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entitled

Behavioral and Academic Outcomes Following Implementation of a Mindfulness-Based Intervention in an Urban Public School

by

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Submitted to the Graduate Faculty as partial fulfillment of the

requirements for the Master of Arts Degree in Clinical Psychology

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An Abstract of

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The current study aimed to examine whether the implementation of a mindfulness-based intervention in an urban public school led to improvements in student misbehavior, school attendance, and academic achievement. Twenty classrooms (K-8) were randomly assigned to either the intervention group (i.e., MBI group) or waitlist control group (i.e., WLC group). Following random assignment of classrooms to the intervention and waitlist control group, all teachers, students, and parents were invited to participate in the study. Although all randomized classrooms were part of the intervention, not all teachers, students, and parents agreed to take part in the evaluation of the mindfulness program. Of those who did agree to take part in the study, the current analyses included data for 130 students ($n_{MBI} = 81$, $n_{WLC} = 49$) from 19 classrooms ($n_{MBI}=9$, $n_{WLC}=10$) as well as 70 parents ($n_{MBI} = 38$, $n_{WLC} = 32$) who provided data (at one time point or more) speaking to the behavioral functioning of their child.

Baseline study data were collected from all participating students prior to the start of the intervention in the fall of 2017. At the end of the fall semester, post-intervention data were collected from the intervention group, and pre-intervention data were collected

from the waitlist control group. The final phase of data collection took place at the end of the 2018 school year, at which time post-intervention data were collected from the waitlist control group and 4-month follow-up data from the intervention group.

Behavioral and academic functioning were assessed in the current study using multiple reporting sources including school records, teacher report, parent report, and student self-report. Teachers, parents, and students completed the Strengths and Difficulties Questionnaire (SDQ-Teacher/Parent/Youth versions; Goodman, 1997), which includes scales assessing conduct problems, hyperactivity/inattention problems, and peer relationship problems. School records of student absences, grades, standardized test scores, office referrals for misconduct, and suspensions were collected for all participating students.

Contrary to hypotheses, students' behavioral functioning (e.g., rates of office referrals, days suspended, days absent, and parent, teacher, and self-rated conduct problems, hyperactivity-inattention problems, and peer relationship problems) and academic functioning (e.g., standardized test scores and letter grades in Math, Reading, and ELA) were not found to improve to a statistically-significant degree following delivery of the mindfulness-based intervention. Despite absence of statistically-significant improvements, positive changes at the individual-level were captured in statistical analyses. These results and the implications of individual-level improvements are discussed within the context of the sociodemographic and socioeconomic characteristics of the current sample. Suggestions for future evaluations of mindfulness-based interventions are also proposed.

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List of Abbreviations

CS……...Change Score

GS……...Gain Score

MBCT……Mindfulness-Based Cognitive Therapy
MBI……Mindfulness-Based Intervention
MBSR……Mindfulness-Based Stress Reduction

ORM……...Office Referral for Misconduct

WLC……Waitlist Control

Preface

Among the many issues schools are faced with addressing to promote positive student outcomes are chronic student misbehavior and absenteeism. These issues represent significant barriers to the academic achievement and overall success of youth, while also representing factors that place youth at risk for more serious long-term negative outcomes (Darney, Reinke, Herman, Stormont & Ialongo, 2013). Unfortunately, disproportionately high rates of misbehavior and delinquency, school non-attendance, and mental and behavioral health problems are present among minority youth in socioeconomically-disadvantaged communities where, despite the greater need, access to mental health resources tend to be fewer (Kawachi, Daniels, & Robinson, 2005; Reiss, 2013).

In light of empirical evidence demonstrating the adverse impact school problem behavior and absenteeism has on student outcomes (e.g., Gottfried, 2014; Noltemeyer, Ward, & Mcloughlin, 2015), as well as the disparities that exist with respect to accessing and utilizing mental health resources among at-risk youth, schools have become increasingly attentive to the importance of early intervention and the implementation of school-wide measures that may improve student attendance, school engagement, and children's emotional and behavioral functioning. School-based programming that takes a broad approach to ameliorating these risk factors by promoting the development of skills and competencies that are commonly underdeveloped or impaired in at-risk populations likely have the greatest potential for making the most meaningful impact on children's successful development.

Mindfulness-based interventions (MBI) have been implemented with children and adolescents in both clinical (Dimidjian & Segal, 2015) and school settings (Sibinga et al., 2016). Research findings from studies examining treatment outcomes following MBI provide support for their use and their promise for promoting a broader foundation of skills and competencies that tend to be underdeveloped or absent among youth with externalizing disorders (e.g., self-regulation [Flook et al., 2015; Perry-Parrish et al., 2016]; social skills [Schonert-Reichl & Lawlor, 2010]; attentional resources [Black & Fernando, 2014]; and impulsivity [Franco, Amutio, Lopez-Gonzalez, Oriol, & Martinez-Taboada, 2016]). Moreover, previous school-based programs have yielded positive reviews from children and teachers (Felver, Frank, & McEachern, 2014). Such findings may support the utility of school-based mindfulness programming as one potential means for increasing school engagement, while also helping students develop stronger skills for coping with stress (van de Weijer-Bergsma, Langenberg, Brandsma, Oort, & Bögels, 2014), empathy-building, and even improved executive functioning (Schonert-Reichl et al., 2015).

The purpose of the present study was to evaluate the effectiveness of a mindfulness-based intervention for improving behavioral and academic outcomes in a sample of at-risk youth attending an urban public school. Based on previous research, it was expected that training in mindfulness practices would foster students' self-awareness, improve students' stress reactivity, promote positive peer relationships, and reduce aggressive behavior. It was also hoped that mindfulness training would improve school engagement and positive behavioral outcomes by facilitating adaptive coping skills for problem-solving challenges inside and outside of school.

Chapter 1

Introduction and Literature Review

Problem Behavior and Absenteeism

Problem behaviors of childhood present significant challenges for schools, communities, and parents, as well as for the misbehaving children themselves. In urban socioeconomically-disadvantaged communities, children are at particularly high risk for poor emotional and behavioral outcomes (Mendelson, Greenberg, Dariotis, Gould, Rhoades, & Leaf, 2010). In fact, findings indicate that approximately 20-30% of children in economically-disadvantaged communities enter elementary school with externalizing problems (Ritsher et al., 2001), which are also highly comorbid with internalizing problems such as anxiety and depression (Ialongo, Werthamer, Kellam, Brown, Wang, & Lin, 1999). In addition to emotional and behavioral problems, lower socioeconomic status has also been consistently linked with social problems, delinquency (DeCarlo Santiago, Wadsworth, & Stump, 2011), and attention-deficit/hyperactivity disorder (Russell, Ford, Williams, & Russell, 2016), and externalizing problems are reported at disproportionately higher rates among African-American youth compared to Caucasian youth (Martinez et al., 2012). Due to the externally-directed nature of externalizing problems, they also tend to be recognized by adults (i.e., parents, teachers, other caregivers) at higher rates than internalizing problems, leading to greater rates of referrals for mental health services (Neary & Eyberg, 2002).

These early emerging behavior problems represent significant threats to children's current functioning, while also posing serious long-term consequences into adolescence and adulthood (Campbell, Shaw, & Gilliom, 2000; Darney, Reinke, Herman, Stormont,

& Ialongo, 2013; Moffitt, 1993). Among the many correlates and outcomes of misbehavior in elementary school, consistent and strong relationships have been reported between child misbehavior and academic failure, social dysfunction and peer rejection, substance use, and delinquency (Liu, Huang, Kao, & Gau, 2017; Moffitt, 1993; Nelson, Benner, Lane, & Smith, 2004; Patterson, Capaldi, & Bank, 1991; Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2003; Schaeffer, Petras, Ialongo, Masyn, Hubbard, et al., 2006). Such poor outcomes also tend to continue into later adolescence and adulthood, with findings indicating higher school dropout rates, poverty and unemployment, and incarceration among children with externalizing behavior problems (Morgan, Farkas, & Wu, 2009).

Although children with externalizing problems face their own barriers to achieving positive outcomes, they may also be considered barriers themselves when conceptualizing the impact their behavior has on the classroom learning environment for their peers and teachers, as these behaviors impede teachers' efforts in fostering and maintaining an efficient learning environment in the classroom (Sun & Shek, 2012). According to teachers, inattentiveness and daydreaming in class, avoidance of or refusal to engage in school and classroom activities, engaging in behaviors that disrupt class, failure to complete school work and comply with instructions, talking back, acting impulsively or aggressively, fighting with peers, and threatening and bullying classmates all tend to provoke unneeded stress and require significant time and energy to manage in their classroom (Sun & Shek, 2012).

These early problem behaviors tend to escalate over time, with research findings indicating significant decreases in students' academic achievement, school non-

attendance, declines in social functioning, and increased delinquency outside of school (Weerman, Harland, & van der Laan, 2007). These relationships may relate in some degree to corrective measures used by schools that aim to reduce problem behavior, such as in-school and out-of-school suspensions. In the United States, approximately 2.8 million students (K-12) received one or more out of school suspensions; reports further indicate that 1.1 million of those students were of African American descent (U.S. Department of Education, 2016), highlighting the salience of racial disparities in rates of suspension among American youth (Wallace, Goodkind, Wallace, & Bachman, 2008).

Although measures such as suspension are intended to ameliorate problem behavior and promote positive behavior and achievement among misbehaving students, findings from a recent meta-analysis showed that school suspension is inversely related to academic achievement and significantly positively associated with school dropout (Noltemyer, Ward, & Mcloughlin, 2015). Furthermore, negative outcomes associated with rates of suspension have been found to have detrimental outcomes extending beyond the student him or herself, impacting the overall school district with lower academic achievement and standardized test scores observed among schools with higher rates of suspension (Rausch & Skiba, 2004).

Early problem behavior is also associated with higher rates of school non-attendance, a relationship that has been consistently documented even among elementary school children (e.g., McCluskey, Bynum, & Patchin, 2004). This is a wide-spread reality, affecting virtually every school in the nation; according to the U.S. Department of Education's Civil Rights Data Collection survey report (2016), more than 3.8 million elementary school students, or 11% of all elementary school students in the U.S., are

chronically absent from school (i.e., 15 or more absences during an academic year). Moreover, national averages recorded for the 2013-2014 school year indicate that approximately one in seven students missed three weeks or more of school.

Similar to externalizing problems, chronic absenteeism occurs at particularly high rates in socioeconomically-disadvantaged communities, where socioeconomic and psychosocial challenges such as chronic illness, lack of access to school transportation, safety concerns, victimization, and poor psychological health tend to present greater barriers to school attendance (U.S. Department of Education's Civil Rights Data Collection survey, 2016). Furthermore, rates of chronic absenteeism tend to vary by sociodemographic factors such as race, with Black students approximately 36% more likely to be chronically absent compared to White students (Wallace, Goodkind, Wallace, & Bachman, 2008).

Absenteeism has also been found to predict a host of negative outcomes, including poor academic and social outcomes among primary school students (Gottfried, 2014). For example, in a nationally representative sample of kindergarteners during the 2010-2011 school year, Gottfried (2014) examined the impact of chronic absenteeism on achievement and socioemotional outcomes finding reductions in math and reading achievement, as well as overall educational and social engagement as rates of absenteeism increased.

Problem behaviors such as those reviewed in the previous paragraphs pose clear risks to students' long-term academic, social, and overall well-being. In the following paragraphs, specific factors that have been found to be associated with problematic behavior among youth will be discussed, with a particular emphasis on how chronic

stress is believed to contribute to the development and progression of conduct problems in at-risk populations.

Potential Moderators of Problem Behavior Among Youth

Prolonged exposure to stress has been found to place children at risk for a host of maladaptive outcomes, including emotional and behavioral problems, academic failure, and even health problems (Grant, Compas, Thurm, McMahon, Gipson, Campbell, et al., 2006; Takeuchi, Williams, & Adair, 1991). Children in urban communities are at particularly high risk for encountering early life stress, long-term chronic stress, as well as exposure to recurrent trauma (Sibinga, Webb, Ghazarian, & Ellen, 2016), which are strongly compounded by the effects of multigenerational poverty in urban low-income communities, as well as fewer educational and economic resources and opportunities, greater rates of illicit drug use or distribution, and higher rates of community and neighborhood violence. In fact, as one estimate suggests, 50-96% of urban youth have witnessed violence in their community firsthand (Gorman-Smith, Henry, & Tolan, 2004). Thus, chronic stress and the maladaptive outcomes associated with exposure to prolonged stress are particularly salient for minority youth living in socioeconomically-disadvantaged communities with fewer resources (Broderick & Jennings, 2013; Garcia-Coll, Crnic, Lamberty, Wasik, Jenkins, Garcia, et al., 1996).

In addition to the underlying influence of chronic stress, other environmental factors such as parenting behaviors (Pinquart, 2017), neighborhood characteristics (Shaw, Sitnick, Reuben, Dishion, & Wilson, 2016), and social relationships (e.g., peer rejection, deviant peer affiliation [Ettekal & Ladd, 2015]) have been linked to increased risk for the development of problem behavior. Organic factors have also been implicated in child

behavioral problems; these include temperamental characteristics and neurocognitive impairments, such as deficits in executive functioning, impulsivity, inhibitory control (Martel, Nigg, Wong, Fitzgerald, Jester, Puttler, et al., 2007) and effortful control (Olson, Sameroff, Kerr, Lopez, Wellman, 2005).

In the case of temperamental characteristics, research has indicated that self-control plays a significant role in how children navigate challenges they encounter; for example, in academic contexts, children with low self-control have been found to be less successful in school, tend to have more conflict with teachers, and have poorer work habits relative to peers with higher levels of self-control (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009; Rudasill & Rimm-Kaufman, 2009).

Conceptualizing the trajectories through which early conduct problems develop and progress into later phases of life lends clear support for an array of interactions among individual and environmental factors, which may be exacerbated by prolonged exposure to chronic stress. Given that many psychological disorders begin to emerge during childhood and early adolescence (Paus, Keshavan, & Giedd, 2008), this developmental period represents an important window of opportunity for implementing interventions to ameliorate risk for future psychological disorders and associated impairment (Britton, Lepp, Niles, Rocha, Fisher, & Gold, 2014), especially among populations identified as being at particularly high-risk for mental and behavioral health problems.

Intervening on Purported Moderators of Problem Behavior

As discussed previously, exposure to chronic psychosocial stress is associated with increased rates of externalizing problems among youth (Grant, Compas, Thurm,

McMahon, Gipson, Campbell, et al., 2006; Takeuchi, Williams, & Adair, 1991). Research investigating the relationships among chronic stress and psychological and behavioral problems suggests that prolonged exposure to stress overwhelms and depletes children's resources for self-regulation and coping effectively with life challenges over time (Lazarus & Folkman, 1984). Findings in support of this assertion are further bolstered by empirical evidence indicating that better-developed coping skills can buffer the negative effects of chronic stress on such problems (Garcia-Coll et al., 1996; Kilmer, Cowen, Wyman, Work, & Magnus, 1998).

While many of the sources of chronic stress experienced by at-risk populations may not be readily amenable to change (e.g., neighborhood violence, low socioeconomic resources, disparities in access to mental and behavioral healthcare), early interventions that target the maladaptive psychological, affective, and attentional processes associated with chronic stress and externalizing problems among at-risk youth may be within reach. Therefore, targeting deficient self-regulatory skills and resources for coping with chronic stress may serve to ameliorate early problem behavior (Perry-Parrish, Copeland-Linder, Webb, Shields, & Sibinga, 2016).

As described throughout the preceding paragraphs, impulsivity, poor self-regulation of emotions and behavior, inattention, and hyperactivity are just a few of the factors implicated in the expression of externalizing behaviors and other classroom-interfering behaviors (e.g., fighting with peers, refusing instructions, classroom disengagement, etc.). Importantly, mindfulness-based interventions (MBI) have the primary aim of cultivating attention regulation and emotional self-control (Britton et al.,

2014; Marlatt & Kristeller, 1999), lending to their utility for targeting the psychological and attentional processes underlying externalizing problems.

Introduction to Mindfulness-based Interventions

Simply stated, mindfulness is "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn, 1994, p. 22). According to Kabat-Zinn, committing oneself to paying attention in an open way without the added weight of our own likes and dislikes, opinions and prejudices, and expectations, we allow for a greater range of possibilities to unfold, while also allowing ourselves the chance to mindfully respond to the environment rather than unconsciously reacting to it. As such, "it is simply a practical way to be more in touch with the fullness of your being through a systematic process of self-observation, self-inquiry, and mindful action" (Kabat-Zinn, 1994, p. 25).

Mindfulness is considered to be a trainable skill that facilitates one's ability to attend to the present moment "without habitual reaction (i.e., needless emotional, cognitive, or behavioral reactivity) or conceptual exaggeration (i.e., needless elaboration of thought)" (Black & Fernando, 2014, p. 1242). It emphasizes the process of facilitating and enhancing broad, focused, and sustained attention, as well as the skills for switching attention from one stimulus to another, which in turn requires intentional effort. In practice, mindfulness training utilizes simple exercises and techniques that have been shown to enhance children and adolescents' self-awareness and self-regulation of attention, emotion, and behavior (Greenberg & Harris, 2012).

Mindfulness also relies on *foundational attitudes*, which include non-judgment, acceptance, trust, patience, non- striving, curiosity and kindliness (Bishop, Lau, Shapiro,

Carlson, Anderson, Carmody et al., 2004; Kabat- Zinn, 1990; Shapiro, Carlson, Astin, & Freedman, 2006). These attitudes form the basis of mindful awareness, and serve as a common thread throughout the literature describing formal mindfulness practices. For example, an overarching theme of mindful awareness is the emphasis on acceptance of unpleasant experiences over attempts to change them, and this appears to foster insight, learning, and self-regulation skills (Creswell, 2017). In the case of self-regulation, research suggests that the component underlying the effectiveness of mindfulness for facilitating self-regulatory processes and coping in stressful situations is nonjudgmental awareness (Perry-Parrish & Sibinga, 2014).

One of the most well-known and well-studied mindfulness intervention is Mindfulness-based Stress Reduction (MBSR; Kabat-Zinn, 1982, 1990). The focus of the MBSR program is learning mindful awareness of bodily sensations using techniques such as body scans, stretching, and yoga. MBSR also translates these practices for more effective application to daily life and dealing with stress. The MBSR curriculum is delivered over the course of 8 weeks, with weekly group-based classes, daily audio-guided home practices, and a full-day mindfulness retreat.

The structure of the MBSR program has been adopted in the development of other mindfulness-based interventions targeting specific populations or problems; for example, Mindfulness-based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2012) combines elements of MBSR and Cognitive Behavior Therapy (CBT), and was originally developed for use in relapse prevention of depression.

Both MBSR and MBCT are experiential learning programs that share a common structure (e.g., weekly group sessions, home practice) and core curriculum of

mindfulness practices (e.g., body scan, movement, sitting, and walking meditations; Burke, 2010). Although MBSR and MBCT were originally developed for use in adult populations, researchers have adapted the curriculums of MBSR and MBCT for use in child and adolescent populations. For example, the MBSR protocol has been adapted for use with teens (MBSR-T; Biegel, 2009) and children (MBSR-C; Saltzman & Goldin, 2008), and MBCT exists in its adapted form for use with children (MBCT-C; Semple & Lee, 2011).

In their adaption to the original Mindfulness-based Stress Reduction (Kabat-Zinn, 1982, 1990) curriculum, Saltzman and Goldin (2008) present an outline of how the intervention is translated for use in schools with child and adolescent populations. The authors propose that the intention of the course is to provide children an opportunity to learn and practice the art of using mindfulness in their daily lives when encountering challenges, with the goal of learning to *respond rather than react* to negative events. The MBSR program for school children follows an 8-session in-class intervention that can be offered to children only or children and parents together, with class sizes of 8 to 30 participants. In addition to the in-class curriculum, participants are encouraged to engage in home practice. Additional in-class exercises targeting enhanced mindful awareness, artistic expression, and verbal communication are also incorporated into the curriculum (Saltzman & Goldin, 2008, p. 143).

School-based mindfulness program curriculums incorporate many of the formal and informal practices included in the MBSR curriculum. For example, as described by Saltzman and Goldin (2008), curriculums often include training in formal practices including body scan, sitting, eating, and walking exercises, as well as the informal

practices involving orienting children to skills for focusing attention, attending to the present moment, and choosing responses to everyday events. In addition to these techniques, yoga practices (Khalsa, Hickey-Schultz, Cohen, Steiner, & Cope, 2012) and tai-chi (Wall, 2005) are two additional practices that have been incorporated into school-based mindfulness interventions.

Overall, researchers have found strong evidence supporting the benefits of incorporating mindfulness based interventions and stress reduction programming in school curriculums. For example, positive changes in school/behavioral functioning have been observed among students following participation in MBIs, including improvements in cognitive and academic performance, concentration, executive functioning and conduct problems (Flook et al., 2010; Kiselica, Baker, Thomas, & Reedy, 1994; Napoli, 2002; Napoli, Krech, & Holley, 2005; Shapiro, Oman, Thoresen, Plante, & Flinders, 2008).

Notable improvements have also been reported for other internally-relevant outcomes associated with externalizing problems, such as improvements in students' self-awareness and impulse control, reductions in levels of emotional reactivity to challenges (Flook et al., 2010; Thompson & Gauntlett-Gilbert, 2008; Rempel, 2012), and improvements in students' perceived ability for managing academic stress (Shapiro et al., 2008). The following section provides a more extensive review of the research findings of studies investigating the effectiveness of school-based mindfulness interventions with youth; see Table 1 for information on individual studies and their respective MBI components.

Outcomes following mindfulness-based intervention in schools

Stress reduction. In reviewing the empirical evidence supporting the utility of mindfulness-based school programs, outcomes related to stress reduction present as a promising place to start. Student misconduct and other negative school behaviors are highly associated with greater levels of psychosocial stress among youth (e.g., poverty, domestic violence, family breakdown, media violence, etc.) and the impact of stress on emotional and behavioral outcomes varies as a function of how effectively children are able to cope with the daily stressors to which they are exposed (Barnes, Bauza, & Treiber, 2003; Grant, Compas, Thurm, McMahon, Gipson, Campbell, et al., 2006; Takeuchi, Williams, & Adair, 1991). Furthermore, training in mindfulness is believed to exert positive effects for coping with stress by improving children's ability for observing thoughts and emotions non-judgmentally without reacting impulsively, and being able to approach stressful situations as challenges rather than threats (Kabat-Zinn, 1994).

School-based mindfulness interventions have shown promising outcomes for improving stress management skills among youth, primarily as a function of improving self-regulatory competencies, affect, and emotional development (Mendelson et al., 2010). Among urban youth exposed to chronic stress, Sibinga, Webb, Ghazarian, and Ellen (2016) found significant reductions (pre-to-post-intervention) in self-rated negative affect, negative coping, rumination, self-hostility, and post-traumatic symptom severity following implementation of an adapted version of MBSR, relative to youth in a health education control group. Similarly, Mendelson and colleagues (2010) observed significant improvements among students' responses to stress following a yoga-based

mindfulness intervention, including lower levels of rumination, intrusive thoughts, and stress-invoked emotional arousal.

Externalizing behavioral outcomes. Accumulating research findings have supported the use of school-based mindfulness interventions for targeting externalizing problems among students. In fact, research findings such as those reported by Franco, Amutio, Lopez-Gonzalez, Oriol, and Martinez-Taboada (2016) indicate that mindfulness training leads to quite large reductions in symptoms of impulsivity and aggressiveness, with effect sizes for pre-to-post assessments of impulsivity and aggressiveness that range from $d = .67$ to 1.16.

Mindfulness-based interventions have also been shown to improve school attendance, rates of behavior infractions, and suspensions among participating students. Barnes, Bauza, & Treiber (2003) used school records as outcome measures, finding that the meditation group (transcendental meditation intervention) showed a mean decrease of 6.4 absentee periods compared to an increase of 4.8 in the control group ($p < .05$), a mean decrease of 0.1 infractions over the four months compared to an increase of 0.3 in the control group ($p < .03$), and a mean reduction of 0.3 suspension days due to behavior-related problems in the meditation group compared to an increase of 1.2 in the control group ($p < .04$).

Evidence for the utility of MBI in reducing externalizing problems is also supported by significant reductions in pre-to-post-intervention ratings of behavior problems from a range of informant reporting sources, including caregivers (e.g., Fung, Guo, Jin, Bear, & Lau, 2016) and teachers (Black & Fernando, 2014). In their field intervention trial of the Mindful Schools program, Black and Fernando (2014) found

improvements among teacher-reported indices of student behavioral functioning, including attention, self-control, and prosocial behavior and these were maintained at the 7-week post-assessment.

In addition to the findings from studies examining MBIs with non-clinical samples of school students, research studies examining mindfulness-based relaxation techniques have shown similar effects on problem behavior with selected samples of children and adolescents with observed externalizing problems. For example, Redfering and Bowman (1981) found significant reductions in non-attending or off-task behavior among students placed in a self-contained classroom for "emotional disturbances" following training in the use of a meditative-relaxation technique. Importantly, in addition to finding significant increases in attending behaviors, children in the meditation group also self-reported that they experienced an increased sense of internal control.

Research examining outcomes following the Meditation on the Soles of the Feet program have also demonstrated significant reductions in aggressive behavior among adolescents identified as having serious aggression problems (Singh et al., 2007). These reductions in aggressive behavior were maintained at the one-year follow up assessment, as were youths' ratings of feeling more relaxed, better able to control their impulses, and more focused. Felver, Frank, and McEachern (2014) found similar outcomes in their evaluation of the Soles of the Feet Program with children identified as having disruptive behavior problems. Interestingly, the program corresponded to significant decreases in off-task behaviors as well as enhanced school engagement.

In addition to changes in behavioral functioning, cognitive and attentional deficits implicated in attention-deficit/hyperactivity disorder (ADHD) have also been found to

improve following mindfulness-based intervention. Several specific MBI programs have been examined in samples of youth with ADHD; for example, Zylowska and colleagues (2008) evaluated the Mindfulness Awareness Practices program (MAP) for ADHD, finding improvements in attention and cognitive symptoms following treatment using both self-report and performance-based measures of ADHD symptoms. In another RCT, Napoli, Krech, and Holley (2005) evaluated the Attention Academy Program (AAP) intervention, finding significant improvements in post-intervention measures of teacher-reported social skills and attention, and performance-based measures of selective visual attention (all *p*-values < .001). Effect sizes for outcome measures ranged from *d* = .39 - .60.

Socio-emotional outcomes. Youth with externalizing problems also commonly suffer social impairments and deficits in social competence (Hoza, 2007; Melnick & Hinshaw, 2000). These difficulties have also been shown to improve as a result of engagement in mindfulness training. According to Kabat-Zinn (1994), mindfulness training elicits a greater sense of trust and closeness to peers and other social relationships. School-based mindfulness intervention research suggests that mindfulness training contributes to healthy character development, as evidenced by greater creativity, prosocial behavior, better psychological health, and healthier peer relationships (Rempel, 2012). Moreover, significant increases in socially competent behaviors of students, as well as improvements in peer relationships and interpersonal skills, optimism, self-confidence, and self-esteem have been reported (Fisher, 2006; Schonert-Reichl & Lawlor, 2010).

Following the implementation of a social and emotional learning (SEL) program (mindfulness + empathy training), Schonert-Reichl and colleagues (2015) found that relative to children in a social responsibility program control group (i.e., no mindfulness component), children in the SEL group had higher scores on indices of empathy, perspective-taking, emotional control, optimism, school self-concept, and mindfulness, as well as lower self-rated symptoms of depression. Moreover, peers rated children in the SEL group as more prosocial, less aggressive, and more popular/accepted relative to students in the control group.

Flook, Goldberg, Pinger & Davidson (2015) found similar results following implementation of a mindfulness-based prosocial skills training program that aims to cultivate attention, emotion regulation, and kindness practices (e.g., empathy, sharing, gratitude). Preschoolers who underwent training in the Kindness Curriculum (KC) program were found to show greater improvements in social competence and received better grades in domains of learning, health, and social-emotional development, whereas students in the control group showed greater rates of selfish behavior over time.

Table 1

Review of Mindfulness-Based Intervention Research: Study Design, MBI Characteristics, and Outcomes

Author (Year)	Design	N	Sample	Control	Intervention	Key Components	Primary Outcomes	Primary Results
Barnes et al., 2003	RCT	45	Student sample African-American youth 15-18 YOA	Health Education Control (*n*=20)	16-week Transcendental Meditation (TM) Program 5x/week 15-min. in-class sessions Intensity = 75	Meditation	School records: absenteeism, school rule infractions, suspension days	Decreases in absences ($p<.05$), rule infractions ($p<.03$), suspension days ($p<.04$). All outcomes decreased for meditation group, and increased for control group
Black & Fernando, 2014	Field Study	409	K-6th grade, urban sample 95.7% ethnic minority	No control group	5-week Mindful Schools Curriculum: 3x/wk, 15-min sessions Intensity = 45	Mindful bodies, breathing, listening, walking, eating, etc.	TR: classroom behavior, attention, self-control, empathy, etc.	Effect sizes for each outcome ranged from Cohen's $d = 0.25$ to 0.50

Author (Year)	Design	N	Sample	Control	Intervention	Key Components	Primary Outcomes	Primary Results
Britton et al., 2014	RCT	100	Student sample, 6th graders (*Mage* = 11.79)	Active control condition (*n*=48)	6-week Teacher-led meditation modules 5x/week, 10-min/sessions Intensity = 50	Breath awareness, awareness of thoughts, feelings, and sensations, and body sweeps	SR: externalizing, internalizing, negative emotionality	Both groups: comparable decreases in internalizing, externalizing, and attention problems (all *d*s >0.80); difference in magnitude NS
Felver, Frank, & McEachern (2014)	EXP	3	Student sample, 8-year-olds with externalizing problems	No control group	1-week Meditation on the Soles of the Feet Program 5-sessions, 25 min each Intensity=125	Meditative-relaxation/ breathing	TR, SR, and observer ratings: disruptive behavior	Unweighted average of all study effects, g (SE) = 1.43 (0.37)[a]
Flook, Goldberg, Pinger & Davidson, 2015	RCT	68	Preschool sample (M_{age} = 4.67) 58.8% White	WLC (*n*=37)	12-week Kindness Curriculum (KC) 2x/week, 30 min training sessions Intensity = 60	Mindfulness practice and kindness practices (e.g., empathy, gratitude, sharing)	TR, SR, school records, performance: academic achievement, social competence, prosocial behavior, physical health	Approach to learning (*d*=0.54), health (*d*=0.56), social/ emotional (*d*=0.97) improved cognition and language NS; TR social competence (total): *d*=0.26

Author (Year)	Design	N	Sample	Control	Intervention	Key Components	Primary Outcomes	Primary Results
Franco et al., 2016	RCT	27	High schoolers 12-19 YOA (M_{age}=15.85 (SD=2.38)	WLC (*n*=14)	10-week mindfulness psycheducation program (1x/week, 15 min) Intensity = 15	"Meditacion Fluir" technique of letting go of the need to control thoughts, feelings, and sensations	SR: impulsivity, aggressiveness	pre-post changes in Impulsivity *d*=1.16, Aggression: Physical *d* =0.80, Verbal *d*=0.995, Hostility *d*=1.03, Anger *d*=0.67
Fung, Guo, Jin, Bear, & Lau, 2016	RCT	19	Clinical school sample screened for depression Grades 7th-8th Latin- and Asian-American	Delayed Treatment Group (*n*=10)	12-week Learning to BREATHE (L2B; Broderick, 2013) (60-minute sessions 1x/week) Intensity = 60	Body awareness, integrating awareness of thoughts, feelings bodily sensations, reducing harmful self-judgments, and integrating mindful awareness into daily life	SR, PR: internalizing, externalizing, emotion regulation	Pre-Post changes (Immediate vs. Delayed Treatment Groups): Parent report of child externalizing problems, p <.05, η_p^2=.29

Author (Year)	Design	N	Sample	Control	Intervention	Key Components	Primary Outcomes	Primary Results
Mendelson et al., 2010	RCT	97	Urban student sample, 4th – 5th grade students 60.8% Female, 83% African-American	WLC (*n*=46)	12-week mindfulness and yoga (45-minute sessions, 4x/week) Intensity=180	Yoga-based physical activity, breathing techniques, and guided mindfulness practices	SR: involuntary stress responses, internalizing, social adjustment	ES range: 0.51 to 0.83 for outcomes of Involuntary Engagement. Emotional arousal rumination, intrusive thoughts
Napoli et al., 2005	RCT	228	Non-clinical student sample, 1st – 3rd grade	No-AAP Control Group (n=114)	Attention Academy Program (AAP) intervention (12 bi-monthly AAP training sessions, 45-min each) Intensity=5.19	Sitting and walking exercises, body scan meditations, relaxation exercises, breathing exercises	TR, SR, performance measures: behavior, attention, social skills, anxiety	Cohen's d = .39 – .60
Redfering & Bowman, 1981	EXP	18	School sample, 8-11 YOA with behavioral disturbances	20-Minute Rest Condition (*n*=9)	Benson's (1975) Relaxation Technique 20-min, 5 sessions Intensity=100	Meditative-relaxation	Observer ratings: externalizing behavior	$p < .001$ (pre-post non-attending behaviors; meditation versus control)

Author (Year)	Design	N	Sample	Control	Intervention	Key Components	Primary Outcomes	Primary Results
Schonert-Reichl et al., 2015	RCT	99	Elementary school students, 4th and 5th grades ($M_{age,}$ 44% female)	Social responsibility program (n=51; MindUP without mindfulness)	12-week Social and Emotional Learning Program (SEL) – "MindUP" 12 lessons, 1x/week (50 min each) Intensity=50	Mindfulness + empathy training	SR, Peer report, performance, grades: executive functioning, stress levels, SR well-being, peer-reported prosocial behavior and acceptance, math grades	Pre-post between-group differences: empathy d=.42, emotional control d=.59, school self-concept d=.50, mindfulness d=.55; peer-rated outcomes ranged from d=.42 to .87
Sibinga et al., 2015	RCT	300	Non-clinical urban school sample 5th – 8th graders (M_{age}=12.0) 99.7% African American 50.7% Female	Health education program (n=141)	12-week Adapted MBSR program Intensity not computed (duration and number of weekly sessions not reported)	Not Reported	SR: aggression, mood and emotion regulation, stress, coping, internalizing problems	Post-program intervention versus control group changes on all outcomes, p's< .05

Author (Year)	Design	N	Sample	Control	Intervention	Key Components	Primary Outcomes	Primary Results
Singh et al., 2007	EXP	3	School sample of adolescents with conduct disorder (M_{age} = 13.3)	No control group	4-week Meditation on the Soles of the Feet Program (3x/week, 15 minute sessions) Intensity=45	Meditative-relaxation/ breathing	School records, observation: conduct problems and aggression (not analyzed for each participant)	N/A – findings not reported consistently for each participant and outcome.
Zylowska et al., 2008	Pre-Post	32	Adults and adolescents with ADHD (15YOA+)	No control group	8-week Mindfulness Awareness Practices (MAP) program for ADHD 2.5 hr sessions 1x/week + home practice Intensity=150	Sitting and walking meditation, psychoed-ucation on ADHD, loving-kindness meditation	Self-report, performance measures: ADHD symptoms (inattention, hyperactivity, combined), cognitive functioning	Pre-post changes in ADHD symptoms all $p<.05$

Note: RCT = Randomized Controlled Trial, EXP = Experimental Design, Pre-Post = non-controlled design, SR = Self-Report, PR = Parent Report, TR = Teacher Report, NS = Non-Significant, WLC = waitlist control, MBSR = Mindfulness-based Stress Reduction; ADHD = Attention Deficit Hyperactivity Disorder. [a] Effect size reported in Klingbeil et al., 2017.
Intensity of intervention calculated as total minutes in program divided by number of weeks).

Why Teach Mindfulness in Schools?

The findings presented throughout the previous sections speak to the promise of mindfulness-based programs for addressing a wide range of student problem behaviors, both internalizing and externalizing, as well as promoting and improving levels of overall wellbeing among students (Huppert & Johnson, 2010; Semple, Lee, Rosa, & Miller, 2010). With the accumulating evidence base supporting the effectiveness of MBI, interventions that incorporate mindfulness into school curriculums have gained increasing attention from intervention and prevention researchers and school administrators. This is largely due to the nature of MBI, as incorporating mindfulness training within the school context has the potential for promoting the development and utilization of broadly applicable and long-lasting skills that may impact students' performance both within and outside of school contexts (Napoli et al., 2005; Rempel, 2012).

Mindfulness-based interventions are also attractive to schools because of their relative feasibility and ease of incorporating the intervention into the school curriculum. The issue of feasibility is particularly important given the pervasiveness of constraints faced by schools that wish to provide their students with needed psychosocial support through the adoption (and maintenance) of evidence-based interventions. These constraints are even greater for schools in disadvantaged communities where at-risk populations with the greatest need for supportive resources exist. Investigations of the feasibility of MBIs have found that MBI programs are a relatively cost-effective method of improving and promoting children's socio-emotional, cognitive, and academic development (Flook et al., 2010).

A related benefit of incorporating MBI programs in schools serving disadvantaged communities relates to disparities in access to mental and behavioral healthcare in at-risk populations. In light of evidence demonstrating the adverse outcomes associated with exposure to chronic stress and poverty, at-risk youth and their families represent a subset of the population with an elevated need for access to mental health resources, while also reflecting a demographic with some of the lowest rates of mental healthcare utilization (Reiss, 2013). Therefore, implementing mindfulness-based interventions in the school may provide one means through which this disparity in access to and utilization of mental health resources is addressed.

Although many of the factors and characteristics that place individuals at-risk are not readily amenable to change (e.g., poverty, neighborhood violence, chronic socioeconomic and psychosocial stress), school-based interventions may be most effective by providing a broad means through which children may learn more effective strategies and skills to effectively cope with and problem solve through challenges they experience in life. Such an intervention may aim to address larger-scale problems such as chronic absenteeism, peer victimization and bullying, self-esteem, emotional and behavioral disturbances, and student academic and social competence by addressing potential underlying mechanisms contributing to these problems, such as school climate, student engagement, and resiliency, teaching skills for problem solving, coping with stress and adversity, and cognitive-based skills related to attentional capacities, emotion regulation, and behavioral competence (Aldridge & McChesney, 2018; Oldfield, Stevenson, Ortiz, & Haley, 2018).

Limitations of Previous Research on Mindfulness-Based Interventions in Schools

Results of previous research investigating school-based mindfulness interventions have yielded promising evidence in support of MBI as a potentially effective means through which student behavioral concerns and overall student mental health and wellbeing may be addressed. However, a large portion of the literature base consists of studies with small sample sizes - up to 60% of which include less than 50 participants (Black and Fernando, 2014) – and little advancement has been made in replicating findings in larger studies with socioeconomically and ethically-diverse samples. Therefore, an ongoing consensus in the literature on mindfulness-based interventions for school children is that more research utilizing larger and more diverse samples with stronger research design and methodology are needed in order to speak to the efficacy of mindfulness for improving student outcomes both in the short-term and long-term (e.g., Black & Fernando, 2014).

The Present Study

The present study was conducted to evaluate the effectiveness of a mindfulness-based intervention for improving behavioral and academic outcomes in a sample of at-risk youth attending an urban public elementary school. Given the limitations of previous studies in the literature (e.g., small, non-diverse samples; lack of experimental control group, etc.), the current study utilized a randomized-controlled, multi-time point design to examine outcomes across phases of intervention delivery in a sample of youth from low-income and majority minority demographics.

The MBI curriculum was implemented as a non-elective course that was integrated into students' academic schedules. This intervention was anticipated, based on

previous research findings, to enact positive changes in domains of self-awareness, stress reactivity, prosocial behavior, and emotional and behavioral functioning. The focus of the current study was on outcomes related specifically to school functioning and problem behavior; as such, in accordance with the findings of previous research, it was anticipated that the intervention would produce positive changes in conduct problems, symptoms of hyperactivity and inattention, rates of office referrals for misconduct, rates of suspensions, and rates of school non-attendance.

This study utilized a multi-methodological design for measuring problem behavior, incorporating school records of student misconduct and discipline outcomes (e.g., office referrals for misconduct, suspensions, and absenteeism) as well as teachers', parents', and students' self-report on indices of behavioral functioning (i.e., conduct problems, hyperactivity/inattention, and peer relationship problems). These reports were obtained from each informant using parallel versions of the Strengths and Difficulties Questionnaire (SDQ), which is a well-validated and normed measure of child and adolescent emotional and behavioral functioning. These data were collected at three time points: pre-intervention, immediately post-intervention, and 4-months post-intervention.

In addition to measuring problem behavior using objective rating scales from multiple informants and school records, the current study also incorporated school records of academic achievement. Students' grades in Math, Reading, and English/Language Arts (ELA) were obtained for each student at the end of each academic quarter; standardized test scores were also obtained for each student across three testing sessions (i.e., beginning of the academic year [fall], mid-year [winter], and end of year [spring]).

Aims and Hypotheses

Aim 1. To examine school-level behavioral and academic outcomes following delivery of the mindfulness-based intervention to students.

Hypothesis 1. Rates of office referrals for misconduct, days suspended, and days absent were expected to decrease as a function of participation in the intervention. Over the course of the active intervention period for students in the MBI group, rates of each infraction type are expected to be significantly lower compared to students in the WLC group and these improvements are expected to be maintained through the 4-month follow up. Among students in the WLC group, rates of each infraction accrued during the pre-intervention period were expected to be significantly higher compared to rates observed at post-intervention.

Hypothesis 2. Participation in the mindfulness intervention was expected to enact positive changes in students' academic achievement, as measured by letter grades in Math, Reading, and ELA. Between-groups differences were expected in comparisons of final post-intervention grades for the MBI group and WLC group, with improvements favoring the MBI group; these improvements were expected to be maintained at the end of the four-month-follow-up period. Pre- to post-intervention grade assignments in the WLC group were anticipated to improve following delivery of the intervention in the spring.

Hypothesis 3. Standardized test scores (Math and Reading) were anticipated to improve across the three testing sessions (i.e., fall, winter, spring) as a function of participation in the mindfulness intervention. While both groups were expected to show improvements across the testing sessions (e.g., pre-intervention scores versus

post-intervention and 4-month follow-up scores), the magnitude of improvement was expected to be significantly greater among students in the MBI group compared to WLC; test scores obtained at the second/mid-year testing session were expected to be significantly higher in the MBI group compared to the WLC group; a significant improvement in test scores was expected for students in the WLC group following delivery of the intervention in the spring (i.e., scores from the final testing session were expected to be significantly better than those scores received at the baseline and mid-year testing session).

Aim 2. To examine whether participation in the mindfulness intervention leads to positive changes in students' behavior, as measured by parent, teacher, and students' self-report on the Strengths and Difficulties Questionnaire.

Hypothesis 4. Positive changes in ratings of students' conduct problems, hyperactivity/inattention, and peer relationship problems were expected to occur as a function of participation in the intervention. Thus, significant within-group differences from pre- to post-intervention for the MBI group were expected, and these changes were anticipated to be maintained through the 4-month follow-up assessment. Within-group differences between baseline and pre-intervention scores were not expected to occur in the WLC group. However, following intervention in the spring, within-groups differences (reflecting improvements in behavior problems and problems with peers) were expected to occur in comparisons of the WLC group's pre- to post-intervention scores on the SDQ.

Chapter 2

Methods

Participants

The current study took place at an urban public school in Toledo, Ohio. Teachers and all children (K – 8th grade) enrolled at the school during the 2017-2018 academic year were invited to participate in the study. Parents of each student were also invited to participate in the study by completing self-report measures about their child and themselves. All students, regardless of participation in the evaluation of the program received the mindfulness intervention. A total of 20 teachers (4 males, 16 females), 109 parents/caregivers, and 146 children completed the informed consent and assent procedures.

Prior to contacting parents for the informed consent process, kindergarten through 8th grade classrooms and teachers were randomly assigned to receive the mindfulness intervention in the fall semester or the spring semester during academic year 2017-2018. Following randomization, blanket-recruitment/consenting procedures were employed starting at the beginning of the year. Study researchers (i.e., Principal Investigator and graduate research assistants) visited Robinson Elementary School on several occasions to complete the informed consent process with parents of students in all classes (i.e., regardless of group). During these visits, some parents chose to complete the baseline/pre-intervention questionnaires in-person, while others completed the forms later and sent them back to the school with their child. Counts and proportions of consented and non-consented students per class are presented in Table 2.

Table 2

Proportion Consented by Class for Intervention and Waitlist Control Groups

Grade	Total Students (N)	Consented (n)	No Consent (n)	Proportion Consented
Intervention Group	189	94	95	0.50
K	20	17	3	0.85
1	11	9	2	0.82
2	28	16	12	0.57
4	29	13	16	0.45
5	23	9	14	0.39
6	27	7	20	0.26
7	15	6	9	0.4
8	15	3	12	0.2
ED 1-3	9	9	0	1.0
ED 6-8	12	5	7	0.42
WLC Group	148	52	96	0.35
K	22	12	10	0.55
1	10	6	4	0.6
3	30	9	21	0.3
7	19	5	14	0.26
8	16	6	10	0.38
ED 4-6	9	0	9	0.00
MD 3-5	8	3	5	0.38
CCSE 1-3	11	2	9	0.18
CCSE 5-7	11	7	4	0.64
CCSE 7-8	12	2	10	0.17
Study Total	337	146	191	0.43

Note. Data from nine consented 5th grade students in the MBI group were excluded from analyses due to non-comparability in delivery of intervention (received 1 - 30-minute session per week compared to 2 - 30 minute sessions per week delivered to all other classes). ED = Emotionally Disturbed, MD = Multiple Disabilities, CCSE = Cross Categorical Special Education.

Due to scheduling constraints, one classroom was delivered a lesser dosage of the intervention (i.e., 30-min session once per week versus 30-minute session twice per week). This class was later folded into the spring intervention with the WLC group. To maintain comparability of the dosage delivered across the MBI and WLC groups, data from this classroom was excluded from the current analyses testing the effectiveness of the MBI in reducing problem behavior and promoting academic achievement. Therefore, for the purposes of the present study, the MBI group was comprised of 9 classrooms and the WLC group included 10 classrooms. Table 3 presents counts and proportions of total consented students in each class and group included in the final sample for the current study.

Table 4 presents additional descriptive information for the sample, including demographic characteristics. Overall, the final sample included a total of 130 students ($N_{MBI} = 81$, $N_{WLC} = 49$). The total sample of consented students used in the present analyses had a mean age of 9.09 (*SD* = 2.83), was primarily African American (*N* = 110, 84.6%), and was approximately equal with regard to student gender (50.8% male). The majority of consented students (*n* = 102) were enrolled in mainstream classes (78.5%); the remaining sample of consented students were receiving specialized education in classes for Emotional Disturbances (*n* = 14, 10.8%), Multiple Disability (*n* = 3, 2.3%), or Cross-Categorical Special Education (*n* =11, 8.5%).

Table 3

Inclusion/Exclusion Counts for Consented Students in MBI and WLC groups

Grade	Consented (n)	Excluded (n)	Included (n)	Proportion Included
Intervention Group	94	13	81	0.86
K	17	2	15	0.88
1	9	0	9	1.00
2	16	0	16	1.00
4	13	2	11	0.85
5	9	9	0	0.00
6	7	0	7	1.00
7	6	0	6	1.00
8	3	0	3	1.00
ED 1-3	9	0	9	1.00
ED 6-8	5	0	5	1.00
Control Group	52	3	49	0.94
K	12	2	10	0.83
1	6	0	6	1.00
3	9	1	8	0.89
7	5	0	5	1.00
8	6	0	6	1.00
ED 4-6	0	0	0	0.00
MD 3-5	3	0	3	1.00
CCSE 1-3	2	0	2	1.00
CCSE 5-7	7	0	7	1.00
CCSE 7-8	2	0	2	1.00
Study Total	146	16	130	0.89

Note: Reasons for exclusion of data are as follows: MBI, Grade K: 2 students moved schools during intervention period; no post-data available. MBI, Grade 4: 2 students moved schools during intervention period; no post-data available. MBI, Grade 5: Data from nine consented 5th grade students in the MBI group were excluded from analyses due to non-comparability in delivery of intervention (received 1 - 30-minute session per week compared to 2 - 30 minute sessions per week delivered to all other classes). WLC, Grade K: 2 students moved prior to intervention period; no pre- or post-data available. MBI, Grade 3: 1 student moved prior to intervention period; no pre- or post-data available. WLC, Grade ED 4-6: Inclusion rate is 0 due to no consent response. ED = Emotionally Disturbed, MD = Multiple Disabilities, CCSE = Cross Categorical Special Education.

Table 4

Descriptive Statistics and Sample Characteristics for Final Sample

	Intervention (n = 81)	Control (n = 49)	Total (N = 130)
Age (M, [SD])	8.87 (2.67)	9.44 (3.07)	9.09 (2.83)
Race (n, group%)			
African American	70 (86.4%)	40 (81.6%)	110 (84.6%)
White	6 (7.4%)	4 (8.2%)	10 (7.7%)
Multi-Racial	5 (6.2%)	5 (10.2%)	10 (7.7%)
Gender (n, %)			
Male	44 (54.3%)	22 (44.9%)	66 (50.8%)
Female	37 (45.7%)	27 (55.1%)	64 (49.2%)
Grade (n, %)			
Kindergarten	15 (18.5%)	10 (20.4%)	25 (19.2%)
First	11 (13.6%)	6 (12.2%)	17 (13.1%)
Second	20 (24.7%)	1 (2.0%)	21 (16.2%)
Third	3 (3.7%)	9 (18.4%)	12 (9.2%)
Fourth	11 (13.6%)	0 (-)	11 (8.5%)
Fifth	0 (-)	5 (10.2%)	5 (3.8%)
Sixth	8 (9.9%)	5 (10.2%)	13 (10.0%)
Seventh	8 (9.9%)	6 (12.2%)	14 (10.8%)
Eighth	5 (6.2%)	7 (14.3%)	12 (9.2%)

Note. Descriptive information on grade level in the current table is cumulative and is not divided based on students' enrollment in mainstream/ED/MD/CCSE; i.e., each non-mainstream classroom is comprised of multiple grade levels, and thus, demographics for all consented students are reflected in the above statistics. See Table 3 for information on sample Grade x Group x Class Type.

Procedures

At the beginning of the fall semester, researchers visited the school each day for one week to collect pre-intervention (i.e., MBI group) and baseline (i.e., WLC group) self-report measures from all students. Following completion of the pre-intervention testing, the intervention was delivered to students in the MBI group. With the exception of the 5th grade class who received a lesser-dose of the intervention (i.e., 30-minutes 1-day per week), all classes convened two-days per week for 30-minute periods. During the last week of the fall semester prior to winter break, students met with research staff to complete the post-intervention assessments. At the start of spring semester, researchers returned to the school to collect pre-intervention self-report measures from students in the WLC group. Following completion of the pre-intervention data collection, the intervention was delivered to students in the WLC group. See Figure 2.1 for a flow chart of study procedures.

Overall, students in the WLC group completed self-report assessments at baseline (i.e., concurrently collected with MBI group's pre-intervention testing at the start of the academic year), pre-intervention (i.e., second baseline) prior to beginning the intervention at semester 2, and post-intervention (i.e., concurrently collected with the MBI group's 4-month follow-up assessment). These data collection time points apply to all reporting sources (i.e., student self-report measures, parent report, and teacher report. For example, parents and teachers of students in the MBI group were asked to participate in the pre-intervention assessment in the fall, the post-intervention assessment in December, and the 4-month follow-up assessment at the end of the school year. Parent measures were sent home with students at each time point with instructions for parents to complete and return

to the school with their child. Accordingly, teachers completed the SDQ for each participating child in their class from a secure online data collection survey system at each time point.

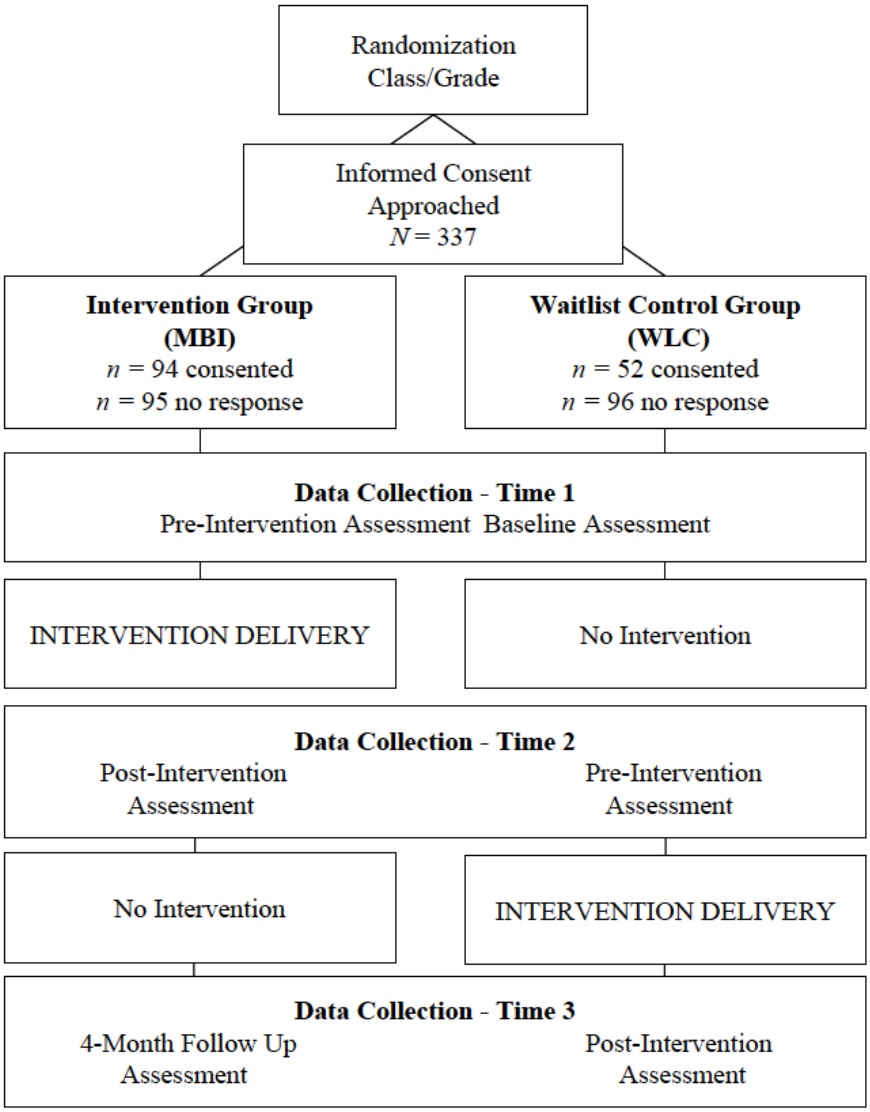

Figure 1. Study design and procedure flow chart showing progression of randomization, recruitment and informed consent, data collection, and intervention delivery.

Measures

School records of student behavior and academic achievement. School records pertaining to student absences, days suspended (e.g., in-school and out-of-school), and office referrals for misconduct for the 2017-2018 school year were collected for each participating student. Rates of office referrals, days suspended, and days absent were separated and examined based on frequencies observed over the fall semester (i.e., 1st day of school to winter break) and the spring semester (i.e., return to school in January to last day of school in May). Categories of discipline events included disorderly conduct, failure to follow directions, fighting, profanity, physical assault, possession of non-firearm weapon, repeated violations, and "other good and just cause".

Data speaking to students' academic achievement and functioning were collected from the school for each participating student. Letter grades (A-F) were collected on students' achievement in three core academic classes: Math, Reading, and English/Language Arts (ELA). Course letter grades were obtained at the end of each academic quarter of the 2017-2018 year.

Standardized test scores were also collected for each student. The Measures of Academic Progress (MAP) tests are computer-based interim assessments completed by all Ohio students at three time points: the start of the academic year (i.e., fall 2017), the end of the first semester (winter 2017), and the end of the academic year (i.e., spring 2018). MAP tests provide a measure of student achievement from kindergarten to 12th grade, in domains of reading, math, language usage, and science. The current study collected fall, winter, and spring MAP Reading and Math test scores for all students for whom scores were available. Specifically, MAP Reading scores were available for all

consented students in grades K-8 while Math scores were available for students grades 2 through 8 (i.e., Kindergarteners and first graders did not complete this portion of the exam).

Informant and self-reports of student behavior. Parallel versions of the *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 1997) were completed by children about their own behavior, as well as by teachers and parents about each child to evaluate behavioral outcomes pertaining to students' school conduct and interpersonal functioning. Scales of the SDQ used in the current study include the Conduct Problems, Hyperactivity-Inattention, and Peer Relationship Problems scales. The SDQ is a 25-item questionnaire that has been well-validated and deemed reliable in the assessment of child psychopathology and prosocial behavior (Goodman, 2001). Moreover, internal consistency across parent, teacher, and self-report versions of the measure is good (mean Cronbach $\alpha = .73$), with a mean cross-informant correlation of .34.

Mindfulness Intervention Curriculum

Development of the mindfulness-based intervention curriculum was informed by core practices outlined in Mindfulness-based Stress Reduction (MBSR) and Mindfulness-based Cognitive Therapy (MBCT) curriculums (e.g., Saltzman & Goldin, 2008; Segal, Williams, & Teasdale, 2012; Semple & Lee, 2014). The MBI was incorporated into student's semester schedule as a non-elective course. Students received the MBI regardless of participation in the research study evaluating the effectiveness of the intervention. The intervention itself was delivered during two 30-minute class periods over the course of 12-weeks by a trained mindfulness facilitator. Sessions included training in mindful breathing, focusing attention and awareness, integrating mindfulness

practices in day-to-day activities (e.g., mindful movement, coloring, eating, etc.), as well as empathy-building and psychosocial skill development.

Each session opened with a mindful attention-centering exercise using the "Listening Bowl". When rung, the bowl creates a comfortable tone that resonates around the room and becomes less and less audible as the vibrations decrease. Students are instructed to listen to the tone until they can no longer hear it, at which time they are to hold up their hand. Following this exercise, students engage in the Mindful Minutes breathing meditation. At session 1, all students started with an initial duration of one minute of practicing the breathing meditation. Over the course of the semester, the duration of Mindful Minutes increased based on students' ability to stay engaged in the task and their desire to increase the duration of the exercise. Following Mindful Minutes, the instructor introduced the lesson (see Table 5) for that day's class.

Table 5

Mindfulness Intervention Curriculum

Lesson	Topic
1	Introduction to Mindful Routines and Noticing
2	Mindful Breathing and the Mindful Minute
3	Focusing
4	Mindful Movement
5	Focus and Dealing with Distractions
6	Mindful Movement, Continued
7	Movement and Breath to Energize
8	Movement and Breath to Calm
9	Dealing with Anger
10	Dealing with Anger, cont.
11	Mindful Coloring
12	Mindful Mandala Building
13	Mindful Eating
14	Brain: Amygdala and Prefrontal Cortex
15	Kindfulness (Kindness + Mindfulness)
16	Interconnectedness

Data Analytic Strategy

Preliminary analyses. To confirm effectiveness of randomization of participants to groups, pre-intervention assessment scores (i.e., parent, teacher, and student self-report SDQ subscale scores, standardized test scores from first test administration, first quarter grades in Math, Reading and ELA), and demographic variables (e.g., age, gender, race) were examined as dependent variables in independent measures t-tests or Mann-Whitney U-Tests when data were found to violate assumptions of normality. Accordingly, group (i.e., MBI vs. WLC) was entered as the independent variable in all analyses.

School records of student behavior: Office referrals, suspensions, and absences. Data for office referrals, days suspended, and days absent were counts; as

such, each of their distributions were highly positively skewed and zero-inflated. Therefore, the nonparametric equivalent of independent samples t-tests (i.e., Mann-Whitney U-Test) was used to examine between-group differences in the total number of ORMs, days suspended, and days absent accrued by students in the MBI group relative to those in the WLC group over the course of the first semester (i.e., active intervention period for MBI group). Rates of office referrals, absences, and suspensions received during fall semester were entered into analyses as dependent variables, with intervention group (MBI, WLC) as the predictor variable. Across infraction types, rates were expected to be significantly lower in the MBI group compared to the WLC group.

Moreover, rates of infractions were expected to decrease as a function of participation in the intervention; to test this hypothesis, within-group treatment effects were examined among students in the WLC group following delivery of intervention during the spring semester. Given the degree of positive skew and zero-inflation in the distributions of these data, the nonparametric alternative to the paired samples t-test – the Wilcoxon signed-rank test – was used to examine pre-intervention to post-intervention changes in rates of infractions within the WLC group following delivery of the intervention during the spring semester. Wilcoxon signed-rank tests were also used to examine rates of infractions from post-intervention through the 4-month follow up period in the intervention group.

Grades. Students' letter grades in Math, Reading, and ELA were recorded for each quarter of the academic year. Prior to conducting analyses, letter grades were coded on the following metric: A+ = 13, A = 12, A- = 11, B+ = 10, B = 9, B- = 8, C+ = 7, C = 6, C- = 5, D+ = 4, D = 3, D- = 2, F = 1. Across Math, Reading, and ELA, data were

observed to violate assumptions of normality, as assessed by graphical and statistical methods (Shapiro Wilk test, *p*s <.05). Therefore, in order to evaluate whether the intervention contributed to potential improvements in school functioning, nonparametric tests were conducted.

Between-groups differences (MBI vs WLC) in grades were examined using Mann-Whitney U Tests, with intervention group as the predictor variable and Math, Reading, and ELA grades at the end of fall semester (i.e., quarter 2) as dependent variables. Wilcoxon signed-rank tests were used to examine pre- to post-intervention changes in grades among students in the WLC group. Analyses were restricted to WLC cases and final marks in each class for semester 1 and semester 2 (i.e., academic functioning prior to intervention versus functioning during the active intervention period) were entered as paired-dependent variables. Wilcoxon signed-rank tests were also conducted to examine whether improvement in grades was maintained through the 4-month follow up period, with analyses restricted to MBI group cases and quarter 2 and quarter 4 grades entered as dependent variables. As nonparametric tests, these analyses employ median rather than mean measures of central tendency; as such, median values will be reported for Reading, Math, and ELA grades at each quarter.

Standardized test scores. MAP Reading and Math scores were anticipated to improve across the three testing sessions as a function of participation in the mindfulness intervention. Scores were collected from MAP test administrations in the fall, winter, and spring of Academic Year 2017-2018. Fall scores served as baseline and pre-intervention performance indicators for students in the MBI and WLC groups, respectively. Winter scores served as post intervention and pre-intervention performance indicators for MBI

and WLC, respectively. Finally, spring scores serve as the follow-up and post-intervention performance indicators for MBI and WLC, respectively.

While both groups were expected to show improvements across the testing sessions (e.g., pre-intervention scores versus post-intervention and 4-month follow-up scores), the magnitude of improvement was expected to be significantly greater among students in the MBI group compared to WLC. To test this hypothesis, gain scores were calculated for math and reading scores separately to reflect relative improvement in scores from the first testing session (i.e., fall, pre/baseline) to the second testing session (i.e., winter, post/pre); e.g., Math Gain $Score_A$ = Time 2 Math Score – Time 1 Math Score; Gain $Score_B$ = Time 3 Math Score – Time 2 Math Score. Given that scores at time 2 were expected to exceed time 1 scores, and time 3 scores were expected to exceed time 2 scores, a positive value for either Gain $Score_A$ or Gain $Score_B$ reflected improvement in score, whereas a negative value reflected decline in score.

To examine group differences in gain scores following intervention to the MBI group, Gain $Score_A$ for Reading and Math were each entered as dependent variables in an independent measures t-test, with intervention group as the independent variable. To examine pre-post changes in standardized test scores following delivery of intervention to the WLC group, analyses were restricted to WLC group cases and Gain $Score_A$ and Gain $Score_B$ for math and reading tests were entered as dependent variables in paired samples t-tests. To examine whether gains were maintained through the 4-month follow-up period, Gain $Score_A$ and Gain $Score_B$ were entered as dependent variables in a paired samples t-test, with analyses restricted to MBI group cases.

Self- and informant ratings of behavior. One-way Analysis of Variance (ANOVA) was used to examine between groups differences in magnitude of change on parent, child self-report, and teacher report of conduct, hyperactivity-inattention problems, and peer relationship problems. "Change" scores (i.e., difference scores; time 1 minus time 2) for each of the three SDQ behavior problem scales were calculated and entered as dependent variables. Change scores are preferred in such cases because they provide an unbiased approximation of true change that holds regardless of baseline score (Zumbo, 1999). Moreover, using change scores as dependent variables in ANOVA is considered a viable alternative to ANCOVAs when the focus of analyses involves testing directionality of changes from pre- to post-assessments (Schonert-Reichl et al., 2015; Tabachnick & Fidell, 2001).

To examine post-intervention changes within the WLC group, an additional change score was calculated to reflect differences on each scale at time 2 and time 3 (e.g., time 2 score minus time 3 score). These change scores also served in the evaluation of any intervention maintenance effects (i.e., post-intervention/time 2 to 4-month follow up/time 3).

Chapter 3

Results

Preliminary Analyses

Groups did not differ significantly on demographic characteristics (i.e., age, race, or gender), baseline grades in math, reading, and ELA, or baseline (i.e., fall) MAP Reading or Math test scores (all *p*s>.05). With the exception of absences, school records of behavioral infractions were highly correlated with one another (see Table 6). Moreover, the modal value of ORMs, suspensions, and absences was zero across the sample; this created strong zero-inflation of the distributions of each of these variables, and therefore, the distributions of ORMs, suspensions, and absences were significantly positively skewed.

There were no significant group differences on SDQ scales measuring conduct, hyperactivity/inattention problems, or peer relationship problems observed for parent or child self-report at baseline/pre-intervention; however, teacher ratings of student hyperactivity/inattention problems were significantly higher among children in the MBI group prior to intervention, relative to children in the WLC group ($U = 369$, $z = 2.53$, $p = .011$).

Table 6

Correlations Among School Record Variables (ORMs, Suspensions, and Absences) at Semester 1, Semester 2, and Total Academic Year

	ORM 1	ORM 2	SUSP 1	SUSP 2	ABS 1	ABS 2	ORM T	SUSP T
ORM 1	-							
ORM 2	.56**	-						
SUSP 1	.71**	.30**	-					
SUSP 2	.42**	.45**	.37**	-				
ABS 1	.07	.08	.05	-.08	-			
ABS 2	.05	.11	.03	-.05	.63**	-		
ORM T	.89**	.88**	.58**	.49**	.09	.09	-	
SUSP T	.69**	.47**	.83**	.82**	-.03	-.02	.66**	-
ABS T	.07	.11	.04	-.07	.90**	.91**	.10	-.03

Note. **p <.01. ORM=Office Referral for Misconduct, SUSP=Suspensions, ABS=Absences. Variable names with "1" ("2") reflect semester 1 (2) counts; "T" denotes counts for total AY2017-18. Correlations on total sample: ORM N=130, suspensions N=128, absences N=130.

School Records of Student Behavior: Office Referrals for Misconduct

On average, students in the intervention group accrued fewer office referrals for misconduct (ORMs) over the course of the fall semester (M = .80, SD = 1.65) compared to students in the WLC group (M = 1.08, SD = 2.71). However, due to violations to assumptions of normality in these data, mean rates of ORMs were unable to be compared between groups using parametric tests; thus, nonparametric tests were used to examine between-groups and within-group differences in ORMs. Results of the Mann-Whitney U-Test indicated that between-groups differences in rates of ORMs accrued over the course of the fall semester were not statistically significant (U = 2021, z = .220, p = .826, r = 0.02). Therefore, while lower rates of ORMs were observed among students in the MBI

group during the active intervention period relative to those who received no intervention during fall semester (i.e., WLC group), these group differences did not reach statistical significance.

Within-group pre- to post-intervention changes in rates of ORMs accrued by students in the WLC group were examined using Wilcoxon signed-rank tests. Although rates were observed to change in the expected direction (i.e., lower rates of ORMs in semester 2), differences in rates of ORMs during the fall semester (i.e., pre-intervention) were not significantly different from rates observed in the spring ($W = 41.50$, $z = -1.06$, $p = .288$, $r = -0.15$). More specifically, results of the Wilcoxon signed-rank test yield ranks of paired differences in the counts of ORMs at semester 1 and 2 (i.e., semester 2 ORMs minus semester 1 ORMs). As such, negative differences reflect positive changes, or reductions in ORMs at semester 2 (i.e., semester 1 ORMs > semester 2), whereas positive differences reflect negative changes, or higher rates of misbehavior and subsequent ORMs at semester 2 (i.e., semester 1 ORMs < semester 2 ORMs). Results indicated that, within the WLC group, 34 of the 49 cases had no changes in rates of ORMs across the two semesters; 6 cases had more ORMs post-intervention compared to pre-intervention (i.e., positive differences); and 9 cases had fewer ORMs following intervention (i.e., negative differences).

It was expected that students in the MBI group would have fewer rates of ORMs compared to students in the WLC group over the course of the intervention group's active intervention period (i.e., fall semester), and that rates of ORMs received in the spring semester would be either comparable to or lower than those observed in the fall. Support for this hypothesis would speak to maintenance effects or continued impact of

intervention on students' behavioral outcomes. This hypothesis was tested using Wilcoxon signed-rank tests, with cases for analyses restricted to those of the MBI group, and rates of ORMs accrued in the fall and spring entered as paired dependent variables. Results provided no support for hypothesized maintenance effects of intervention on rates of ORMs through the 4-month follow up period in the MBI group. In fact, a statistically significant within-group difference in the opposite direction was found for rates of ORMs accrued by students in the MBI group during fall (i.e., active intervention period) and spring semesters (i.e., no intervention), $W = 484$, $z = 2.81$, $p < .01$, $r = 0.31$. See Figure 2. Specifically, within the MBI group, 46 of the 81 cases had no change from semester 1 to semester 2; 26 cases yielded positive differences (higher ORMs at semester 2); and only 9 cases yielded negative differences (lower ORMs at semester 2).

Table 7

Between- and Within-Groups Test Statistics for Office Referrals for Misconduct

	U	*W*	*p*	*z*	*r*
ORMs – Semester 1	2021.00		.826	.220	.02
ORMs – Pre/Post (WLC)		41.50	.288	-1.06	-.15
ORMs – Post/follow up (MBI)		484.00**	.005	2.08	.31

Note. **p <.01. ORM = office referral for misconduct. MBI (n = 81), WLC (n = 49). U = test statistic (Mann-Whitney) for between-group differences at semester 1; W = test statistic (Wilcoxon signed-rank) for within-group differences in ORMs from semester 1 to semester 2; r = Cohen's effect size r.

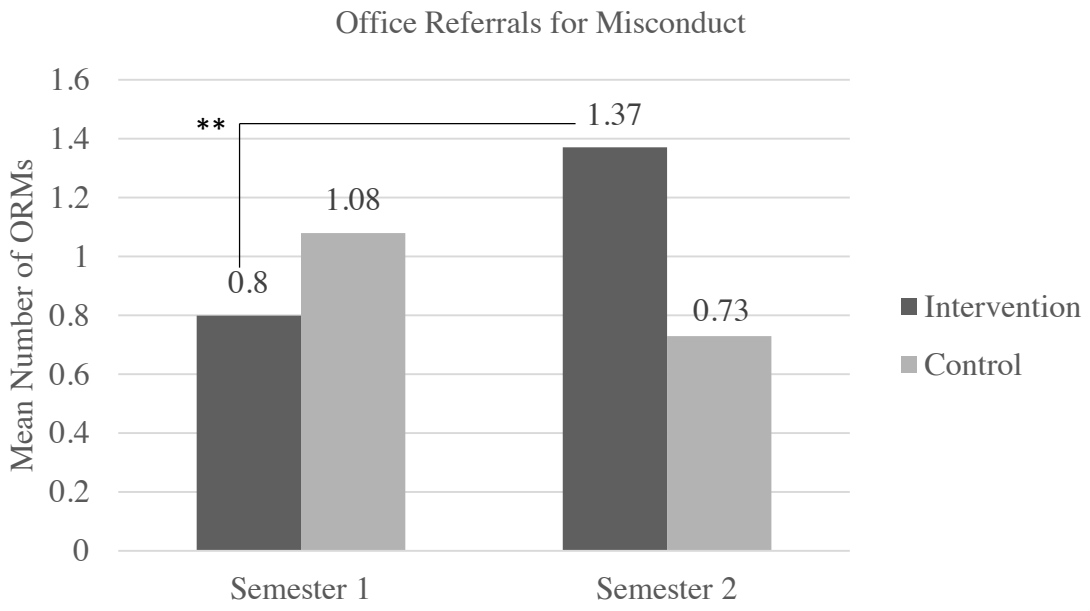

Figure 2. ***p <.01. Bar graph depicting counts of ORMs accrued during the active intervention period and 4-month follow up period by the intervention group (n = 81) and pre- and post-intervention by the control group (n = 49).

School Records of Student Behavior: Suspension Days

Across the 2017-2018 school year, the total count of days suspended accrued by students in the MBI group (n =80) was 106 days; 39 days over the course of fall semester (M = .49, SD = 1.61) and 67 days over the course of the spring semester (M = .84, SD = 2.06). Students in the WLC group (n = 48) accrued a total of 51 suspension days; 26 days during fall semester (M = .54, SD = 2.27) and 25 days during spring semester (M = .52, SD = 1.73). Among students in the intervention group, 88.8% received no suspensions during the first semester of the 2017-2018 school year, 8.6% had 1 to 5 days of suspension, and 2.4% had more than 6 days of suspension (max = 10 days). In the WLC group, 89.6% of students had no suspensions, 8.1% had 3 or fewer suspensions, and one student (2.1%) accrued a total of 15 suspension days. During the second semester, 80%

of students in the MBI group had no suspension days, 16.5% had fewer than 5 days suspension, and 3.6% had 6 to 11 days suspended. Among students in the WLC group, 87.5% no suspension days and the remaining 12.6% of students were observed to accrue fewer than 10 suspension days.

Overall, the intervention and control groups had roughly comparable rates of suspension days over the course of the fall semester relative to their respective sample sizes (i.e., larger sample size for MBI group compared to WLC). This was evidenced in analyses of between-groups differences in suspension days using Mann-Whitney U-Tests. Results of this test showed that the intervention group did not differ significantly from the control group with respect to the distribution of rates of suspensions accrued over the course of fall semester (i.e., active intervention period for MBI group; no intervention for WLC), $U = 1938$, $z = .164$, $p = .870$, $r = 0.01$.

Wilcoxon signed-rank tests were used to examine within-group differences in suspension days accrued among students in the WLC group during the pre-intervention and active intervention period. Rates of suspension days accrued by students in the WLC group during the pre-intervention period were not significantly different from rates accrued during the active intervention period ($W = 27.00$, $z = .535$, $p = .593$, $r = 0.08$). Specifically, 39 of the 48 WLC cases had no change in rates of suspension from pre-intervention to the active intervention period; 5 cases had more suspension days post-intervention compared to pre-intervention; and 4 cases had fewer suspension days during the active intervention period compared to the pre-intervention period.

Wilcoxon signed-rank tests were also used to examine rates of infractions from post-intervention through the 4-month follow up period among students in the MBI

group. Results indicated no significant difference between rates of suspensions during the active intervention period compared to the 4-month follow up period (W = 88.00, z = 1.60, p = .110, r = 0.18). Moreover, among students in the MBI group, 65 of the 80 cases analyzed had no changes in suspension rates from the active-intervention period to the follow up period; 11 cases had more suspension days during the follow up period compared to the active intervention period; and only 4 cases had negative differences indicative of fewer days suspended in the follow up period relative to the active intervention period.

Table 8

Between- and Within-Groups Test Statistics for Days Suspended

	U	*W*	*p*	*z*	*r*
Days suspended – Semester 1	1938.00		.870	.164	.01
Suspension days – Pre/Post (WLC)		27.00	.593	.535	.08
Suspension days – Post/follow up (MBI)		88.00	.110	1.60	.18

Note. MBI (n = 80), WLC (n = 48). U = test statistic (Mann-Whitney) for between-group differences at semester 1; W = test statistic (Wilcoxon signed-rank) for within-group differences in suspension days from semester 1 to semester 2; r = Cohen's effect size r.

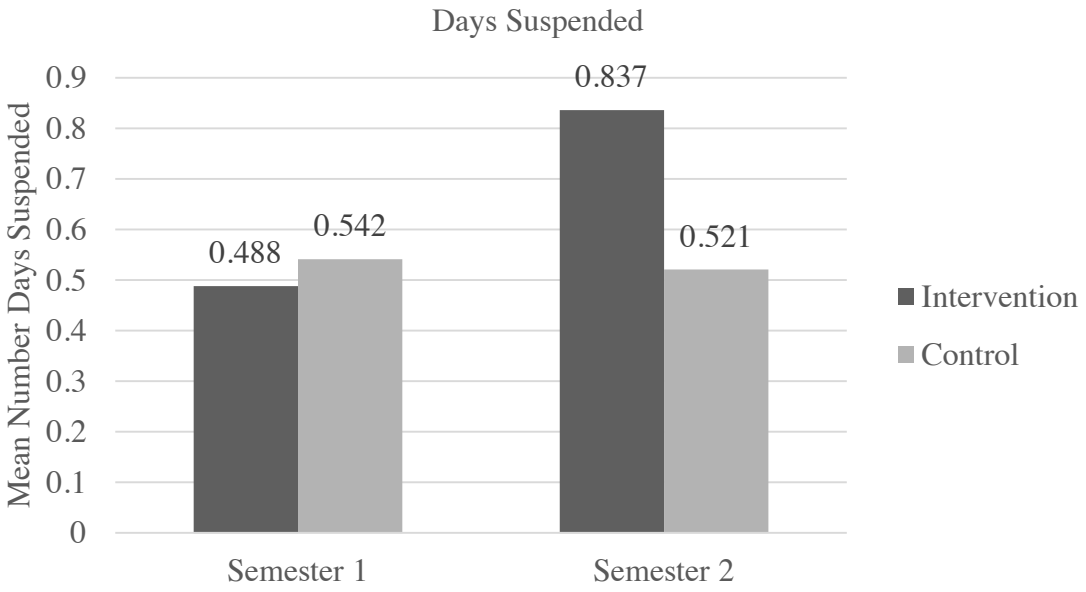

Figure 3. Bar graph depicting counts of days suspended during the active intervention period and 4-month follow up period by the intervention group (n = 81) and pre- and post-intervention by the control group (n = 49).

School Records of Student Behavior: Absences

Over the course of the academic year, a total of 1242 days absent and 548 days absent were observed among students in the MBI and WLC groups, respectively. During the first semester, rates of absences among students in the MBI group ranged from 0-35 days, while absence rates in the WLC group ranged from 0-55 days. The majority of students in the MBI and WLC groups had fewer than 10 absences (82.6% and 87.6%, respectively). Over the course of the second semester, rates of absences in the MBI group ranged from 0 to 45 days, whereas rates among students in the WLC group ranged from 0 to 18 days. Across semester 2, 70.4% of students in the MBI group had fewer than 10 absences (85.6% in WLC), 18.4% had 10.5 to 20 absences (14.1% of WLC), and 10.9 had between 21 and 45 absences.

Results of the Mann-Whitney U-Test indicated that the MBI and WLC groups did not differ significantly with respect to the distribution of rates of absences accrued over the course of fall semester (i.e., active intervention period for WLC group, no intervention for WLC), $U = 2155$, $z = .822$, $p = .411$, $r = .07$.

Wilcoxon signed-rank tests were used to examine within-group differences in infractions from pre- to active-intervention periods among students in the WLC group; median rates of absences in this group did not differ significantly from pre-intervention to active-intervention period ($W = 589.50$, $z = 1.11$, $p = .269$, $r = 0.16$). Specifically, of the 49 cases analyzed, 5 cases neither increased or decreased in rates of absences; 24 cases had more absences during the active intervention period compared to the pre-intervention period; and 20 cases had more absences during the pre-intervention period compared to the active intervention period. While only a slight difference was observed between ranked improvements and greater rates of absences among students in the WLC group, this finding is nonetheless in the opposite direction than expected.

Wilcoxon signed-rank tests were also used to examine rates of infractions from post-intervention through the 4-month follow up period among students in the MBI group. Results indicated a statistically significant difference in rates of absences accrued by students in the MBI group over the course of semester 1 compared to semester 2 ($W = 2208.50$, $z = 4.14$, $p < .001$, $r = 0.46$). Specifically, no changes were observed among 6 of the 81 cases analyzed; 52 cases accrued more absences during the follow up period compared to the active intervention period; and only 23 cases had fewer days absent during the follow up period compared to the active intervention period. This finding was

in the opposite direction than expected and represents a large effect according to Cohen's (1988) guidelines for effect size r.

Table 9

Between- and Within-Groups Test Statistics for Days Absent

	U	*W*	*p*	*z*	*r*
Days absent – Semester 1	2155.00		.411	.822	.07
Days absent – Pre/Post (WLC)		589.50	.269	1.11	.16
Days absent – Post/follow up (MBI)		2208.50**	.001	4.14	.46

Note. **p<.01. MBI (n = 81), WLC (n = 49). U = test statistic (Mann-Whitney) for between-group differences at semester 1; W = test statistic (Wilcoxon signed-rank) for within-group differences in days absent from semester 1 to semester 2; r = Cohen's effect size r.

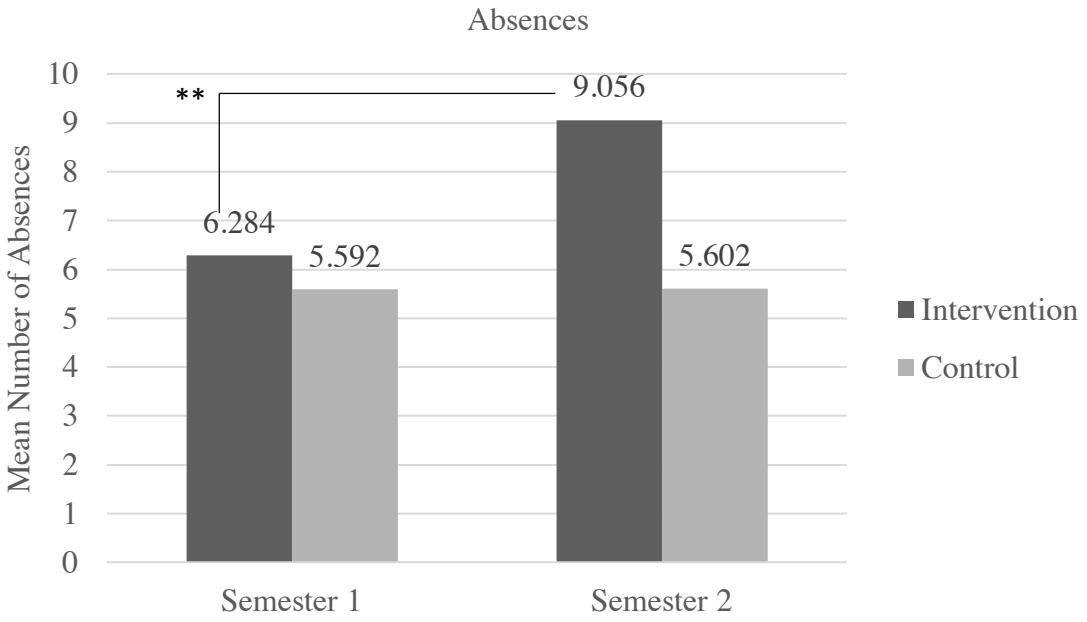

Figure 4. **p <.01. Bar graph depicting counts of absences accrued during the active intervention period and 4-month follow up period by the intervention group (n = 81) and pre- and post-intervention by the control group (n = 49).

Math, Reading, and English/Language Arts Letter Grades

Descriptive statistics for grade values in Math, Reading, and ELA for each group are presented in Table 10. These include the means and standard deviations, median grade values, and group size for which data were available across the four quarters of grades in Reading, Math, and ELA.

Table 10

Descriptive Statistics for Grades at Each Quarter for Intervention and Control groups

	Intervention Group			Control Group		
	n	*M(SD)*	*Mdn*	*n*	*M(SD)*	*Mdn*
Reading Grade Q1	53	7.26 (3.28)	8.00	31	6.94 (3.12)	6.00
Reading Grade Q2	79	6.39 (3.36)	6.00	47	7.74 (2.86)	8.00
Reading Grade Q3	74	6.77 (3.78)	6.00	48	7.63 (3.13)	8.00
Reading Grade Q4	79	6.58 (3.80)	6.00	48	7.52 (3.15)	8.00
Math Grade Q1	55	7.07 (3.86)	8.00	31	6.68 (3.35)	7.00
Math Grade Q2	81	6.60 (3.58)	6.00	47	7.13 (3.25)	6.00
Math Grade Q3	75	6.53 (3.75)	6.00	48	7.46 (3.18)	7.50
Math Grade Q4	80	6.45 (3.71)	6.00	48	7.65 (2.86)	8.00
ELA Grade Q1	55	7.25 (3.61)	7.00	31	6.16 (3.44)	7.00
ELA Grade Q2	81	6.28 (3.23)	6.00	47	6.66 (3.45)	6.00
ELA Grade Q3	75	7.07 (3.63)	8.00	48	7.19 (3.18)	7.00
ELA Grade Q4	80	6.68 (3.86)	6.00	48	7.10 (3.04)	6.00

Note. Mdn = Median. All grades coded A+ = 13, A = 12, A- = 11, B+ = 10, B = 9, B- = 8, C+ = 7, C = 6, C- = 5, D+ = 4, D = 3, D- = 2, F = 1. Quarter 2 grades used in between-groups analyses for semester 1; Quarter 4 grades used in analyses for semester 2.

Due to violations of assumptions of normality across Math, Reading, and ELA grades at each quarter, Mann-Whitney U-Tests were conducted, with intervention group

as the predictor variable, and Math, Reading, and ELA grades at quarter 2 as dependent variables. No significant differences were observed in Math ($U = 1768$, $z = -.676$, $p = .499$, $r = 0.06$) and ELA ($U = 1784$, $z = -.594$, $p = .552$, $r = 0.05$) grades at the end of fall semester among students in the MBI group compared to those in the WLC group. However, median ranks for quarter 2 Math and ELA grades were slightly higher among students in the WLC group compared to the intervention group. A similar but statistically significant trend was observed for Reading grades at the end of semester 2. Contrary to hypotheses that students in the MBI group would have higher grades in all three subjects at the end of the active intervention period, these results indicate that Reading grades were significantly higher among students in the WLC group compared to students in the MBI group, $U = 1458$, $z = -2.04$, $p = .042$, $r = 0.18$. However, this difference represents a small effect according to guidelines of Cohen (1988).

The nonparametric alternative to paired samples t-tests – Wilcoxon signed-rank tests - were used to examine pre-intervention (i.e., grades at the end of semester 1; quarter 2) to post-intervention (i.e., grades at the end of semester 2; quarter 4) changes in grades immediately following delivery of the intervention to the WLC group. Wilcoxon signed-rank tests showed no significant differences in Reading grades ($W = 88.00$, $z = -.97$, $p = .335$, $r = 0.14$), Math grades ($W = 151.00$, $z = 1.24$, $p = .214$, $r = 0.18$), or ELA grades ($W = 264.00$, $z = 1.01$, $p = .311$ $r = 0.15$) measured at the pre- and post-intervention periods for students in the WLC group. In a total of 47 cases analyzed, 26 cases had no changes in Reading grade; 12 cases had higher Reading grades post-intervention; and 9 cases had lower Reading grades post-intervention. For ELA grades, no changes were observed for 18 cases, 14 cases had higher ELA grades post-intervention, and 15 cases had lower ELA

grades post-intervention. Finally, a total of 26 students in the WLC group had no changes in Math letter grades at the end of their intervention period. This is in contrast to 7 cases found to have higher Math grades, and 14 cases found to have poorer math grades from the pre- to post-intervention periods.

Wilcoxon signed-rank tests were also conducted to examine changes in grades from post-intervention through the 4-month follow up period among students in the MBI group. Analyses were restricted to MBI group cases, and quarter 2 and quarter 4 grades in Reading, Math, and ELA were entered as dependent variables. Results revealed no significant differences from semester 1 to semester 2 grades in Reading ($W = 852.00$, $z = .69$, $p = .490$, $r = 0.08$), Math ($W = 552.00$, $z = -.20$, $p = .839$, $r = 0.02$), or ELA ($W = 707.00$, $z = 1.23$, $p = .220$, $r = 0.14$) across students in the MBI group. Among the 79 cases analyzed, 24 had no changes in Reading grades, 27 had higher Reading grades at the end of the 4-month follow up period, and 28 cases had poorer Reading grades. Among the 80 cases analyzed, 34 cases had no changes in Math grades, 22 cases had higher Math grades at the end of the follow up period, and 24 cases had poorer math grades Finally, 32 of the 80 cases analyzed showed no change in ELA grade at the end of the follow up period, while 21 cases had higher ELA grades and 27 had poorer ELA grades.

MAP Standardized Test Scores: Math and Reading

Both the intervention and WLC groups were expected to show improvements across the testing sessions (e.g., pre-intervention scores versus post-intervention and 4-month follow-up scores); however, the magnitude of improvement was expected to be significantly greater among students in the MBI group compared to WLC. To examine

group differences in gain scores following delivery of the intervention to the MBI group, Gain $Score_A$ (i.e., time 2 score – time 1 score) for MAP Reading and Math were each entered as dependent variables in an independent measures t-test, with intervention group as the independent variable.

On average, students in the intervention group had a mean gain score of 5.75 points (SD = 10.64) on the MAP Math test, and 7.31 points on the MAP Reading test (SD = 9.19). A comparable mean gain score on the MAP Math test was observed among students in the WLC group (M = 5.27, SD = 8.53), while a slightly lower mean gain was observed on the MAP Reading test (M = 4.97, SD = 8.83).

Between-groups differences in gains from fall to winter (i.e., intervention period for MBI group) scores on the MAP Math and Reading tests were examined using independent samples *t*-tests. Hedges' *g* was calculated for each test as a measure of effect size; this measure reflects an index of effect size that is preferred for *t*-tests when group size is unequal. Results of independent *t*-tests indicated no statistically significant differences between the MBI and WLC groups with respect to gains on the MAP Math test (t[37] = 1.48, p = .883, g = 0.06) or MAP Reading test (t[90] = 1.19, p = .239, g = 0.26). While differences between groups in gains on the MAP Reading test did not reach statistical significance, the difference is considered to be of a small effect.

Table 11

Descriptive Statistics for MAP Math and Reading Standardized Test Scores

	MAP Math			MAP Reading		
	Fall	Winter	Spring	Fall	Winter	Spring
	M(SD)	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*
MBI Group	164.60 (19.50)	187.18 (21.91)	192.42 (21.47)	159.63 (22.56)	175.18 (25.63)	180.91 (25.91)
GS_A	-	5.75 (10.64)	-	-	7.31 (9.19)	-
GS_B	-	-	5.22 (8.77)	-	-	4.53 (9.61)
WLC Group	188.20 (22.89)	193.72 (18.55)	198.75 (18.57)	164.32 (23.52)	175.91 (26.03)	180.42 (26.23)
GS_A	-	5.27 (8.53)	-	-	4.97 (8.83)	-
GS_B	-	-	5.41 (5.62)	-	-	6.12 (10.90)

Note. GS_A= Gain Score (Score 2 minus Score 1); GS_B = Gain Score (Score 3 minus Score 2). Group size for MAP Math Scores: Fall (MBI = 25, WLC = 15), Winter (MBI = 51, WLC = 29), Spring (MBI = 55, WLC = 28); Group size for MAP Reading Scores: Fall (MBI = 60, WLC = 34), Winter (MBI = 77, WLC = 43), Spring (MBI = 79, WLC = 45).
GS_A Math (MBI = 24, WLC = 15), Reading (MBI = 59, WLC = 33). GS_B Math (MBI = 51, WLC = 27), Reading (MBI = 75, WLC = 42).

Between-groups differences in gains from fall to winter (i.e., intervention period for MBI group) scores on the MAP Math and Reading tests were examined using independent samples t-tests. Hedges' *g* was calculated for each test as a measure of effect size; this measure reflects an index of effect size that is preferred for with t-tests when group size is unequal. Results of independent t-tests indicated no statistically significant differences between the MBI and WLC groups with respect to gains on the MAP Math

test (t[37] = 1.48, p = .883, g = 0.06) or MAP Reading test (t[90] = 1.19, p = .239, g = 0.26). While differences between groups in gains on the MAP Reading test did not reach statistical significance, the difference is considered to be of a small effect.

To examine pre-post changes in standardized test scores following delivery of intervention to the WLC group, analyses were restricted to WLC group cases and Gain $Score_A$ and Gain $Score_B$ for math and reading tests were entered as dependent variables in paired samples t-tests. Mean gains in MAP Math scores observed from Fall to Winter MAP testing administrations (M = 5.43, SD = 8.83) were not significantly different from mean gain scores observed from Winter to Spring administrations (M = 5.79, SD = 3.58) in the WLC group, t(13)= -0.13, p = .899, d = -0.37. Thus, while scores were observed to increase across testing sessions, the observed differences in gain scores from pre-intervention to post-intervention were not statistically significant.

For the MAP Reading test, students in the WLC group had mean gain scores of 4.97 points (SD = 8.97) from Fall to Winter, and 6.75 (SD = 12.08) from Winter to Spring. While these mean gains do reflect improvement from pre- to post-intervention, comparison of Fall-Winter to Winter-Spring (i.e., pre- to post-intervention) were not significantly different, t(31)= -0.54, p = .595, d = -0.10. Thus, original hypotheses that performance on standardized tests of reading and math would improve following delivery of the intervention among students in the WLC group were partially supported by these findings; improvement in scores on each test were observed, in line with hypotheses, however, the magnitude of improvement did not reach statistical significance.

To examine whether gains occurred among students in the MBI group over the course of the 4-month follow-up period, Gain $Score_A$ and Gain $Score_B$ were entered as

dependent variables in a paired samples t-test, with analyses restricted to MBI group cases. Mean gains on the MAP Math test from Fall to Winter (M = 5.75, SD = 10.63) were not significantly different from gains observed across scores from the Winter to Spring (M = 4.50, SD = 8.93) test administrations, $t(23)$= .382, p =.706, d = 0.078. Further, the average gains on MAP Math scores appear to have decreased slightly from Fall-Winter to Winter-Spring comparisons. The same is true of trends observed for the MAP Reading gain scores: gains from Fall to Winter (M = 7.35, SD = 9.16) were higher compared to gains from Winter to Spring testing (M = 4.82, SD = 9.80). However, these differences were not statistically significant, $t(56) = 1.32$, p = .192, d = 0.18 . Therefore, support was not found for original hypotheses suggesting maintenance of improved performance on standardized testing in math and reading following delivery of the mindfulness-based intervention.

Self and informant ratings of behavior

Descriptive statistics for self and informant ratings of student Conduct Problems, Hyperactivity-Inattention Problems, and Peer Relationship Problems from the Strengths and Difficulties Questionnaire (SDQ) at each of the three testing periods are presented in Table 12.

Table 12

Descriptive Statistics for Parent, Child, and Teacher Report on the SDQ at 3 Time Points

	Intervention Group *M*(*SD*)			Control Group *M*(*SD*)		
	Time 1	Time 2	Time 3	Time 1	Time 2	Time 3
Parent Report						
Conduct Problems	1.62 (2.11)	1.33 (1.30)	0.75 (0.96)	1.67 (1.50)	1.05 (0.90)	1.71 (1.79)
Hyperactivity-Inattention	3.95 (2.73)	3.58 (2.71)	4.25 (1.71)	4.67 (2.85)	3.56 (1.92)	4.29 (2.06)
Peer Problems	2.24 (2.07)	2.50 (2.24)	2.25 (2.22)	2.83 (2.36)	2.61 (1.42)	2.14 (2.54)
Child Report						
Conduct Problems	2.79 (1.91)	3.03 (2.09)	3.25 (1.82)	2.36 (1.43)	2.63 (2.36)	2.39 (2.06)
Hyperactivity-Inattention	4.21 (2.36)	4.27 (2.27)	4.57 (2.32)	3.91 (1.30)	4.21 (1.96)	3.06 (1.66)
Peer Problems	3.29 (1.90)	2.90 (2.26)	2.64 (2.04)	2.82 (1.25)	2.58 (1.67)	3.00 (1.88)
Teacher Report						
Conduct Problems	2.78 (3.08)	2.47 (2.52)	2.61 (2.52)	1.09 (2.07)	1.17 (1.38)	2.35 (2.51)
Hyperactivity-Inattention	6.44 (2.90)	5.43 (3.34)	5.05 (3.31)	3.27 (3.07)	3.89 (2.63)	4.23 (3.19)
Peer Problems	2.33 (2.01)	1.88 (1.96)	1.98 (1.80)	1.73 (1.42)	2.06 (1.63)	2.37 (2.05)

Note. Scales of the Strengths and Difficulties Questionnaire range from 0 to 10. Reports at time point 1: N=55 parents (MBI *n* = 37, WLC *n* = 18); N=39 students (MBI *n* =28, WLC *n* =11); N=56 teacher (MBI *n* = 45, WLC *n* = 11). Reports at time point 2: N=29 parents (MBI *n* = 12, WLC *n* = 17); N=49 students (MBI *n* =30, WLC *n* =19); N= 69 teacher (MBI *n* = 51, WLC *n* = 18). Reports at time point 3: N=11 parents (MBI *n* = 4, WLC *n* = 7); N=46 students (MBI *n* =28, WLC *n* =18); N= 101 teacher (MBI *n* = 61, WLC *n* = 40).

Change scores were calculated to reflect magnitude of change from pre- to post-intervention (i.e., time 1 score minus time 2 score). In line with expectations for

intervention effects, time 1 problem scores should be greater than time 2 problem scores if the intervention is enacting positive changes in behavior in the expected direction (following intervention delivery to the MBI group). Alternatively, the presence of a negative change score on these problem scales would reflect changes in the opposite direction indicating more problems following intervention compared to pre-intervention. Descriptive statistics for change scores on each scale for each informant are presented in Table 13.

Prior to calculating change scores, one outlying data point (≥3 SD above the mean; Osborne & Overbay,2004), was observed in the post-intervention parent ratings on the Conduct Problems scale. Following the removal of the outlier, the Conduct Problems scale for parent report at post-test was approximately normally distributed, as were scores on the Hyperactivity-Inattention Problems scale, and the Peer Relationships Problems scale. Children's self-report ratings on each scale met assumptions of normality.

Table 13

Descriptive Statistics for Change Score 1 (Time 1-Time 2) on each SDQ Scale

	Intervention Group *M*(*SD*)			Control Group *M*(*SD*)		
	Parent	Child	Teacher	Parent	Child	Teacher
Conduct Problems	-0.36 (1.02)	-0.30 (1.90)	0.73 (2.95)	-0.25 (1.25)	-0.04 (1.80)	0.09 (1.81)
Hyperactivity-Inattention	-1.00 (1.95)	-0.04 (2.41)	0.40 (2.82)	0.25 (0.96)	-0.73 (1.90)	-1.00 (2.40)
Peer Problems	-1.27 (2.15)	0.30 (2.03)	1.30 (2.63)	0.75 (0.50)	0.27 (1.35)	-0.45 (1.81)

Note. CS = Change Scores. Negative CS indicates greater problems at time 2 compared to time 1; positive CS indicates fewer problems at time 2 compared to time 1. Change scores (time 1, time 2): parent data pairs N=15 (MBI n = 11, WLC n = 4), child data pairs N=38 (MBI n = 27, WLC n = 11), teacher data pairs N=41 (MBI n = 30, WLC n = 11).

Change scores reflecting differences in scores on each scale from pre- to post-intervention were entered as dependent variables in one-way ANOVA, with intervention group entered as the independent variable. Separate analyses were run for each reporting source and eta squared (η^2) is reported as an effect size measure for the ANOVA F-test statistic.

Results of ANOVA indicated no significant between-groups differences in the magnitude of change from pre- to post-intervention on parent's report of child conduct problems ($F[1,13] = 0.032$, $p = 0.860$, , $\eta^2 = 0.00$), hyperactivity-inattention problems ($F[1,13] = 1.46$, $p = 0.248$, $\eta^2 = 0.10$), or peer relationship problems ($F[1,13] = 3.32$, $p = 0.091$, $\eta^2 = 0.20$). Similarly, no significant between-groups differences were observed among children's self-report of conduct problems ($F[1,36] = 0.01$, $p = 0.860$, $\eta^2 = 0.00$), hyperactivity-inattention problems ($F[1,36] = 0.72$, $p = 0.403$, $\eta^2 = 0.02$), or peer relationship problems ($F[1,36] = 0.001$, $p = 0.972$, $\eta^2 = 0.00$). Thus, results do not support original hypotheses that scores across reporting sources would decrease following delivery of the intervention to the MBI group.

Teacher report on the SDQ scales were found to violate assumptions of normality; for this reason, the nonparametric alternative to ANOVA – Independent-Samples Kruskal-Wallis Test – was utilized to examine between groups differences in the magnitude of change from pre- to post-intervention on each scale. No significant between-groups differences were observed with respect to magnitude of change from pre- to post-intervention on conduct problems ($H[1]=0.01$, $p = .904$, $r = 0.02$), hyperactivity-inattention problems ($H[1] = 1.67$, $p = .197$, $r = 0.20$), or peer relationship problems ($H[1] = 3.15$, $p = .076$, $r = 0.28$).

To examine within-group differences in the magnitude of change on each scale of the SDQ from pre- to post-intervention among students in the WLC group, paired samples t-tests were conducted, with analyses restricted to WLC group cases. The paired dependent variables included the baseline change score (i.e., time 1 minus time 2) for each scale and the post-intervention change score (i.e., time 2 – time 3). As such, valid scores at each of the 3 time points were required in order to produce results for this analysis.

At time 3, only eight parents (MBI n = 3, WLC n = 5) completed and returned this measure; of those 8 cases, there were only two cases with both time 2 and time 3 data points. Therefore, sample size for parent report on each of the SDQ scales was insufficient to conduct analyses reflecting pre- to post-intervention effects for the WLC group and maintenance effects through the 4-month follow up period in the MBI group. For this reason, paired-samples t-tests were only conducted on child self-report for each of the three SDQ scales. To test these hypotheses in the non-normally distributed teacher report data, Wilcoxon signed-rank tests were conducted.

Results of the paired samples t-tests revealed no significant differences between the degree of change occurring over the course of the pre-intervention period relative to that observed during the active intervention period for WLC group children's self-reported conduct problems (t[8]= -0.21, p=.836, d = -0.08), hyperactivity-inattention problems (t[8]= -1.69, p=.129, d = -0.68), or peer relationship problems (t[8]= -0.44, p=.674, d = -0.18). Similarly, Wilcoxon signed-rank tests indicated no significant differences in the degree of change from the pre-intervention period to the active intervention period in teachers' report of student conduct problems (W=2.50, z=-0.92,

p=.357, *r* = -0.28), hyperactivity-inattention (*W*=37.50, *z*=1.81, *p*=.070, *r* = 0.55), and peer relationship problems (*W*=24.00, *z*=-0.18, *p*=.857, *r* = -0.05).

Results of the paired samples t-tests revealed no significant differences between the degree of change occurring over the course of the intervention period relative to that observed during the 4-month follow up period among the MBI groups' self-reported conduct problems (*t*[22]= 0.22, *p*=.830, *d* = 0.9), hyperactivity-inattention problems (*t*[22]= 0.39, *p*=.702, *d* = 0.17), or peer relationship problems (*t*[22]= 0.27, *p*=.788, *d* = 0.12). Among teachers' reports of student problems, Wilcoxon signed-rank tests indicated that the magnitude of change during the active intervention period (i.e., time 1 – time 2) was not significantly different from the magnitude of change observed over the course of the 4-month follow up period for student conduct problems (*W*=139.00, *z*=-0.93, *p*=.351, *r* = -0.22), hyperactivity-inattention (*W*=144.00, *z*=-0.50, *p*=.616, r = -0.09), and peer relationship problems (*W*=115.00, *z*=-1.80, *p*=.072, r = -0.41).

Table 14

Descriptive Statistics for Change Scores 1 and 2 on each SDQ Scale

		Intervention Group *M*(*SD*)			Control Group *M*(*SD*)		
		Parent	Child	Teacher	Parent	Child	Teacher
(CS) Conduct Problems	CS 1	-0.36 (1.02)	-0.30 (1.90)	0.73 (2.95)	-0.25 (1.25)	-.036 (1.80)	0.09 (1.81)
	CS 2	1.00 (2.00)	-0.12 (1.45)	-0.02 (1.57)	-0.20 (0.84)	0.06 (1.60)	-0.33 (1.88)
(CS) Hyperactivity-Inattention	CS 1	-1.00 (1.95)	-0.04 (2.41)	0.40 (2.82)	0.25 (0.96)	-0.73 (1.90)	-1.00 (2.40)
	CS 2	2.00 (1.73)	-0.35 (2.71)	0.12 (1.45)	0.80 (0.84)	1.00 (1.32)	0.39 (0.85)
(CS) Peer Problems	CS 1	-1.27 (2.15)	0.30 (2.03)	1.30 (2.63)	0.75 (0.50)	0.27 (1.35)	-0.45 (1.81)
	CS 2	1.33 (1.52)	0.15 (1.64)	-0.04 (1.15)	0.20 (1.92)	-0.12 (1.65)	-0.22 (1.35)

Note. CS = Change Scores. Negative CS indicates greater problems at time 2 compared to time 1; positive CS indicates fewer problems at time 2 compared to time 1. CS1 = Change Scores (time 1 minus time 2), CS2 = Change Scores (time 2 minus time 3). Sample for CS1: parent data pairs N=15 (MBI *n* = 11, WLC *n* = 4), child data pairs N=38 (MBI *n* = 27, WLC *n* = 11), teacher data pairs N=41 (MBI *n* = 30, WLC *n* = 11). Sample for CS2: parent data pairs N=8 (MBI *n* = 3, WLC *n* = 5), child data pairs N=43 (MBI *n* = 26, WLC *n* = 17), teacher data pairs N=69 (MBI *n* = 51, WLC *n* = 18).

Chapter 3

Discussion

The present study was conducted to examine behavioral and academic outcomes following delivery of a mindfulness-based intervention in an urban public elementary school. Contrary to hypotheses, the intervention was not found to enact statistically significant positive changes on rates of office referrals for misconduct, days suspended, and days absent, nor were grades in reading, math, or ELA found to improve to a statistically significant degree as a function of intervention delivery in either group.

Despite the absence of statistically significant improvements, it remains worthwhile to note that in the majority of analyses, evidence of positive change in the hypothesized directions was observed (see Table 15 for summary of changes [i.e., no change, worsening, and improvement] for each group on each school record variable). When working within communities and schools as overwhelmed with stressors and challenges as that observed the current study's sample, change can be difficult to evidence with one intervention. Therefore, despite the absence of statistically significant change or improvement at the group-level, the presence of even small overall rates of improvement at the individual-level remains a positive finding.

In the case of findings related to student absenteeism, it is likely that rates of absences may be a poor indicator of positive change; this is largely a function of absences being a low-frequency variable with a significantly zero-inflated distribution. Moreover, rates of absences can be highly affected by extraneous factors such as illness or family time-away. With this in mind, the finding that absences were not correlated with rates of suspensions or office referrals supports the previous consideration while also suggesting

that absenteeism is not a meaningful indicator of problematic behavior in the current sample.

Table 15

Summary of No Change, Negative Change, and Positive Change on School Record Data

	Group	No Change		Worsened		Improved	
	n	*n*	%	*n*	%	*n*	%
Office Referrals							
Control	49	34	69.39	6	12.24	9	18.37
Intervention	81	46	56.79	26	32.10	9	11.11
Suspensions							
Control	48	39	81.25	5	10.42	4	8.33
Intervention	80	65	81.25	11	13.75	4	5.00
Absences							
Control	49	5	10.20	24	48.98	20	40.82
Intervention	81	6	7.41	52	64.20	23	28.40
Grades: Math							
Control	47	26	55.32	14	29.79	7	14.89
Intervention	80	34	42.50	24	30.00	22	27.50
Grades: Reading							
Control	47	26	55.32	9	19.15	12	25.53
Intervention	79	24	30.38	28	35.44	27	34.18
Grades: ELA							
Control	47	18	38.30	15	31.91	14	29.79
Intervention	80	32	40.00	27	33.75	21	26.25

Note. Indices of change (i.e., no change, worsened, improved) reflect the number of cases with values that increased or decreased from the periods on which they were compared (e.g., semester 1 [active intervention period for intervention group; pre-intervention period for control] versus semester 2 [follow-up period for intervention group; active intervention period for control]).

When looking at rates of absences accrued by students in the WLC group over the course of the first semester (i.e., no intervention) to rates of absences during the active

intervention period, 20 students were found to have fewer days absent during the intervention period compared to the prior semester. In the case of ORMs, rates of discipline referrals did decrease from pre-intervention to the active intervention period among students in the WLC group as hypothesized. Although only 9 students in the WLC group showed decreases in rates of ORMs from the pre- to post-intervention periods, the majority of cases in this group (69.4%) showed *no change* in rates of ORMs – positive or negative. While no change may be considered an absence of any intervention effect at all, it may be particularly worthwhile to consider that, within a population that experiences a disproportionately higher volume of risk factors relative to protective factors when it comes to problem behavior and associated negative outcomes, an absence of change in any direction is better than worsening behavior.

Several considerations are relevant for interpreting findings of the current study. First, indices of statistical significance only provide one piece of the puzzle. This is particularly relevant when considering the impact of disproportionate group sizes on indices of statistical significance, as seen in the current study. Specifically, relative to sample size, analyses were likely underpowered as a result of having notably more cases in the MBI group compared to the WLC group. This was further compounded by a lack of availability of data points for every subject at each time point. These considerations and other relevant considerations are discussed further in the following sections.

Interpreting Findings in Context

Contrary to hypotheses, findings of the current study were not observed to correspond with those reported in previous research such as Barnes, Bauza, and Treiber (2003), Fung, Guo, Jin, Bear, and Lau (2016), and Black and Fernando (2014).

Barnes and colleagues (2003) used a similar method of measuring school problem behavior including rates of behavioral infractions, attendance, and suspensions to test outcomes following delivery of a meditation intervention. Across behaviors, statistically significant reductions were noted to occur among students in the treatment group while statistically significant increases were found among students in the control group (all *p*-values <.05). Findings in the current study were somewhat less consistent across measures, but findings did indicate that over the course of the fall semester (i.e., active intervention period), the MBI group had lower rates of ORMs relative to the WLC group and tests of within-group differences from pre- to post-intervention for the WLC group also showed a greater percentage of cases that improved relative to cases that worsened.

With regard to self- and informant ratings of problem behavior, Black and Fernando (2014) reported statistically significant improvements among teacher-reported indices of student behavioral functioning (e.g., attention, self-control, and prosocial behavior) from pre- to post-intervention with effects maintained at the 7-week post-assessment. Similar outcomes were noted by Fung and colleagues (2016) in their examination of parent report outcomes. One notable difference between the current study and that of Black and Fernando (2014) is sample size: the aforementioned study reports statistics for teachers' ratings on a total of 409 students. The current study had a total of 130 consented students, and only a portion of this sample had available data for each measure at the various time points, markedly reducing the power for detecting statistically significant effects.

This lack of consistency in available data points across time points for the SDQ was particularly detrimental for analyses using change scores. Each of the two change

scores (i.e., CS1 and CS2) were computed using 2 of the 3 SDQ time points in order to reflect a measure of the magnitude of variation in behavioral outcome ratings from pre- to post-intervention and post-intervention through the 4-month follow up period. As such, valid scores on both time 1 and time 2 (or time 2 and time 3) SDQ scales were required to compute a valid change score. During the final step of analyses, CS1 and CS2 were entered into paired samples t-tests to evaluate intervention effects (and maintenance effects) for students in the WLC group (and MBI group); here, in order to execute the statistical test, valid scores would be required for all three time points which severely reduced the available sample. In the case of parent report on the SDQ, the sample of available data pairs was reduced to zero.

With regard to the lack of comparability of findings in the current study to those reviewed in the introduction, several other important considerations should be noted. The first consideration relates to disparity in age-related features of the current sample relative to previous studies. The current study was comprised of a large proportion of kindergarten students relative to older-aged grades. Among the many school-based mindfulness intervention studies reviewed in the introduction, relatively few studies included young children in their sample. Specifically, of the 14 studies listed in Table 1, only two program evaluations reported outcomes for children aged 6 and under (i.e., pre-school and kindergarten; Black & Fernando, 2014; Flook, Goldberg, Pinger, & Davidson, 2015).

Flook and colleagues (2015) examined outcomes of a MBI specifically for preschool children (M_{age} = 4.67), finding small to medium effect sizes across measures of grades (e.g., teacher-rated approach to learning, health, social-emotional functioning) but

not cognitive factors or language/communication (Flook, Goldberg, Pinger & Davidson, 2015). While Black and Fernando (2015) did not look specifically at outcomes for young children, their sample did include kindergarteners (proportion of sample at each grade level was not reported); their study yielded small to medium effects for teacher-reported indices of classroom behavior (attention, self-control, participation, caring for others).

When evaluating and comparing treatment outcomes across studies, intervention dosage and intensity are helpful variables for speaking to intervention-specific differences in outcomes at the individual-level or program-level. For example, an MBI that consists of five thirty-minute sessions held over the course of one week may be expected to enact changes on relevant outcome variables to a different degree than another MBI program that meets for a total of twelve weeks (five days per week) for one-hour sessions. In order to evaluate whether program-specific characteristics were contributing to the lack of comparability with findings in the literature, an approximate measure of program intensity (e.g., program duration, total sessions, minutes of sessions, etc.) was created for the current program and each program listed in Table 1.

This intensity rating was calculated as the total number of minutes of intervention divided by the number of weeks in which the intervention was delivered. Therefore, an intervention delivered in 15-minute sessions three times per week for 16 weeks would be considered less intense compared to another intervention delivered in five 60-minute sessions over the course of 1 week (intensity ratings of 45 and 300, respectively).

Across studies in Table 1, intervention intensity ranged from 5.19 minutes to 180 minutes per week, with a mean intensity of 73.86 minutes. With regard to comparability of intervention intensity in the present study with those in the literature, the MBI

evaluated in the present study ($M_{Intensity}$ = 960/12 weeks = 80 minutes) is considered to be slightly higher but overall comparable to the average intensity observed for studies listed in table 1. Therefore, it is unlikely that the lack of comparability of findings with those in the literature was due to intensity-related differences.

Study-Specific Considerations

Toledo Public Schools serves a student population with an exceptionally high level of socioeconomic stress and adversity; for multiple years, the district earned a state-wide rating of "F" and remained the 2nd worst performer out of more than 600 Ohio schools according to the most recent state-wide performance measures conducted (Ohio Department of Education, 2017-2018 Report Card; see Appendix D, E for district-level and school-level report cards, respectively). Outside indices of academic performance, Toledo Public Schools face severe limitations with regard to social determinants of health. For example, the district is reported to have the highest percentage of homeless students (12.4%) in Ohio (Rosenkrans & Ornelas, 2017) and 86.4% of students are classified as economically disadvantaged (based on percentage of school body qualifying for free or reduced-priced lunch; Ohio Department of Education, 2017-2018 Report Card).

Given the extent to which these academic and socioeconomic challenges are embedded in Robinson's socioenvironmental context, it is likely that more than one semester of intervention delivery is needed to improve outcomes and more fully promote students' healthy psychological, social, and behavioral functioning.

Features of randomization are also considered to have implications for the current study. Rather than randomizing students to intervention groups, randomization occurred

at the classroom-level with the goal of creating groups with approximately equivalent distributions of grades (K-8). However, the beginning of the school year presented challenges to maintaining these original efforts. Specifically, three teachers of classrooms that had already been randomized left their positions at Robinson; administrators then merged some students from classrooms without a teacher to existing classrooms, leading to disproportionate class sizes between groups. As such, the relative imbalance that resulted between groups might also have contributed to the lack of statistically significant between group comparisons.

In the case of analyses of standardized MAP test scores, it was stated that no support was not found for original hypotheses regarding initial improvement and maintenance of improved performance on standardized testing in math and reading following delivery of the mindfulness-based intervention. However, this should be considered within the context of the current study's aims for examining statistical significance of the *magnitude of gains* across testing sessions. As such, analyses examined statistical significance of the observed point-difference between testing sessions (e.g., test score from time 1 subtracted from test score from time 2) corresponding to intervention delivery. Therefore, while the magnitude of change (i.e., point-differences between two test scores) did not reach statistical significance, these gains were in the expected direction reflecting overall improvement across time points. Thus, partial support for hypotheses was found.

Certain systematic differences were observed in available measures of academic and behavioral functioning at different grade levels. This is true for reporting of student problem behaviors on the Strengths and Difficulties Questionnaire (SDQ) as the SDQ

was only administered to grades four through eight; thus, kindergarteners, first graders, and second graders did not report on their own behavioral and peer relationship difficulties. In the case of academic functioning, data the standardized MAP Reading exam scores were available for all grades (i.e., K-8), whereas scores on the MAP Math test were only available for a subset of the sample, as this portion of the exam was only completed by students in grades 2-8.

For the behavior-based school record data, variables reflecting suspension and office referral rates were highly correlated with one another, but rates of absences were not. Thus, absenteeism may not be a good indicator of problem behavior. These correlations also suggest that suspensions and office referrals are not independent of one another and share considerable overlap. Therefore, it is not surprising that a lack of evidence for significant effects of the MBI on one outcome was also observed for the other. Moreover, given the nature of these data as count variables, the majority of cases across time points corresponded to a modal value of zero. This has implications for both statistical analyses and facets of measurement more broadly.

In the case of statistical analyses, zero-inflated distributions observed across rates of suspensions, ORMs, and absences required use of non-parametric analyses instead of parametric tests; given that non-parametric analyses use modal values instead of means, modal values of zero in the present analyses may have limited in sensitivity to actual changes within and between groups. With regard to implications for measurement, the high correlation among variables along with their zero-inflated distributions (positive skew), it could be argued that a more sensitive measure of behavior problems leading to office referrals is needed. Future studies may wish to employ observation-based measures

that attend more closely to temporal factors of intervention, such as when - in proximity to mindfulness class - transgressions are taking place.

Additional factors may also be worthwhile to consider when evaluating the current findings for behavioral infraction rates. First, only one baseline measure of student behavioral functioning was found to return significant between-groups differences in preliminary analyses: this finding indicated that students in the MBI group had significantly higher ratings from teachers on the Hyperactivity-Inattention scale of the SDQ. Because hyperactivity and inattentive qualities in childhood and adolescence are associated with greater rates of problem behavior (e.g., Biederman, Faraone, Milberger, Jetton, Chen, Mick, …, & Russell, 1996), the trends for nonsignificant change or change in the opposite direction in analyses examining rates of ORMs, suspensions, and absences across time points in the present study may be impacted to some degree by differences in severity of hyperactive and inattentive symptoms among students in the MBI group relative to controls.

Interestingly, follow up analyses (i.e., Mann-Whitney U Test) were conducted to examine the effect of age on pre-intervention hyperactivity-inattention problems; after removing kindergarteners from the sample for analysis, the baseline difference was no longer significant ($U=119$, $z = 1.92$, $p=.06$). This suggests that the inclusion of the youngest of students in the current study (i.e., students in grades K-2) may yield some degree of error variability with respect to the lack of comparability of findings with those in the literature. Overall, this baseline difference may have clinical implications warranting further assessment such to suggest that students in the MBI group may need more targeted resources and mindfulness skills for buffering the negative effects of

hyperactivity and inattention on problem behavior and subsequent referrals for misconduct, and whether these resources can be better adapted to suit the needs of younger participants.

Strengths and Limitations

The current study has several notable strengths: first, as is the case across many areas of clinical research, there is often a lack of diversity in the samples enrolled in treatment outcomes studies. The present study examined behavioral and academic outcomes in a socioeconomically-disadvantaged and racially-diverse population. In doing so, it remains a noteworthy consideration to acknowledge that these two outcomes – behavioral functioning and academic achievement – are two factors that have been cited as historically ingrained in the social and civil disparities observed among African Americans and other minority populations (for a review of the achievement gap and discipline gap, see (Gregory, Russell, Skiba, & Nogura, 2010) and (Monroe, 2005), respectively). This study also utilized multiple methods and reporting sources to evaluate student behavior (e.g., parent, teacher, and self-ratings; school records) at multiple time points (e.g., baseline, pre-intervention, post-intervention, 4-month follow up).

The current study also has several important limitations. First, and likely of greatest impact to the present study – these analyses did not control for dosage of the intervention in either group. Due to inconsistency in reporting of students' attendance to each mindfulness class, no reliable measure of physical attendance to the class or participation during class activities was available to include as a covariate. Had such a measure been available, it is likely that findings may have addressed proposed research assumptions with greater specificity and sensitivity to the effects of intervention.

Moreover, a large pool of evidence supports the effectiveness of mindfulness-based interventions for enacting positive changes in student behavioral and academic functioning, as shown by the many treatment outcomes studies reviewed in the introduction chapter. As such, upon securing a reliable measure of attendance – ideally of participation in the mindfulness curriculum – it is likely that results from future work on the larger School Mindfulness Project will reflect a more nuanced picture of intervention effects.

An additional limitation of the current study pertains to the observed variability between group sample sizes (e.g., MBI n = 81, WLC n = 49). As highlighted in the description of participants and procedures, there was notable disparity between proportions of consented and nonresponse among the MBI group (e.g., 94 consented, 95 no response) and WLC group (e.g., 52 consented, 96 no response). While rates of consent tend to vary by study procedures and other study-specific characteristics, other studies examining treatment outcomes of mindfulness-based interventions in the school have reported variability in parental response rates for informed consent procedures based on socioeconomic characteristics of the school and community. For example, Johnson, Burke, Brinkman, and Wade (2016) evaluated a school-based MBI in multiple schools with variable socioeconomic standings; this study reported that consent non-return was over-represented by the lowest socioeconomic school included in their sample, with returned consent from only 25% of students approached.

Within the context of the current study, one specific reason for disparity in consent rates may have been related to the timing of informed consent procedures and intervention delivery for the classes comprising the MBI group; for example, during the

first week of school prior to starting intervention, teachers' in the MBI group may have taken greater initiative in sending home and reminding students to return consent forms because they were preparing to start the intervention with their class that semester. Alternatively, teachers in the WLC group had less direct contact with study staff and thus reminders for prompting their students to talk to their caregivers about the program.

Another reason for this may have been differences in the composition of grades and class types available for randomization between the groups and variation in parent attendance to initial recruitment meetings (e.g., Parent Night, Parent Teacher Conferences). While the study design aimed to randomize grades and class types as best as possible, there was a larger proportion of mainstream classrooms assigned to receive the intervention during the fall, even after excluding the 5th grade class from analyses due to unbalanced intervention delivery.

Overall, the final sample used in the current analysis was composed of 7 mainstream classes in the MBI group (and 2 classes labeled as emotionally disturbed), while the WLC group included 5 mainstream classes, 1 Multiple Disability class (from which only parent report was collected), and 3 Cross Categorical Special Education classes. Therefore, the disproportionate ratio of class type and grade between the two groups may have played a role in the variability observed in rates of consented versus non-response in the MBI and WLC groups.

The particularly low subsample size of the WLC group relative to the MBI group posed a number of complications for analyses; however, the issue was especially trying for the data analytic plan when paired with the issues presented by the very low response

rate and inconsistency of matched pairs of parent report of student behavior across time points for scales of the Strengths and Difficulties Questionnaire.

As a pilot RCT, results and limitations of the current study were expected to provide important insight into the primary areas of the ongoing study's design and data analysis plan. To summarize and propose additional considerations on this topic, it is believed that a reliable measure of attendance and participation in the mindfulness program will serve to strengthen findings of future evaluations exponentially. Group differences in individual cognitive factors, such as hyperactivity and inattention among students should be evaluated and potentially considered as a covariate in relevant analyses if baseline ratings continue to yield positive between-groups differences in coming cohorts of students enrolled in the study.

Moreover, with regard to statistical analyses, future work utilizing these data, and other data on treatment outcomes following mindfulness-based intervention more broadly, should examine outcomes using more robust analyses that better capture effects of time, such as Growth Mixture Modeling (GMM), controlling for key individual-level variables such as gender, age, grade, and class type.

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Appendix A

University of Toledo IRB Informed Consent Form - Parent Consent

IRB # 202305

UT IRB Approved
0000202305

ICF Version Date: 08/03/17

THE UNIVERSITY OF TOLEDO 1872

ADULT RESEARCH SUBJECT - INFORMED CONSENT AND PARENT/GUARDIAN PERMISSION FORM

The Robinson Elementary School Mindfulness Project

Principal Investigator: Wesley A. Bullock, PhD 419-530-2719
Susan Doyle, M.S. 419-530-2717 (student investigator)

Purpose: You and your child are invited to participate in the research project entitled *Program Evaluation of the School Mindfulness Project*, which is being conducted at your child's school under the direction of *Dr. Wesley Bullock at the University of Toledo.* The purpose of this study is to gain information about the Mindfulness Program that is happening at your child's school this year, to find out how the program is working and how it may benefit the students who take part in it. This information will help schools better understand the effects of the School Mindfulness Program for students, parents, and teachers.

Description of Procedures: The *School Mindfulness Project* is a class-based program being offered at your child's school as part of the regular curriculum this year. The Mindfulness program is designed to promote mindfulness skills that help children learn to focus their attention, manage stress better, and improve their emotional and behavioral functioning. The program includes educational and experiential learning that occurs twice each week for one hour, with mindfulness-based exercises and activities for the students in the class.

This program and research evaluation for the *School Mindfulness Project* will take place in your child's school for the children and parents. Some program outcome questionnaires may be completed by you at school, or at your home, or by phone or on-line based on your preference.

For this study, you and your child will be asked to fill out a set of opinion questionnaires to help evaluate whether the Mindfulness program is helping your child. Parents will be asked to complete 3 questionnaires and children will be asked to complete 3 questionnaires. Parents and children will be asked to complete these questionnaires at three times: (1) before the Mindfulness program starts, (2) immediately after the Mindfulness program ends, and (3) at a follow-up time about four months later. Parents will be asked to complete their questionnaires either at school during school registration, or at home and return them to the investigator by mail; parents may also choose to complete their questionnaires over the phone with a research assistant or independently online. Children will be asked to complete their questionnaires in their Mindfulness group at school.

Length of time:
Parent/Guardian questionnaires will take approximately 20 minutes to complete. The child questionnaires will take approximately 20 minutes for your child to complete. Help will be available for you or your child while answering the questionnaires.

Potential Risks/Alternatives: There are minimal risks to participation in this study, including loss of confidentiality. Your child may experience some discomfort from reading certain items on the

University of Toledo IRB Approved
Approval Date: 08/03/17
Expiration Date: 08/02/18

questionnaires, although this is very unlikely. Your child has the right to not answer any specific questions or to stop their participation at any time. Should you or your child become upset while taking part in this study, the researcher will be available to answer your questions and address your concerns. If you have questions or concerns about taking part in the study *after* you or your child has completed the questionnaires, the investigator will also be available to answer any questions and address any concerns. Additionally, if requested, the investigator will also be able to provide you with a referral to a school counselor or psychologist.

Potential Benefits: Potential benefits for you and your child if you participate in the School Mindfulness Project include better understanding what mindfulness skills are, and how using those mindfulness skills may help you or your child to learn how to focus attention, manage stress better, and improve emotional and behavioral functioning. Other potential benefits may be that you will learn about how research studies are run and others may benefit by learning about the results of this research.

Confidentiality: The researchers will make every effort to prevent anyone who is not on the research team from knowing that you or your child provided this information, or what that information is. To protect confidentiality of your responses, no teacher, and no one from the school, will see your answers to the questionnaires. Only research team members will see the questionnaires that are completed, and all data we get from a parent/guardian or child will be coded by a research number, not by name. Only general group results, not specific individual outcomes, will be used in any report about the project.

Although we will make every effort to protect you and your child's confidentiality, there is a low risk that this might be breached. Also, you should know that there are some limits to confidentiality. Cases where reported information indicates that you or another person is judged to be in imminent danger and cases of suspected child abuse or neglect must be reported to the appropriate authorities.

Voluntary Participation: Your refusal to allow your child to participate in this study will involve no penalty or loss of benefits to which you are otherwise entitled and will not affect your relationship with The University of Toledo or your child's school. Participation in the research is voluntary and you or your child may discontinue participation at any time without any penalty or loss of benefits. If your child does not participate in the research evaluation of the project, they may still participate in the mindfulness program. If your child does not participate in the research, they will continue their school day as normal (i.e. working at their desk).

NO TEXT THIS PAGE

Contact Information: Before you decide to accept this invitation for your child to take part in this study, you may ask any questions that you might have. If you have any questions at any time before, during or after your participation or if you or your child experiences any psychological distress as a result of this research you should contact a member of the research team Dr. Wesley Bullock (419-530-2719) or Susan Doyle (419-530-2717).

If you have questions beyond those answered by the research team or your rights as a research subject or research-related injuries, the Chairperson of the SBE Institutional Review Board may be contacted through the Office of Research on the main campus at (419) 530-2844.
Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

SIGNATURE SECTION – Please read carefully

You are making a decision whether or not you and your child will participate in this research study. Your signature indicates that you have read the information provided above, you have had all your questions answered, and you have decided to allow you your child to take part in this research.

The date you sign this document to enroll your child in this study, that is, today's date must fall between the dates indicated at the bottom of the page.

[ ] I AGREE for myself and my child to participate in this research study.

[ ] I AGREE for my child to participate in this research study, but I am not interested in participating.

Name of Parent/Guardian (please print)	Signature of Parent/Guardian	Date
Name of Child (please print)	Child's Grade and Name of Teacher (please print)	
Name of Person Obtaining Consent (please print)	Signature	Date

This Adult Research Informed Consent document has been reviewed and approved by the University of Toledo Social, Behavioral and Educational IRB for the period of time specified in the box below.

Approved Number of Subjects: 750

University of Toledo IRB Approved
Approval Date: 08/03/17
Expiration Date: 08/02/18

Appendix B

University of Toledo IRB Informed Consent Form - Teacher Consent

IRB # 202305
ICF Version Date: 01.01.2013

Department of Psychology
The University of Toledo
Mail Stop #948
2801 W.
Bancroft Street
Toledo, OH, 43606

ADULT RESEARCH SUBJECT - INFORMED CONSENT FORM – Teachers
The Robinson Elementary School Mindfulness Project

Principal Investigator: Wesley A. Bullock, Ph.D., 419-530-2719
Susan Doyle, M.S., 419-530-2717

Purpose: You are invited to participate in the research project entitled *Program Evaluation of the School Mindfulness Project*, which is being conducted at Robinson Elementary under the direction of *Dr. Wesley Bullock at the University of Toledo.* The purpose of this study is to gain information about the Mindfulness Program that is happening at Robinson Elementary this year, to find out how the program is working and how it may benefit the students and teachers who take part in it. This information will help schools better understand the effects of the School Mindfulness Program for students, parents, and teachers.

Description of Procedures: The *School Mindfulness Project* is a class-based program being offered at Robinson Elementary as part of the regular curriculum this year. The Mindfulness program is designed to promote mindfulness skills that help children and teachers learn to focus their attention, manage stress better, and improve their emotional and behavioral functioning. The program includes educational and experiential learning that occurs twice each week for one hour, with mindfulness-based exercises and activities for the students in the class. The Mindfulness program will also provide additional professional development training sessions for participating teachers, with a goal of developing the mindfulness skills of teachers as well.

This program and research evaluation for the *School Mindfulness Project* will take place in Robinson Elementary school for the children, parents, and teachers. Teacher program outcome questionnaires will be completed by hand at Robinson Elementary, or at home.

For this study, you will be asked to fill out a set of opinion questionnaires to help evaluate whether the Mindfulness program is helping you and your students. Teachers will be asked to complete 3 questionnaires. Two of the questionnaires will be about the teachers' own mindfulness and burnout levels, and one questionnaire will be filled out once per every student of the teachers class, to obtain teacher report of students' functioning over time. Teachers will complete questionnaires 3 times; (1) before the Mindfulness program starts, (2) immediately after the Mindfulness program ends, and (3) at a follow-up time about three months later.

After you have completed your participation, the research team will debrief you about the data, theory and research area under study and answer any questions you may have about the research.

Length of time:
Teacher questionnaires will take approximately 1 hour to complete.

University of Toledo IRB Approved
Approval Date: 08/03/17
Expiration Date: 08/02/18

IRB # 202305
ICF Version Date: 01.01.2013

NO TEXT THIS PAGE

University of Toledo IRB Approved
Approval Date:08/03/17
Expiration Date:08/02/18

Potential Risks: There are minimal risks to participation in this study, including loss of confidentiality. You may experience some discomfort from reading certain items on the questionnaires, although this is very unlikely. You have the right to not answer any specific questions or to stop participation at any time. Should you become upset while taking part in this study, the researcher will be available to answer your questions and address your concerns. If you have questions or concerns about taking part in the study *after* you have completed the questionnaires, the investigator will also be available to answer any questions and address any concerns. Additionally, if requested, the investigator will also be able to provide you with a referral to a counselor or psychologist.

Potential Benefits: Potential benefits for you if you participate in the School Mindfulness Project include better understanding what mindfulness skills are, and how using those mindfulness skills may help you learn how to focus attention, manage stress better, improve emotional functioning, and reduce burnout. Other potential benefits may be that you will learn about how research studies are run and others may benefit by learning about the results of this research.

Confidentiality: The researchers will make every effort to prevent anyone who is not on the research team from knowing that you provided this information, or what that information is. The consent forms with signatures will be kept separate from responses. Responses will not include names and only group results, not individual outcomes, will be reported.

Although we will make every effort to protect your confidentiality, there is a low risk that this might be breached. Also, you should know that there are some limits to confidentiality. Cases where reported information indicates that you or another person is judged to be in imminent danger and cases of suspected child abuse or neglect must be reported to the appropriate authorities.

Voluntary Participation: Your refusal to participate in this study will involve no penalty or loss of benefits to which you are otherwise entitled and will not affect your relationship with The University of Toledo or your school. In addition, you may discontinue participation at any time without any penalty or loss of benefits. If you do not participate in the study, you will continue your workday as normal.

Contact Information: Before you decide to accept this invitation for you to take part in this study, you may ask any questions that you might have. If you have any questions at any time before, during or after your participation or if you experience any psychological distress as a result of this research you should contact a member of the research team Dr. Wesley Bullock (419-530-2719) or Susan Doyle (419-530-2717).

If you have questions beyond those answered by the research team or your rights as a research subject or research-related injuries, the Chairperson of the SBE Institutional Review Board may be contacted through the Office of Research on the main campus at (419) 530-2844.

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

University of Toledo IRB Approved
Approval Date: 08/03/17
Expiration Date: 08/02/18

SIGNATURE SECTION – Please read carefully

You are making a decision whether or not to participate in this research study. Your signature indicates that you have read the information provided above, you have had all your questions answered, and you have decided to take part in this research.

The date you sign this document to enroll in this study, that is, today's date must fall between the dates indicated at the bottom of the page.

Name of Subject (please print)	Signature	Date
Name of Person Obtaining Consent	Signature	Date

This Adult Research Informed Consent document has been reviewed and approved by the University of Toledo Social, Behavioral and Educational IRB for the period of time specified in the box below.

Approved Number of Subjects: 750

University of Toledo IRB Approved

Approval Date: 08/03/17

Expiration Date: 08/02/18

Appendix C

University of Toledo IRB Informed Assent Form - Child Assent

Department of Psychology
The University of Toledo
Mail Stop #948
2801 West Bancroft Street
Toledo, OH 43606-3390

CHILD RESEARCH SUBJECT ASSENT FORM

The Robinson Elementary School Mindfulness Project

Principal Investigators: Wesley Bullock, Ph.D., (419) 530-2719
Susan Doyle, M.S., (419) 530-2717

- **You are being asked to be in a study to help people find out how the *Mindfulness* program in your school helps kids, teachers, and parents.**
- **You should ask any questions you have before making up your mind. You can think about it and discuss it with your family or friends before you decide.**
- **It is okay to say "No" if you don't want to be in the study. If you say "Yes" you can change your mind and then quit the study at any time without getting in trouble. If you say "No" to the study, you will continue to take part in your classroom activities as you normally would while the study is going on.**

We are doing a research study about the Mindfulness Project in your school. A research study is a way to learn more about mindfulness programs. If you decide that you want to be part of this study, you will be asked to answer some questions about how you think and feel. Some questions that you may be asked are, "I get upset with myself for having certain thoughts" *or* "I try to be nice to other people". This is not a test. There are no right or wrong answers. You can answer these questions however you think or feel. If you have questions for anyone, you can ask them now before you begin or any time you need help. You can ask to stop or take a break at any time too.

Everything you say will be confidential. This means that only people working on this project will know what you say, and no one will use your name to talk about anything that you write.

You might feel uncomfortable answering some of the questions we ask you about how you think and feel. If you do not want to answer a question, you do not have to, but we would like you to try your best. You may also stop at any time. No one will be upset with you.

Not everyone who takes part in this study will benefit. A benefit means that something good happens to you. We think one benefit might be that you learn how a research study works. We also think we might learn things from you that will help us figure out how to help other children and their parents.

When we are finished with this study we will write a report about what was learned. This report will not include your name or say that you were in the study.

If you have any questions about the study, you can ask them at any time. You can also call Dr. Wesley Bullock at 419-530-2719, or Susan Doyle, 419-530-2717, if you have a question later.

If you decide to be in this study, please print and sign your name below.

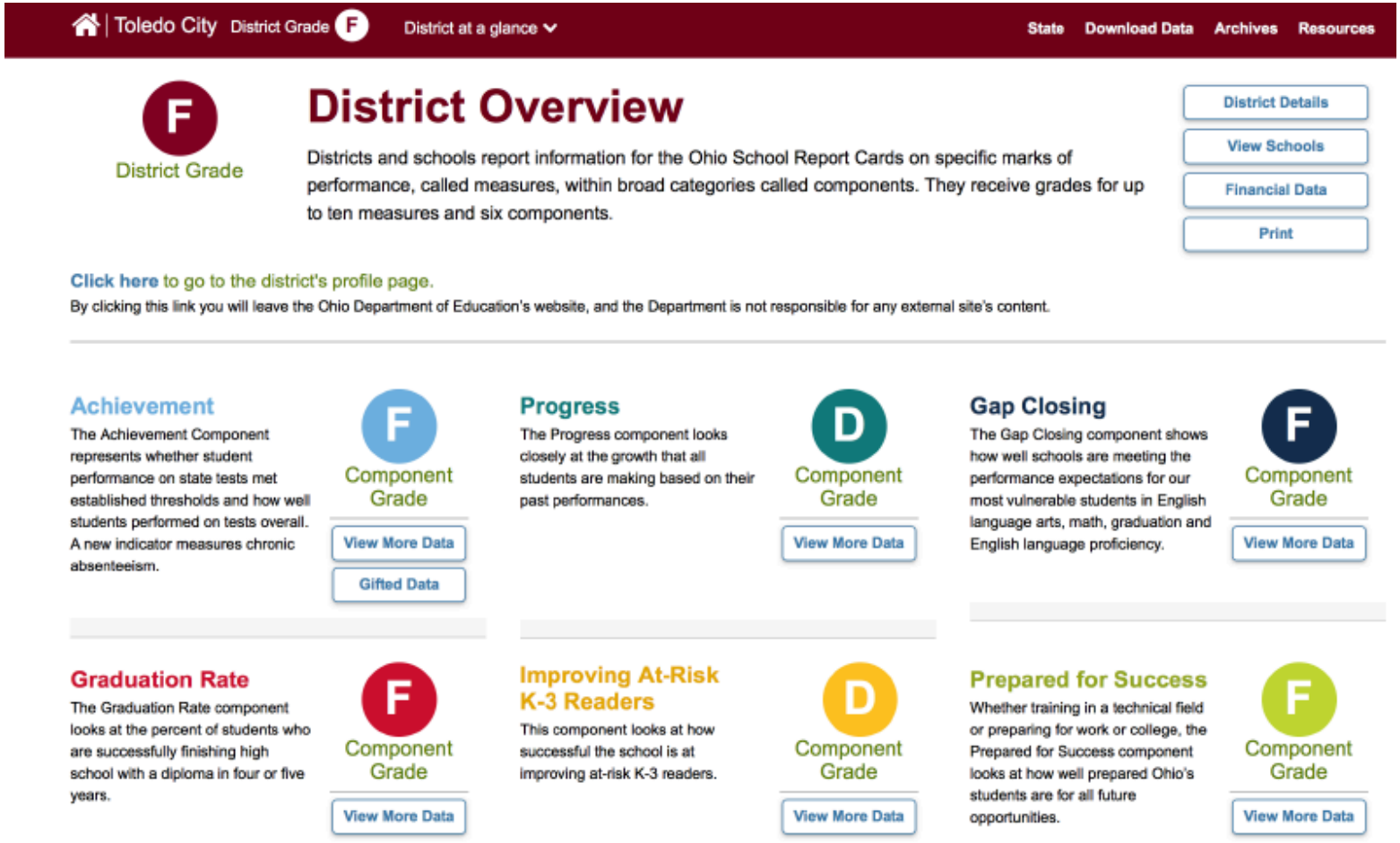
I, _____, agree to be in this research study.
(Print your name here)

Sign your Name: _____ Date: _____

University of Toledo IRB Approved # 202305
UT IRB Approval Date: 8/3/17
UT IRB Expiration date: 8/2/18

Appendix D

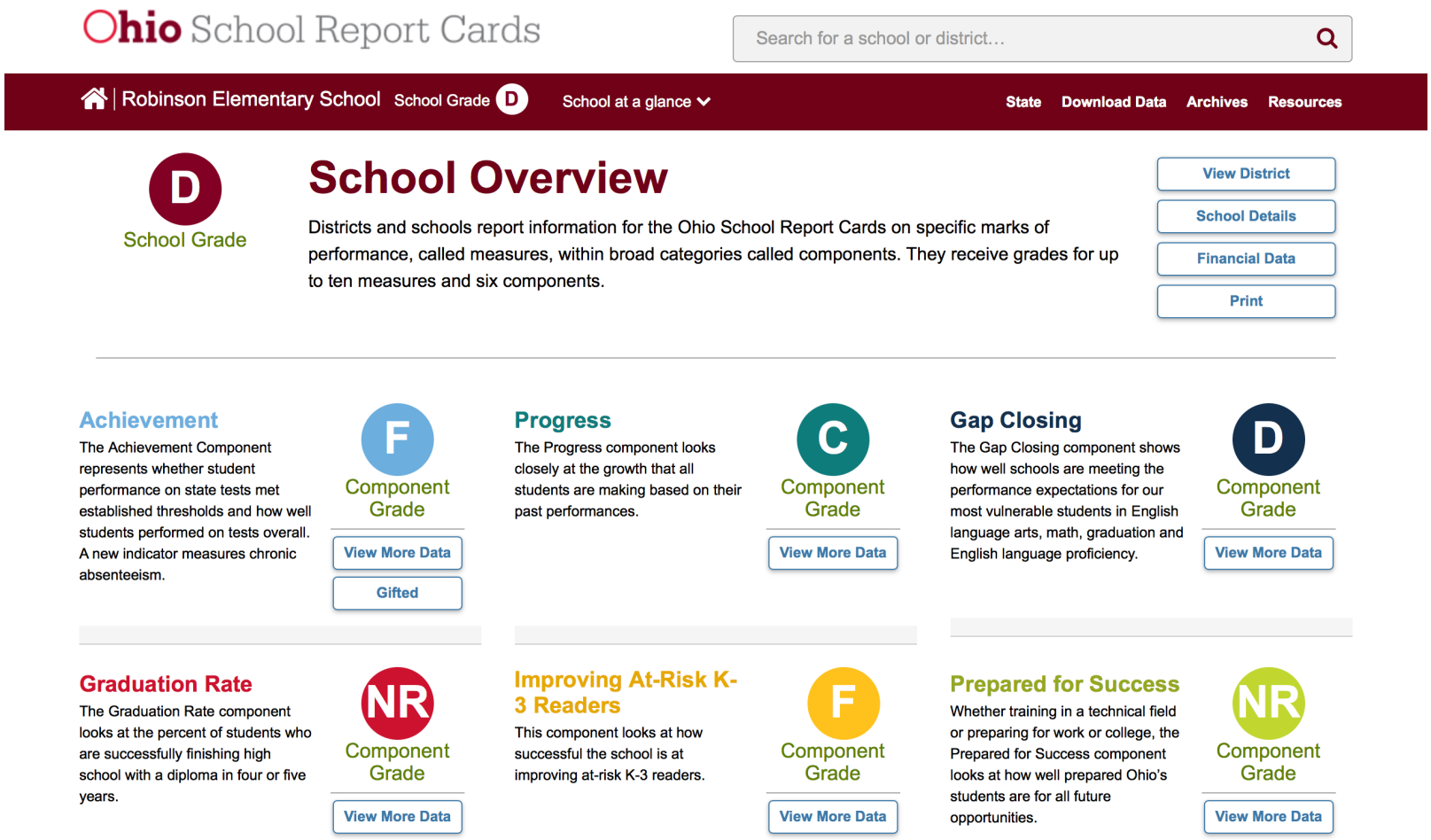
District-Level Performance Indicators for Toledo City Schools on the 2017-2018 Ohio Schools Report Card



Retrieved from Ohio Department of Education webpage: https://reportcard.education.ohio.gov/district/overview/044909

Appendix E

School-Level Performance Indicators for Robinson Elementary School on the 2017-2018 Ohio Schools Report Card



Retrieved from Ohio Department of Education webpage: https://reportcard.education.ohio.gov/school/overview/032102