the impact of the intervention on the daily academic engagement behaviors.

Although it can be difficult to have a true randomized control group in school settings, the addition of this type of group to mindfulness methodology would represent an important advance in the research. Data from the control group could help to account for any confounding variables such as time of year or other contextual variables. Finally, as several researchers have pointed out, standardization of key terms, the general construct, and assessment methodology will support the development of a more robust body of research on the effect of mindfulness-based interventions with youth.

Conclusion

School completion is an important outcome for both individuals and society. The purpose of this study was to explore whether a school-based mindfulness intervention would support behaviors and cognitive processes associated with school engagement. The results from this study suggested that a six-week mindfulness-based group intervention in a high school is feasible and may be effective in supporting factors related to school engagement. The most promising effects were observed in increasing cognitive flexibility skills and increasing academic performance (i.e., improving highest grade). Several assessed school engagement indicators resulted in little to no changes in behaviors: attendance and emotion regulation. The other assessed outcomes, including on-task behavior, emotional engagement, rule-following behavior, lowest grade performance, and attentional skills did not result in significant cross-case analysis, but several participants did demonstrate some shifts in each of these behaviors.

Additional research is needed on the effectiveness of school-based mindfulness programming and its effectiveness in promoting positive behaviors and reducing negative outcomes. In this study, the intervention was interpreted as supportive of building on students' strengths but did not seem to support change in deficit areas. As more research is completed addressing the effectiveness of mindfulness to support students' school engagement cognitions and behaviors, it will be important to continue to explore the efficacy of this intervention in supporting both strengths and ameliorating deficits that hinder achievement.

REFERENCES

- Adams, W., & Sheslow, D. (2003). *Wide Range Assessment of Memory and Learning—Revised (WRAML-2)*. Administration and Technical Manual. Wilmington, DE: Wide Range.
- Ahmed, S. P., Bittencourt-Hewitt, A., & Sebastian, C. L. (2015). Neurocognitive bases of emotion regulation development in adolescence. *Developmental Cognitive Neuroscience, 15*, 11-25. <http://dx.doi.org/10.1016/j.dcn.2015.07.006>
- Aldao, A., Sheppes, G., & Gross, J. J. (2015). Emotion regulation flexibility. *Cognitive Therapy and Research, 39*(3), 263-278. doi: 10.1007/s10608-014-9662-4
- American Psychological Association. (2012). *Facing the school dropout dilemma*. Washington, DC: Author. Retrieved from:
<http://www.apa.org/pi/families/resources/school-dropout-prevention.aspx>
- Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools, (45)*5, 369-386. doi: 10.1002/pits.20303
- Arbuthnott, K., & Frank, J. (2000). Trail making test, part B as a measure of executive control: validation using a set-switching paradigm. *Journal of Clinical and Experimental Neuropsychology, 22*(4), 518-528.
[http://dx.doi.org/10.1076/1380-3395\(200008\)22:4;1-0:FT518](http://dx.doi.org/10.1076/1380-3395(200008)22:4;1-0:FT518)

- Archambault, I., Janosz, M., Morizot, J., & Pagani, L. (2009). Adolescent behavioral, affective, and cognitive engagement in school: Relationship to dropout. *Journal of School Health, (79)9*, 408-415. doi: 10.1111/j.1746-1561.2009.00428.x
- Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, (10)2*, 125-143. DOI: 10.1093/clipsy.bpg015
- Bakosh, L. S., Mortlock, J. M. T., Querstret, D., & Morison, L. (2018). Audio-guided mindfulness training in schools and its effect on academic attainment: Contributing to theory and practice. *Learning and Instruction, (58)*, 34-41. doi: <https://doi.org/10.1016/j.learninginstruct.2018.04.012>
- Bakosh, L. S., Snow, R. M., Tobias, J. M., Houlihan, J. L., & Barbosa-Leiker, C. (2016). Maximizing mindfulness learning: Mindful awareness intervention improves elementary school students' quarterly grades. *Mindfulness, (7)1*, 59-67. doi: 10.1007/s12671-015-0387-6
- Balfanz, R., Herzog, L., & Mac Iver, D. J. (2007). Preventing student disengagement and keeping students on the graduation path in urban middle-grades schools: Early identification and effective interventions. *Educational Psychologist, 42(4)*, 223-235. doi: 10.1080/00461520701621079
- Beauchemin, J., Hutchins, T. L., & Patterson, F. (2008). Mindfulness meditation may lessen anxiety, promote social skills, and improve academic performance among adolescents with learning disabilities. *Complementary Health Practice Review, 13(1)*, 34-45. doi: 10.1177/1533210107311624

- Bishop, S., Lau, M., Shapiro, S., Carlson, L., Anderson, N., Carmody, J., ... Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*(3), 230-241. doi: 10.1093/clipsy/bph077
- Black, D. S., & Fernando, R. (2014). Mindfulness training and classroom behavior among lower-income and ethnic minority elementary school children. *Journal of Child and Family Studies, 23* (7), 1242-1246. <https://doi.org/10.1007/s10826-013-9784-4>
- Blair, C., & Diamond, A. (2008). Biological processes in prevention and intervention: The promotion of self-regulation as a means of preventing school failure. *Development and Psychopathology, 20*, 899-911. doi: 10.1017/S0954579408000436
- Bluth, K., Campo, R. A., Pruteanu-Malinici, S., Reams, A., Mullarkey, M., & Broderick, P. C. (2016). A school-based mindfulness pilot study for ethnically diverse at-risk adolescents. *Mindfulness, 7*(1), 90-104. doi: 10.1007/s12671-014-0376-1
- Bonanno, G. A., & Burton, C. L. (2013). Regulatory flexibility: An individual differences perspective on coping and emotion regulation. *Perspectives on Psychological Science, 8*(6), 591-612. doi:10.1177/1745691613504116
- Bowie, C. R., & Harvey, P. D. (2006). Administration and interpretation of the Trail Making Test. *Nature Protocols, 1*(5), 2277-2281. doi:10.1038/nprof.2006.390
- Briesch, A. M., Ferguson, T. D., Volpe, R. J., & Briesch, J. M. (2012). Examining teachers' perception of social-emotional and behavioral referral concerns. *Remedial and Special Education, 34*(4), 249-256. doi: 10.1177/0741932512464579

- Broderick, P. C. (2013). *Learning to BREATHE: A mindfulness curriculum for adolescents to Cultivate emotion regulation, attention, and performance*. Oakland, CA: New Harbinger.
- Broderick, P. C., & Frank, J. L. (2014). Learning to BREATHE: An intervention to foster mindfulness in adolescence. *New Direction for Youth Development, 142*, 31-44. doi: 10.1002/yd.20095
- Broderick, P. C., & Metz, S. (2009). Learning to BREATHE: A pilot trial of a mindfulness curriculum for adolescents. *Advances in School Mental Health Promotion, 2*(1), 35-46. [https://doi.org/ 10.1080.1754730X.2009.9715696](https://doi.org/10.1080.1754730X.2009.9715696)
- Broderick, P. C., & Metz, S. M. (2016). Working on the inside: Mindfulness for adolescents. In K. A. Schonert-Reichl & R.W. Roeser (Eds.), *Handbook of mindfulness in education* (355-382). New York: Springer. doi: 10.1007/978-1-4939-3506-2_22
- Buck, K. K., Atkinson, T. M., & Ryan, J. P. (2008). Evidence of practice effects in variants of the Trail Making Test during serial assessment. *Journal of Clinical and Experimental Neuropsychology, 30*(3), 312-318. doi: 10.1080/13803390701390483
- Burke, C. (2010). Mindfulness-based approaches with children and adolescents: A preliminary review of current research in an emergent field. *Journal of Child Family Studies, 19*(2), 133-144. doi: 10.1007/s10826-009-9282-x

- Carboni, J. A., Roach, A., & Fredrick, L. D. (2013). Impact of mindfulness training on the behavior of elementary students with attention-deficit/hyperactive disorder. *Research in Human Development, 10*(3), 234-251. doi: 10.1080/15427609.2013.818487
- Carsley, D., Khoury, B., & Heath, N. L. (2018). Effectiveness of mindfulness interventions for mental health in schools: A comprehensive meta-analysis. *Mindfulness, 9*(3), 693-707. <https://doi.org/10.1007/s12671-017-0839-2>
- Chambers, R., Gullone, E., & Allen, N. B. (2009). Mindful emotion regulation: An integrative review. *Clinical Psychology Review, 29*(6), 560-572. [doi:10.1016/j.cpr.2009.06.005](https://doi.org/10.1016/j.cpr.2009.06.005)
- Chang, J. H., Kuo, C. Y., Huang, C. L., & Lin, Y. C. (2018). The flexible effect of mindfulness on cognitive control. *Mindfulness, 9*(3), 792-800. doi: 10.1007/s12671-017-0816-9
- Christenson, S. L., & Thurlow, M. L. (2004). School dropouts, prevention considerations, interventions, and challenges. *Current Directions in Psychological Science, 13*(1), 36-39. doi: 10.1002/bjs.4503
- Christle, C. A., Jolivette, K., & Nelson, C. M. (2005). Breaking the school to prison pipeline: Identifying school risk and protective factors for youth delinquency. *Exceptionality: A Special Education Journal, 13*(2), 69-88. doi: 10.1207/s15327035ex1302_2
- Creswell, J. D. (2017). Mindfulness interventions. *Annual Review of Psychology, 68*, 491-516. doi: 10.1146/annurev-psych-042716-051139

- Crowe, S. F. (1998). The differential contribution of mental tracking, cognitive flexibility, visual search, and motor speed to performance on parts A and B of the Trail Making Test. *Journal of Clinical Psychology, 54*(5), 585-591.
[https://doi.org/10.1002\(SICI\)1097-4679\(199808\)54:5<585::AID-JCLP4>3.0.CO;2-K](https://doi.org/10.1002(SICI)1097-4679(199808)54:5<585::AID-JCLP4>3.0.CO;2-K)
- Denckla, M. B., & Mahone, E. M. (2018). Executive function: Binding together the definitions of attention-deficit/hyperactivity disorder and learning disabilities. L. Meltzer (Ed.), *Executive function in education: From theory to practice* (pp. 5-24). New York, NY: Guilford.
- Dunning, D. L., Griffiths, K., Kuyken, W., Crane, C., Foulkes, L., Parker, J., & Dalgleish, T. (2019). Research review: The effects of mindfulness-based interventions on cognition and mental health in children and adolescents- a meta-analysis of randomized controlled trials. *The Journal of Child Psychology and Psychiatry, 60*(3), 244-258. doi: 10.1111/jcpp.12980
- Eccles, J. S. (2016). Engagement: Where to next? *Learning and Instruction, 43*, 71-75.
<http://dx.doi.org/10.1016/j.learninstruc.2016.02.003>
- Felver, J., Celis-de Hoyos, C. E., Tezanos, K., & Singh, N. N. (2015). A systematic review of mindfulness-based interventions for youth in school settings. *Mindfulness, 7*(1), 34-45. doi: 10.1007/s12671-015-0389-4
- Felver, J., Doerner, E., Jones, J., Kaye, N., & Merrell, K. (2013). Mindfulness in school psychology: Application for intervention and professional practice. *Psychology in the Schools, 50*(6), 531-548, doi: 10.1002/pits.21695.

- Felver, J., Frank, J. L., & McEachern, A. D. (2014). Effectiveness, acceptability, and feasibility of the soles of the feet mindfulness-based intervention with elementary school students. *Mindfulness*, *5*(5), 589-597. <https://doi.org/10.1007/s12671-013-0238-2>
- Felver, J., & Jennings, P. (2016). Applications of mindfulness-based interventions in school settings: An introduction. *Mindfulness*, *7*(1), 1-4. <https://doi.org/10.1007/s12671-015-0478-4>
- Felver, J., Tipsord, J. M., Morris, M. J., Racer, K. H., & Dishion, T. J. (2017). The effects of mindfulness-based intervention on children's attention regulation. *Journal of Attention Disorders*, *21*(10), 872-881. <https://doi.org/10.1177/1087054714548032>
- Finn, J. D., & Zimmer, K. S. (2012). Student engagement: What is it? Why does it matter?. In S.L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 97-131). New York, NY: Springer.
- Flook, L., Smalley, S. L., Kitil, M. J., Galla, B. M., Kaiser-Greenland, S., Locke, J., ... & Kasari, C. (2010). Effects of mindful awareness practices on executive functions in elementary school children. *Journal of Applied School Psychology*, *26*(1), 70-95. doi: 10.1080/15377900903379125
- Frank, J. L., Kohler, K., Peal, A., & Bose, B. (2017). Effectiveness of a school-based yoga program on adolescent mental health and school performance: Findings from a randomized control trial. *Mindfulness*, *8*(3), 544-553. doi: 10.1007/s12671-016-0628-3

- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59-109. doi: 10.3102/00346543074001059
- Fredricks, J. A., & McColskey, W. (2012). The measurement of student engagement: A comparative analysis of various methods and student self-report instruments. In S.L. Christenson, A.L. Reschly, & C. Wylie (Eds.) *Handbook of research on student engagement* (pp. 763-782). New York, NY: Springer.
- Fung, J., Guo, S., Jin, J., Bear, L., & Lau, A. (2016). A pilot randomized trial evaluating a school-based mindfulness intervention for ethnic minority youth. *Mindfulness*, 7(4), 819-828. doi: 10.1007/s12671-016-0519-7
- Fung, J., Kim, J. J., Jin, J., Chen, G., Bear, L., & Lau, A. S. (2018). A randomized trial evaluating school-based mindfulness intervention for ethnic minority youth: Exploring mediators and moderators of intervention effects. *Journal of Abnormal Child Psychology*, 47(1), 1-19. <https://doi.org/10.1007/s10802-018-0425-7>
- Gallant, S. N. (2016). Mindfulness meditation practice and executive functioning: Breaking down the benefit. *Consciousness and Cognition*, 40, 116-130. <http://dx.doi.org/10.1016/j.concog.2016.01.055>
- Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion*, 10(1), 83-91. doi: [10.1037/a0018441](https://doi.org/10.1037/a0018441)
- Goldin, P. R., McRae, K., Ramel, W., & Gross, J. J. (2008). The neural bases of emotion regulation: reappraisal and suppression of negative emotion. *Biological Psychiatry*, 63(6), 577-586. doi: [10.1016/j.biopsych.2007.05.031](https://doi.org/10.1016/j.biopsych.2007.05.031)

- Goldin, P. R., Ziv, M., Jazaieri, H., Hahn, K., & Gross, J. J. (2013). MBSR vs aerobic exercise in social anxiety: fMRI of emotion regulation of negative self-beliefs. *Social Cognitive and Affective Neuroscience*, *8*(1), 65-72.
doi: 10.1093/scan/nss054
- Goldstein, S., Naglieri, J. A., Princiotta, D., & Otero, T. M. (2014). Introduction: A history of executive functioning as a theoretical and clinical construct. In J. A. Naglieri & S. Goldstein (Eds.). *Handbook of executive function* (pp. 3-12). New York, NY: Springer. <https://doi-org.unco.idm.oclc/10.1007/978-1-4614-8106-5>
- Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, *26*(1), 41-84.
<https://doi.org/10.1023/B:JOBA.0000007455.08539.94>
- Greco, L. A., Baer, R. A., & Smith, G. T. (2011). Assessing mindfulness in children and adolescents: Development and validation of the child and adolescent mindfulness measure (CAMM). *Psychological Assessment*, *23*(3), 606-614. doi: 10.1037/a0022819
- Gross, J. J. (2013). Emotion regulation: Conceptual and empirical foundations. In J.J. Gross (Ed.), *Handbook of emotion regulation* (2nd ed., pp. 3-21). New York-NY: Guilford.

- Harrison, J. R., Vannest, K., Davis, J., & Reynolds, C. (2012). Common problem behaviors of children and adolescents in general education classrooms in the United States. *Journal of Emotional and Behavioral Disorders, 20*(1), 55-64. doi: 10.1177/1063426611421157
- Henry, K. L., Knight, K. E., & Thornberry, T. P. (2012). School disengagement as a predictor of dropout, delinquency, and problem substance use during adolescence and early adulthood. *Journal of Youth and Adolescence, 41*(2), 156-166. <https://doi.org/10.1007/s10964-011-9665-3>
- Hill, C. L., & Updegraff, J. A. (2012). Mindfulness and its relationship to emotional regulation. *Emotion, 12*(1), 81-90. doi: [10.1037/a0026355](https://doi.org/10.1037/a0026355)
- Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*(2), 169-183. doi: 10.1037/a0018555
- Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S.W. (2011a). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research: Neuroimaging, 191*(1), 36-43. doi:10.1016/j.pscychresns.2010.08.006
- Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011b). How does mindfulness work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Sciences, 6*(6), 539-559. doi: 10.1177/1745691611419671

- Jensen, C. G., Vangkilde, S., Frokjaer, V., & Hasselbach, S. G. (2012). Mindfulness training affects attention- Or is it attentional effort? *Journal of Experimental Psychology: General*, *141*(1), 106-123. doi: 10.1037/a0024931
- Jha, A. P., Denkova, E., Zanesco, A. P., Witkin, J. E., Rooks, J., & Rogers, S. L. (2019). Does mindfulness training help working memory 'work' better? *Current Opinion in Psychology*, *28*, 273-278. <https://doi.org/10.1016/j.copsyc.2019.02.012>
- Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience*, *7*(2), 109-119. <https://doi.org/10.3758/CABN.7.2.109>
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, *10*(2), 144-156.
doi: 10.1093/clipsy.bpg016
- Kabat-Zinn, J., & Hanh, T. N. (2013) *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York: Bantam.
- Kallapiran, K., Koo, S., Kirubakaran, R., & Hancock, K. (2015). Review: Effectiveness of mindfulness in improving mental health symptoms of children and adolescents: A meta-analysis. *Child and Adolescent Mental Health*, *20*(4), 182-194.
doi:10.1111/camh.12113
- Kennedy, C. H. (2005). *Single-case designs for educational research*. New York: Prentice Hall.

- Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, P., Bouchard, V., ... & Hofmann, S. G. (2013). Mindfulness-based therapy: A comprehensive meta-analysis. *Clinical Psychology Review, 33*(6), 763-771.
[doi:10.1016/j.cpr.2013.05.005](https://doi.org/10.1016/j.cpr.2013.05.005)
- Klingbeil, D. A., Renshaw, T. L., Willenbrink, J. B., Copek, R. A., Chan, K. T., Haddock, A., . . . Clifton, J. (2017). Mindfulness-based interventions with youth: A comprehensive meta-analysis of group-design studies. *Journal of School Psychology, 63*, 77-103. <https://dx.doi.org/10.1016/j.jsp.2017.03.006>
- Kuby, A. K., Mclean, N., & Allen, K. (2015). Validation of the child and adolescent mindfulness measure (CAMM) with non-clinical adolescents. *Mindfulness, 6*(6), 1448-1455. doi: 10.1007/s12671-015-0418-3
- Larson, R. W., Moneta, G., Richards, M. H., & Wilson, S. (2002). Continuity, stability, and change in daily emotional experience across adolescence. *Child Development, 73*(4), 1151-1165. <https://doi.org/10.1111/1467-8624.00464>
- Leyland, A., Emerson, L., & Rowse, G. (2018). Testing for an effect of a mindfulness induction on child executive functions. *Mindfulness, 9* (6), 1807-1815.
<https://doi.org/10.1007/s12671-018-0923-2>
- Li, Y., & Lerner, R. M. (2013). Interrelations of behavioral, emotional, and cognitive school engagement in high school students. *Journal of Youth and Adolescence, 42*(1), 20-32, doi: 10.1007/s10964-012-9857-5
- Liew, J. (2012). Effortful control, executive functions, and education: Bringing self-regulatory and social-emotional competencies to the table. *Child Development Perspectives, 6*(2), 106-111. doi:10.1111/j1750-8606.2011.00196x

- Luberto, C. M., Cotton, S., McLeish, A. C., Mingione, C. J., & O'Bryan, E. M. (2014). Mindfulness skills and emotion regulation: The mediating roles of coping self-efficacy. *Mindfulness*, 5(4), 373-380. doi: 10.1007/s12671-012-0190-6
- Lutz, J., Herwig, U., Opialla, S., Hittmeyer, A., Jancke, L., Rufer, M., . . . Bruhl, A. B. (2013). Mindfulness and emotion regulation-an fMRI study. *Social Cognitive and Affective Neuroscience*, 9(6), 776-785. doi: 10.1093/scan/nst043
- Mak, C., Whittingham, K., Cunnington, R., & Boyd, R. N. (2018). Efficacy of mindfulness-interventions for attention and executive function in children and adolescents- A systematic review. *Mindfulness*, 9(1), 59-78. doi: 10.1007/s12671-017-0770-6
- Martin, R. E., & Ochsner, K. N. (2016). The neuroscience of emotion regulation development: Implications for education. *Current Opinion in Behavioral Sciences*, 10, 142-148. <http://dx.doi.org/10.1016/j.cobeha.2016.06.006>
- McCloskey, G., Perkins, L. A., & Divner, B. V. (2009). *Assessment and intervention for executive function difficulties*. New York: Taylor & Francis.
- McFarland, J., Cui, J., & Stark, P. (2018) Trends in high school dropout and completion rates in the united states: 2014. NCES 2018-117 *National Center for Educations Statistics*. Retrieved September 10, 2016 from <https://nces.ed.gov/pubs2018/2018117.pdf>
- Meiklejohn, J., Phillips, C., Freedman, M. L., Griffin, M. L., Biegel, G., Roach, A., . . . Saltzman, A. (2012). Integrating mindfulness training into k-12 education: Fostering the resilience of teachers and students. *Mindfulness*, 3(4), 291-307. doi: 10.1007/s12671-012-0094-5

- Meltzer, L. (2018). Creating strategic classrooms and schools: Embedding executive function strategies in the curriculum. L. Meltzer (Ed.), *Executive function in education: From theory to practice* (pp. 263-299). New York, NY: Guilford.
- Metz, S., Frank, J., Reibel, D., Cantrell, T., Sanders, R., & Broderick, P. (2013). The effectiveness of the Learning to BREATHE Program on adolescent emotion regulation. *Research in Human Development, 10*(3), 252-272, doi: 10.1080/15427609.2013.818488
- Mindful Schools (2015). *Mindfulness curriculum for adolescents*. Oakland, CA: Mindful Schools.
- Mindful Schools (2019). *Our organization*. Retrieved from <http://www.mindfulschools.org/about-mindfulness/our-organization/>
- Misdraji, E. L., & Gass, C. S. (2010). The Trail Making Test and its neurobehavioral components. *Journal of Clinical and Experimental Neuropsychology, 32*(2), 159-163. doi: 10.1080/13803390902881942
- Mooneyham, B. W., & Schooler, J. W. (2013). The costs and benefits of mind-wandering: A review. *Canadian Journal of Experimental Psychology, 67*(1), 11-18. doi: 10.1037/a0031569
- Moore, A., & Malinowski, P. (2009). Meditation, mindfulness, and cognitive flexibility. *Consciousness and Cognition, 18*(1), 176-186. <https://doi.org/10.1016/j.concog.2008.12.008>

- Moses, J., & Choudhury, S. (2016). A “mechanism of hope”: Mindfulness, education, and the developing brain. In K. A. Schonert-Reichl & R.W. Roeser (Eds.), *Handbook of mindfulness in education* (447-458). New York: Springer. doi: 10.1007/978-3-319-44019-4_30
- Müller, U., & Kerns, K. (2015). The development of executive function. In R. M. Lerner (Ed.), *Handbook of child psychology and developmental science* (7th ed., Vol. 2, pp.1-45). New York, NY: Wiley. <https://doi-org.unco.idm.oclc.org/10.1002/9781118963418.childpsy214>
- Napoli, M., Krech, P. R., & Holley, L. C. (2005). Mindfulness training for elementary school students. *Journal of Applied School Psychology*, 21(1), 99-125. doi: 10.1300/J370v21n01_05
- Nesbitt, K. T., Farran, D. C., & Fuhs, M. W. (2015). Executive function skills and academic achievement gains in prekindergarten: Contributions of learning related behaviors. *Developmental Psychology*, 51(7), 865-878. <http://dx.doi.org/10.1037/dev0000021>
- Neumann, A., van Lier, P. A. C., Gratz, K. L., & Koot, H. M. (2010). Multidimensional assessment of emotion regulation difficulties in adolescents using the difficulties in emotion regulation scale. *Assessment*, 17(1), 138-149. doi: 10.1177/1073191109349579
- Nussbaum, N. L., & Bunner, M. R. (2009). Halstead-Reitan neuropsychological test batteries for children. In: C.R. Reynolds & E. Fletcher-Janzen (Eds.), *Handbook of clinical child neuropsychology* (247-266). Boston:Springer.

- O'Brien, K. M., Larson, C. M., & Murrell, A. R. (2008). Third-wave behavior therapies for children and adolescents: Progress, challenges, and future directions. In: L.A. Greco & S.C. Hayes (Eds.), *Acceptance and mindfulness treatments for children and adolescents: A practitioner's guide* (15-35). California: Harbinger.
- Ochsner, K. N., & Gross, J. J. (2008). Cognitive emotion regulation: Insights from social cognitive and affective neuroscience. *Current Directions in Psychological Science*, 17(2), 153-158. doi: 10.1111/j.1467-8721.2008.00566.x
- Owens, M., Stevenson, J., Hadwin, J. A., & Norgate, R. (2012). Anxiety and depression in academic performance: An exploration of the mediating factors of worry and working memory. *School Psychology International*, 33(4), 433–449. <https://doi.org/10.1177/0143034311427433>
- Palozzi, R., Wertheim, E., Paxton, S., & Ong, B. (2017). Trait mindfulness measures for use with adolescents: A systematic review. *Mindfulness*, 8(1), 110-125. <https://doi.org/10.1007/s12671-016-0567-z>
- Parker, R. I., Vannest, K. J., Davis, J. L., & Sauber, S. B. (2011). Combining nonoverlap and trend for single-case research: Tau-U. *Behavior Therapy*, 42(2), 284-299. doi:10.1016/j.beth.2010.08.006
- Pekrun, R., & Linnenbrink-Garcia, L. (2012). Academic emotions and student engagement. In S.L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 259-301). New York, NY: Springer.

- Pietarinen, J., Soini, T., & Pyhältö, K. (2014). Students' emotional and cognitive engagement as the determinants of well-being and achievement in school. *International Journal of Educational Research*, 67, 40-51.
<http://dx.doi.org/10.1016/j.ijer.2014.05.001>
- Posner, M. I., & Rothbart, M. K. (2007). Research on attention networks as a model for the integration of psychological science. *Annual Review of Psychology*, 58, 1-23.
<https://doi.org/10.1146/annurev.psych.58.110405.085516>
- Purohit, S. P., & Pradhan, B. (2017). Effect of yoga program on executive functions of adolescents dwelling in an orphan home: a randomized controlled study. *Journal of traditional and complementary medicine*, 7(1), 99-105.
<https://doi.org/10.1016/j.jtcme.2016.03.001>
- Rawana, J. S., Diplock, B. D., & Chan, S. (2018). Mindfulness-based program in school settings: Current state of the research. In A.W. Lieschied, D H. Saklofske, & G. L. Flett (Eds.), *Handbook of school-based mental health promotion* (pp. 323-355). New York, NY: Springer. https://doi.org/10.1007/978-3-319-89842-1_18
- Renshaw, T. L., Fischer, A. J., & Klingbeil, D. A. (2017). Mindfulness-based intervention in school psychology. *Contemporary School Psychology*, 21(4), 299-303. <https://doi.org/10.1007/s40688-017-0166-6>
- Reschly, A. L., Appleton, J. J., & Christenson, S. L. (2007). Student engagement at school and with learning: Theories and intervention. *Communiqué*, 35(8), 18-20.
doi: 10.1002/pits.20303
- Reschly, A. L., & Christenson, S. L. (2012). Jingle, jangle, and conceptual haziness: Evolution and future directions of the engagement construction. In S.L.

Christenson, A.L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 3-19). New York, NY: Springer.

Reschly, A. L., Huebner, E. S., Appleton, J. J., & Antaramian, S. (2008). Engagement as flourishing: The contribution of positive emotions and coping to adolescents' engagement at school and with learning. *Psychology in the Schools, 45*(5), 419-431. doi: 10.1002/pits.20306

Riediger, M., & Klipker, K. (2013). Emotion regulation in adolescence. In J.J. Gross (Ed.), *Handbook of emotion regulation* (2nd ed., pp. 187-202). New York-NY: Guilford.

Riggs, N. R., Black, D. S., & Ritt-Olson, A. (2015). Associations between dispositional mindfulness and executive function in early adolescence. *Journal of Child and Family Studies, 24*(9), 2745-2751. <https://doi.org/10.1007/s10826-014-0077-3>

Ristic, J., & Enns, J. T. (2015). Attentional development. In R. M. Lerner (Ed.), *Handbook of child psychology and developmental science* (7th ed., Vol. 2, pp.1-45). New York, NY: Wiley.<https://doi-org.unco.idm.oclc.org/10.1002/9781118963418.childpsy205>

Ritschel, L. A., Tone, E. B., Schoemann, A. M., & Lim, N. E. (2015). Psychometric properties of the Difficulties in Emotion Regulation Scale across demographic groups. *Psychological Assessment, 27*(3), 944.
<http://dx.doi.org/10.1037/pas0000099>

- Rueda, M. R., Fan, J., McCandliss, B. D., Halparin, J. D., Gruber, D. B., Pappert-Lercari, L., & Posner, M. I. (2004). Development of attention networks of childhood. *Neuropsychologia*, *42*, 1029-1040. doi: 10.1016/j.neuropsychologia.2003.12.012
- Rumberger, R., & Rotermund, S. (2012). The relationship between engagement and high school dropout. In S.L. Christenson, A.L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 491-513). New York, NY: Springer.
- Saltzman, A. (2014). *A still quiet place: A mindfulness program for teaching children and adolescents to ease stress and difficult emotions*. Oakland, CA: New Harbinger.
- Sanger, K. L., & Dorjee, D. (2015). Mindfulness training for adolescents: A neurodevelopmental perspective on investigating modifications in attention and emotion regulation using event-related brain potentials. *Cognitive, Affective, & Behavioral Neuroscience*, *15*(3), 696-711.
doi: 10.3758/s13415-015-0354-7
- Scholastic. (2011). *The MINDUP curriculum: Brain-focused strategies for learning—and living*. New York: Scholastic.
- Schonert-Reichl, K. A., Oberle, A., Lawlor, M. S., Abbott, D., Thomson, K., Oberlander, T. F., & Diamond, A. (2015). Enhancing cognitive and social-emotional development through a simple-to-administer mindfulness-based program for elementary school children: A randomized control trial. *Developmental Psychology*, *51*(1), 52-66. <http://doi.org/10.1037/a0038454>
- Schonert-Reichl, K. A., & Roeser, R. W. (2016). Mindfulness in education: Introduction and overview of the handbook. In K. A. Schonert-Reichl & R. W. Roeser (Eds.),

- Mindfulness in education: Integrating theory and research into practice* (pp. 3-16). New York, NY: Springer. doi: 10.1007/978-1-4939-3506-2_1
- Semple, R., Lee, J., Rosa, D., & Miller, L. (2009). A randomized trial of mindfulness-based cognitive therapy for children: Promoting mindful attention to enhance social-emotional resiliency in children. *Journal of Child and Family Studies*, *19*(2), 218-229. doi: 10.1007/s10826-009-9301-y
- Shin, H., Black, D. S., Shonkoff, E. T., Riggs, N. R., & Pentz, M. A. (2016). Associations among dispositional mindfulness, self-compassion, and executive function proficiency in early adolescents. *Mindfulness*, *7*(6), 1377-1384. doi: 10.1007/s12671-016-0579-8
- Siegel, D. (2015). *The developing mind: How relationships and the brain interact to shape who we are* (2nd ed.). New York: Guilford.
- Siegel, D. (2007). *The mindful brain: Reflection and attunement in the cultivation of well-being*. New York: Norton.
- Sinatra, G. M., Heddy, B. C., & Lombardi, D. (2015). The challenges of defining and measuring student engagement in science. *Educational Psychologist*, *50*(1), 1-13. doi: 10.1080/00461520.2014.1002924
- Singh, N. N., Singh, J., Singh, A. D. A., Singh, A. N. A., & Winton, A. S. W. (2011). *Meditation on the soles of the feet for anger management: A trainer's manual*. Raleigh, NC: Fernleaf.
- Smith, A., Guzman-Alvarez, A., Westover, T., Keller, S., & Fuller, S. (2012). Mindful Schools program evaluation. *Unpublished manuscript, Center for Education and Evaluation Services, University of California at Davis, Davis, CA*. Retrieved

from: education.ucdavis.edu/sites/main/files/file-
attachments/mindful_schools_final_report.081512.pdf

- Stephanou, K., Davey, C. G., Kerestes, R., Whittle, S., Pujol, J., Yücel, M., . . . Harrison, B. J. (2016). Brain functional correlates of emotion regulation across adolescence and young adulthood. *Human Brain Mapping, 37*, 7-19. doi: 10.1002/hbm.22905
- Suh, S., Suh, J., & Houston, I. (2007). Predictors of categorical at-risk high school dropouts. *Journal of Counseling & Development, 85*(2), 196-203.
<https://doi.org/10.1002/j.1556-6678.2007.tb00463.x>
- Takacs, Z. K., & Kassai, R. (2019). The efficacy of different interventions to foster children's executive function skills: A series of meta-analyses. *Psychological Bulletin, 145*(7), 653-697. <http://dx.doi.org/10.1037/bul0000195>
- Tang, Y. Y., Hölzel, B. K., & Posner, M. I. (2015). The neuroscience of mindfulness meditation. *Nature Reviews: Neuroscience, 16* (4), 213-225. doi:10.1038/nrn3916
- Tang, Y. Y., & Posner, M. I. (2013). Tools of the trade: theory and method in mindfulness neuroscience. *Social Cognitive and Affective Neuroscience, 8*(1), 118-120. <https://doi.org/10.1093/scan/nss112>
- Tarrasch, R. (2018). The effects of mindfulness practice on attentional functions among primary school children. *Journal of Child and Family Studies, 27*(8), 2632-2643. <https://doi.org/10.1007/s10826-018-1073-9>
- Teasdale, J. D., Segal, Z. V., Williams, J. M. G., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of consulting and clinical psychology, 68*(4), 615-623.

- Teper, R., & Inzlicht, M. (2013). Meditation, mindfulness and executive control: The importance of emotional acceptance and brain-based performance monitoring. *Social Cognitive and Affective Neuroscience*, 8(1), 85-92.
doi: 10.1093/scan/nss045
- Tombaugh, T. N. (2004). Trail Making Test A and B: normative data stratified by age and education. *Archives of Clinical Neuropsychology*, 19(2), 203-214.
[https://doi.org/10.1016/S0887-6177\(03\)00039-8](https://doi.org/10.1016/S0887-6177(03)00039-8)
- U.S. Census Bureau (2018). *Percentage of people in poverty by state using 2- and 3- year averages: 2015-2016 and 2017-2018*. Retrieved from
[census.gov/library/publications/2019/demo/p60-266.html](https://www.census.gov/library/publications/2019/demo/p60-266.html)
- van de Weijer-Bergsma, E., Formsma, A. R., de Bruin, E. I., & Bögels, S. M. (2012). The effectiveness of mindfulness training on behavior problems and attentional functioning in adolescents with ADHD. *Journal of Child and Family Studies*, 21(5), 775-787. doi: 10.1007/s10826-011-9531-7
- Vannest, K. J., & Ninci, J. (2015). Evaluation intervention effects in single-case research designs. *Journal of Counseling & Development*, 93 (4), 403-411.
<https://doi.org/10.1002/jcad.12038>
- Wagner, M., & Davis, M. (2006). How are we preparing students with emotional disturbances for the transition to young adulthood? Findings from the National Longitudinal Transition Study—2. *Journal of Emotional and Behavioral Disorders*, 14(2), 86-98. doi: 10.1177/10634266060140020501

- Wang, M. T., & Holcombe, R. (2010). Adolescents' perceptions of school environment, engagement and academic achievement in middle school. *American Educational Research Journal*, 47(3), 633-662. doi: 10.3102/0002831209361209
- Waters, L., Barsky, A., Ridd, A., & Allen, K. (2015). Contemplative education: A systematic evidence-based review of the effect of meditation interventions in schools. *Educational Psychology Review*, 27(1), 103-134. doi: 10.1007/s10648-014-9258-2
- Weinberg, A., & Klonsky, E. D. (2009). Measurement of emotion dysregulation in adolescents. *Psychological Assessment*, 21(4), 616-621. doi: 10.1037/a0016669
- Werner, K., & Gross, J. J. (2009). Emotion regulation and psychopathology: A conceptual framework. In A. M. Kring & D.M. Sloan (Eds.), *Emotional regulation and psychopathology: A transdiagnostic approach to etiology and treatment* (pp. 13-37). New York, NY: Guilford.
- Zenner, C., Herrnleben-Kurz, S., & Walach, H. (2014). Mindfulness-based intervention in schools- a systematic review and meta-analysis. *Frontiers in Psychology*, 5, 603. doi: 10.3389/fpsyg.2014.00603
- Zoogman, S., Goldberg, S. B., Hoyt, W. T., & Miller, L. (2015). Mindfulness interventions with youth: A meta-analysis. *Mindfulness*, 6(2), 290-302. doi: 10.1007/s12671-013-0260-4
- Zylowska, L., Ackerman, D. L., Yang, M. H., Futrell, J. L., Horton, N. L., Hale, T. S., ... & Smalley, S. L. (2008). Mindfulness meditation training in adults and adolescents with ADHD: a feasibility study. *Journal of Attention Disorders*, 11(6), 737-746. doi:10.1177/108705470730850

APPENDIX A
INSTITUTIONAL REVIEW BOARD APPROVAL



Institutional Review Board

DATE: February 22, 2016

TO: Sarah Groark

FROM: University of Northern Colorado (UNCO) IRB

PROJECT TITLE: [860382-2] Mindfulness Intervention to Support School Engagement with At- Risk Students at an Alternative School

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED

APPROVAL DATE: February 18, 2016

EXPIRATION DATE: February 18, 2017

REVIEW TYPE: Expedited Review

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB has APPROVED your submission. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on applicable federal regulations.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of February 18, 2017.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee

APPENDIX B

INFORMED CONSENT AND ADMINISTRATOR APPROVAL

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH
UNIVERSITY OF NORTHERN COLORADO

Project Title: Mindfulness Intervention to Support School Engagement with At-Risk Students at an Alternative School

Researcher: Sarah Groark

Advisor: Robyn Hess, Ph.D., Department of School Psychology

Email:

The purpose of this research is to investigate whether participation in a mindfulness intervention increases student engagement. If you grant your permission and if your child grants their permission, your child will be asked to complete some individual assessments related to cognitive development, attention, and emotional regulation. These assessments will take approximately 45 minutes to administer. Your child will also participate in a six-week mindfulness intervention. This intervention will be provided in a group setting and occur twice per week in the school setting for 15 minute intervals. Some of the activities that will be included in the group intervention are breathing activities, paying attention to sensory information (sounds, taste), and noticing one's thoughts. Your child will not be required to share any information on their experiences, only to participate in the intervention to the best of their ability and comfort level. Information about your child's attendance, work completion, and classroom behavior will also be collected in order to determine if the intervention has any effect on these elements of school performance. Participants will have the opportunity to earn rewards as part of their participation. These rewards will include sports drinks, gel pens, snacks, ear buds, and gift cards.

All participants' information will remain confidential. Participating will be identified by a randomly assigned number in order to maintain confidentiality. All efforts will be made to keep all information on participants confidential. Completed hard copies of data will be locked in a secure location that I have provided. Digital data will be stored on a password-protected computer. Be assured that at no time will individuals other than my research advisor and myself have access to the data. Completed surveys will be kept for a period of three years after which they will be destroyed.

Risks to your child are minimal. These risks include possible stress from engaging in mindfulness practices. Another risk is loss of instructional time during the initial and final data collection phase. The benefits to your child for participating is the opportunity to gain skills that are well-researched for supporting increased attention and emotional regulation. Research with adolescent and mindfulness consistently results in the adolescents reporting increased feeling of well-being. Moreover, another benefit is feeling positive about participating in research that will be used to support students that are at-risk for dropping out from high school.

Participation is voluntary. You may decide to not have your child participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had the opportunity to ask any questions, please sign below if you would like your child to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Sherry May, IRB

Administrator, Office of Sponsored Programs, Kepner Hall, University of Northern Colorado
Greeley, CO 80639; 970-351-1910.

Your participation in this study is greatly appreciated. Once data have been analyzed and reported, feel free to contact the researcher for any findings or implications of the study.

Thank you for your assistance with this research.

Child's Full Name (please print)
(month/date/year)

Child's Birth date

Parent/Guardian Signature

Date

Minor's Signature

Date

Researcher's Signature

Date

APPENDIX C
TEACHER BEHAVIOR RATINGS

Behavior Tracker

* Required

1. Did student attend class today?

Check all that apply.

- yes, entire class
- came late
- absent

2. Behavioral Engagement *

Today, the student was on-task during class.
Mark only one oval.

- Never
- Occasionally
- Some of the time
- Most of the time
- All of the time

3. Emotional Engagement *

Today, the student appeared to like being at school.
Mark only one oval.

- Never
- Occasionally
- Some of the time
- Most of the time
- All of the time

4. Behavioral Engagement *

Today, the student followed school rules and behavioral expectations.
Mark only one oval.

- Never
- Occasionally
- Some of the time
- Most of the time
- All of the time