THE EFFECTS OF SOCIOEMOTIONAL LEARNING AND MINDFULNESS STRATEGIES ON THE SELF-REGULATION OF PRESCHOOL STUDENTS

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ABSTRACT

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By the time children enter kindergarten, parents and teachers expect that young children are able to demonstrate self-regulation, to control their thoughts, feelings, and behaviors in support of optimal learning and socioemotional functioning at school. Although the literature has suggested that instruction and practice in socioemotional learning (SEL) and in mindfulness can each separately benefit young children's self-regulation, research has not examined the effectiveness of the combination of these approaches. Using a multiple probe across behaviors single-case design, the current study investigated the effects of class-wide implementation of an evidence-based SEL program and the added value of mindfulness practices on 6 preschool students who demonstrated behavioral concerns and low self-regulation. Formative and summative assessments measured mindfulness, executive function, effortful control, and general levels of self-regulation and socioemotional functioning in each participant. Results suggested that SEL-Mindfulness integration did not lead to clear benefits in self-regulation and mindfulness across preschool students, although children who expressed treatment acceptability tended to receive increased ratings in these areas. Implications for school psychological practice and future research are discussed.

This dissertation is dedicated to
my parents, George and Janice Chen, and
to my brother, Albert.

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CHAPTER 1: INTRODUCTION

Joey is a four-year-old boy who attends preschool. Since enrolling, he has had trouble making friends. Many children are scared of him; they do not particularly enjoy playing with him because he does not always share, help, or take turns with them. In addition, he has had multiple tantrums during class and recess because he did not "get his way" or felt that he was treated unfairly. His teachers, Mrs. Kirby and Mrs. Darcy, have noticed that he has slightly improved in expressing his feelings since the beginning of the year and is better able to "calm his body down" when upset or frustrated. However, they admitted that "Joey still has a long ways to go." During whole-group mini-lessons on the rug, Joey has trouble following directions and paying attention. He often "stares off into space" or bothers his attentive peers during this time and needs reminders to re-engage. During snack time and classroom birthday parties, Joey tends to eat before the teachers allow the class to do so because the food happened to be his "favorite".

At the most recent parent-teacher conference, Joey's teachers recommended that he remain in preschool another year before attending kindergarten. Despite Joey's progress, Mrs. Kirby and Mrs. Darcy believe that Joey needs to make additional improvements to his self-regulation, to better manage his behavior and emotional expression, to make friends and be ready to learn, so that he successfully transitions to elementary school next September. During their lesson planning period, they discuss several initial questions they have in supporting Joey. How might they help Joey better manage his actions and feelings consistently? Can they do this in a class-wide setting? Which established or promising evidence-based interventions have proven effective? Would it be possible to select and combine lessons from different interventions to address the unique needs of their students, particularly for Joey? These questions frame Mrs. Kirby's and Mrs. Darcy's joint approach to targeting Joey's self-regulation. Although he is only four years old, enhancing his ability to self-regulate will help him thrive in kindergarten next fall, in addition to other short-term and long-term benefits.

Background

Each fall, thousands of parents across the United States, like Joey's, enroll their child in kindergarten. Upon entrance, parents and educators expect that these young boys and girls will demonstrate the cognitive and socioemotional competencies necessary to thrive in elementary school (Magnuson, Ruhm, & Waldfogel, 2007). These early skills (e.g., counting, reciting the alphabet, making friends with other children) comprise aspects of school readiness, a broad state of preparedness that allows children to learn in a formal educational setting (Snow, 2006). Given its role in nurturing educational growth and development (Ladd, Herald, & Kochel, 2006), school readiness is critically important in children's later success.

An essential pre-requisite of school readiness is self-regulation, or the capacity to manage one's behavior, thoughts, and emotions appropriately during social interactions and engagement in intellectual tasks (Blair, 2002). Nationally-surveyed kindergarten teachers have consistently rated their entering students' ability to manage their behavior and emotions effectively as essential skills, above and beyond cognitive and academic competence, that would enable young children to function productively at school (Lewitt & Baker, 1995; Rimm-Kaufmann, Pianta, & Cox, 2000; Lin, Lawrence, & Gorrell, 2003). Yet, according to a separate survey conducted by the National Center for Early Development and Learning, 46% of kindergarten teachers reported that at least half their class lacked such skills and experiences that facilitate learning and optimal functioning in the educational setting (Rimm-Kaufmann, Pianta, & Cox, 2000). Statistics like these highlight the need to promote self-regulatory skills that are essential for young children's academic and social functioning.

Self-regulation is a multi-dimensional construct that consists of cognitive- and emotion-based processes that govern behavior (McClelland et al., 2015; Blair & Dennis, 2010). Ranging from regulating attention to managing thoughts and emotional expression, self-regulation has been found to have short-term and long-lasting effects across the life span in many areas of life. It is known to facilitate academic and social competence by age 5 by enabling children to focus their attention and moderate their impulses adeptly (McClelland, Morrison, & Holmes, 2000). Children with higher levels of self-regulation tend to have greater skills in emergent literacy, vocabulary and math because they become better at managing their classroom behavior, such as paying attention during instruction, remembering instructions, and completing tasks (McClelland et al., 2007). The ability to self-regulate also correlates with increased social competence (Spinrad et al., 2006) and high quality relationships with peers and teachers (Eisenberg, Valiente, & Eggum, 2010) through adolescence. Well-regulated children tend to behave in constructive, socially appropriate ways, such as being friendly and helpful, which more likely encourages positive peer relationships and intimate relationships. More distally, self-regulation has been found to predict higher levels of educational attainment and quality of life, including higher self-esteem, more intimate interpersonal relationships, better physical health, and more financial security (Moffitt et al., 2011; Busch & Hofer, 2012). The ability to delay gratification, control impulses, and convey emotions appropriately enables children to reap benefits as thriving, well-adjusted adults in many areas of life.

Researchers have conceptualized self-regulation using two distinct approaches. Those who study socioemotional learning (SEL) view self-regulation as part of an interrelated network of cognitive, affective, and behavioral skills that underlie children's academic performance and social interactions (Durlak et al., 2011; Izard et al., 2001). The ability to identify thoughts and emotions accurately; regulate emotions, thoughts, and behaviors effectively in different contexts; take the perspective of and empathize with others from diverse backgrounds; build and maintain healthy relationships; and make positive and respectful choices make up a repertoire of essential skills that socially and emotionally competent children display (Collaborative for Academic, Social, and Emotional Learning [CASEL], 2007). They suggest that cultivating socioemotional competence can improve children's self-regulation.

To promote self-regulation in young children, SEL researchers recommend the use of high-quality, evidence-based SEL curricula. These programs explicitly teach children to engage in pre-requisite skills for learning effectively (e.g., listening and focusing attention), identify their own feelings and those of others, cope with strong emotions and express them in socially acceptable ways, and make friends and resolve conflicts with peers (Committee for Children, 2011). Large-scale experimental studies and meta-analyses have found that universal (primary prevention) and indicated (secondary prevention) SEL programs implemented in elementary and middle schools significantly improved children's social and emotional competence, attitudes, and positive social behavior, in addition to reducing conduct problems and emotional distress (Durlak et al., 2011; Payton et al., 2008). In addition to its strong links to getting along well with others (Han & Kemple, 2006), social and emotional competence has also been found to predict higher academic motivation, math and reading skills, test scores, and grade-point averages (Izard et al., 2001; Hawkins et al., 1999).

Other researchers, who generally agree that early schooling should focus on helping young children "learn how to learn," study self-regulation using a framework that involves temperament and cognition. In this approach, self-regulation is conceptualized in terms of temperament-based effortful control and cognition-based executive function, respectively. Effortful control (EC) refers to the ability to maintain or shift attention in order to complete tasks and to resist impulses in response to events in one's environment. For example, expressing positive emotion when one has received an unfavorable gift and seeking support in the midst of stress or frustration are both behaviors that represent aspects of EC. In contrast, executive function (EF) is defined as a collection of higher-order cognitive skills required to regulate thinking, feeling, and behavior in order to reach a goal. For example, sitting quietly before recess to be chosen as the line leader, keeping focus to complete an assignment, and learning to play a new game represent aspects of EF.

Although they have been found to correlate moderately (Blair & Razza, 2007), EC and EF are thought to be distinct components of self-regulation that mutually interact to enable young children to manage behavior and emotional expression appropriately (Blair & Ursache, 2011; Blair & Dennis, 2010). For example, children who react with a high level of negative emotion (e.g., anger, frustration, anxiety) have more difficulty regulating their behavior at school, a place where they need to focus and shift attention, problem solve, and engage in goal-directed behavior (Blair, 2002). These suggested relations between cognition, emotion, and behavior highlights the importance of targeting EC and EF early in development through training in order to promote self-regulation in young children.

One such type of training that has shown promise in cultivating EC-EF self-regulatory abilities in young children includes mindfulness-based techniques (e.g., deep breathing) (Zelazo & Lyons, 2012). Mindfulness exercises generally teach children to reflect on and attend to alternative, more suitable responses, instead of relying on automatic or emotionally-driven reactions that may not be appropriate in a given situation or context (Zelazo & Lyons, 2012). Although in its infancy, mindfulness research suggests promising results. A recent meta-analysis found that mindfulness-based interventions predicted reductions in behavioral problems, executive dysfunction, inattention, and emotion dysregulation in students across all grade levels (Felver et al., 2016). Other studies have found strong correlations between school-based mindfulness exposure and progress in specific aspects of EF and EC, including attention, delayed gratification, and inhibitory control (Napoli, Krech, & Holley, 2005; Flook et al., 2010).

Significance and Rationale

The research on self-regulation indicates that children can be trained to regulate their thoughts, feelings, and behaviors using school-based SEL or mindfulness interventions. However, three gaps in the extant research gaps limit the implementation of these recommended interventions. First, no study has examined the combined effect of both types of interventions in young children, despite extensive empirical support for the effectiveness of a variety of SEL programs and the promising support for the use of mindfulness-based interventions. As such, it is unknown whether the distinctive components of mindfulness (e.g., mindful awareness of the sense and knowledge of the brain) provide added value to an existing SEL program. The current study addressed this gap by examining the added benefit of a mindfulness component to an existing SEL program to promote EF, EC, and mindful awareness. With a focus on teaching students about why and how the brain relates to feelings and actions – above and beyond teaching social and emotional competence through lessons, games, and rehearsal – the selected mindfulness lessons promoted mind-body awareness and the sense that each individual is capable of changing his or her thoughts and behaviors.

Second, no published work has yet examined the efficacy or effectiveness of implementing specific lessons from established interventions or combining select lessons from different interventions to cater to the specific needs of students. Established programs generally encourage educators to deliver all lessons in sequence and follow implementation recommendations to yield optimal outcomes. However, practical barriers in everyday settings (e.g., limited time and resources) and a focus on skills that a specific child or a particular set of children need to develop may contribute to low fidelity. Although developers of these interventions acknowledge the need for flexibility in delivery, the extent to which practitioners (e.g., teachers) can deviate from the suggested content, sequence, and dosage, among other barriers, is largely unknown. These implementation barriers and the need to target specific skills in a certain child or group of children warranted examination of the delivery of select curriculum lessons or units, as doing so is the first step to determining efficiency and effectiveness of this procedure. Therefore, this study filled a second research gap by investigating the effectiveness of combining selected lessons from SEL and mindfulness programs on the self-regulation of individual students.

Third, the empirical evidence for the effectiveness of SEL programs and the majority of mindfulness interventions has been based on group data. No research has evaluated the effects of SEL programming on individual children. Single-case-experimental multiple baseline designs have been used to investigate the effectiveness of a mindfulness curriculum (*Soles of the Feet*) on certain clinical populations (e.g., Singh et al., 2007) and on typically-developing students (Felver, Frank, & McEachern, 2011). These studies found reductions in aggressive behavior among the majority of participants, but they only examined a mindfulness intervention. The lack of an SEL component in these studies warranted a single-case experimental research investigation to determine the added value of a mindfulness intervention to SEL components for each participant (Gast & Ledford, 2014). As such, this research addressed a third research gap by examining the effectiveness of both SEL and mindfulness lessons in six individual children using single-case experimental design.

Purpose of the Study

The current study had two objectives. First, it investigated the effects of a well-established socioemotional learning (SEL) program (*Second Step*; Committee for Children, 2014) on the self-regulation of preschool students. Second, this study examined the added value of selected components of a mindfulness-based skills training curriculum (*MindUp*; The Hawn Foundation, 2011) to an SEL program on young children's self-management. This study was built on a pilot study conducted by the researcher that explored whether a *MindUp* lesson, which explicitly teaches mindful movement, resulted in improvements in preschool children's self-regulation (inhibitory control, or one aspect of EF and EC). A single-case experimental design (multiple probe across behaviors) was used to investigate the effectiveness of SEL and mindfulness program components on individual four-year-old preschool children (n = 6). Although the findings of this study may not be generalizable to the typical preschool student, one strength of this design is that one can establish causality between these intervention programs and the self-regulation (focused attention, inhibitory control, empathy, and emotion management) of individual children identified as needing additional support in this area.

Research Questions

The current study addressed four research questions regarding the acquisition of preschool children's self-regulatory skills:

1. Does the delivery of *Second Step Early Learning Program* and *MindUp* in combination result in improvements in mindfulness and self-regulation among preschool children?
    a. Do exposure and dosage levels of *Second Step Early Learning Program* and supplemental *MindUp* lessons altogether relate to the mindfulness and self-regulation among preschool children?
2. Does the use of selected units of the *Second Step Early Learning Program* result in improvements in mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) among preschool children?
    a. Do exposure and dosage levels of *Second Step Early Learning Program* relate to the mindfulness and self-regulation among preschool children?
3. If *Second Step Early Learning Program* results in improvements in mindfulness and self-regulation, do supplemental *MindUp* lessons provide added value beyond the benefits of *Second Step Early Learning Program* in preschool children?
    a. Do exposure and dosage levels of supplemental *MindUp* lessons relate to the mindfulness and self-regulation among preschool children?

CHAPTER 2: LITERATURE REVIEW

Self-regulation is a critical component of school readiness, facilitating young children's socioemotional competence and academic achievement in kindergarten and beyond (Blair, 2002; McClelland, Morrison, & Holmes, 2000). To cultivate self-regulation during early childhood, researchers have promoted the use of socioemotional learning (SEL) curricula or mindfulness practices. Those who recommend delivery of SEL programming have found strong positive correlations with improved social behavior and emotional competence, along with increased academic motivation and achievement in large samples of elementary and middle school students (Durlak et al., 2011; Han & Kemple, 2006; Izard et al., 2001). Similarly, those who suggest the use of school-based mindfulness practices have reported improvements in these areas across different groups of elementary, middle, and high school students, in addition to fostering certain components of executive function and effortful control (Felver et al., 2016; Flook et al., 2010; Napoli et al., 2005). Despite these findings, no study has reported on the individual and combined effects of mindfulness and SEL programming on individual preschool students who demonstrate difficulties in self-regulation.

This study aims to accomplish two goals: (a) to investigate the effects of certain components of a research-based SEL program (*Second Step Early Learning Program*; Committee for Children, 2011) and (b) to examine whether components of a mindfulness-based program (*MindUp*, The Hawn Foundation, 2011) provide added value to the SEL program on the self-regulation of individual preschool children. An understanding of how self-regulation is conceptualized, as well as how it relates to the early childhood developmental period (preschool) and to SEL and mindfulness is necessary before investigating the added value of selected *MindUp* lessons to *Second Step* components. Accordingly, the review of the current literature addresses the following topics: (a) overview of early childhood developmental period, (b) theoretical framework of self-regulation, (c) why self-regulation is important in early childhood, (d) how SEL and mindfulness relate to self-regulation and the significance of each in early childhood, and (e) rationale for deconstructing and combining selected lessons from SEL and mindfulness programs.

Early Childhood

This study focuses on early childhood, particularly on preschool-aged children, because it is a time of expansive development for the emergence of self-regulation skills. Children's cognitive development and developmental milestones as they relate to self-regulation are discussed below.

Stages of Cognitive Development. During early childhood, children develop increasingly complex and coherent thoughts, which allow them to learn, get along with others, and regulate their own behaviors, thoughts, and feelings. Piaget offered insight regarding children's growth in self-regulation skills through qualitative descriptions of thoughts and behaviors at different stages of cognitive development, such as the preoperational operational period (Ginsburg & Opper, 1988; Flavell et al., 1968).

Children typically enter Piaget's preoperational stage of cognitive development by age 2 and progress through it at age 7 (Ginsburg & Opper, 1988). Preschool students between ages 3 and 5 generally demonstrate preoperational thinking, even after they enter kindergarten at ages 5 and 6. During this time, boys and girls tend to consider the world entirely in terms of their own points of view. Children at this age do not easily consider other individuals' perspectives or take on the role of another person (Flavell et al., 1968). In addition, preoperational children typically attend to a single feature of an object or event and ignore other aspects. As such, they are likely to incorrectly conclude that liquid poured into a tall, narrow vessel contains more water than an equal amount of liquid poured into a short, wide container, even though they see equal amounts of liquid poured into those containers. Another hallmark of this stage is the ability to engage in symbolic thinking or to represent an item with something else (Stapel-Wax, 2011). For example, a preoperational child would understand that a little room in the diorama represents an actual, life-size room. Language acquisition, problem solving without being able to explain underlying ideas (e.g., completion of one-digit addition facts), and learning from others using language all increasingly develop with symbolic thinking. Children can also understand events in terms of past, present, and future and are able to make connections between previous and current circumstances.

As young children advance through Piaget's stages of cognitive development, growth in self-regulation becomes evident from their increasingly differentiated and coherent structures of thought. Piaget considered a child to have developed effective self-regulation skills when he or she gained a high level of understanding of the social and physical world (Branson, 2000). This understanding, which manifests as the ability to regulate thoughts, feelings, and behaviors skillfully, stems from the ability to interact effectively with one's environment over time. Each developmental period is characterized by the unique ways in which children view the world, which depend largely on changes in cognitive organization and cognitive adaptation involved in innate self-regulatory processes during this time (Miller, 2002). Specifically, the developing interconnections between cognitive activities allows for children to view the world more clearly and rationally over time. Children at each developmental period apply what they know in order to become familiar with characteristics of new objects and events, as well as to understand how these objects and events relate to each other. As children get to know objects, events, and their relationships on a deeper level, they further expand their understanding by considering unique properties not known or considered by them earlier. A reorganization of thought results from increased understanding, which leads children to experience an object or event differently than earlier in time. These self-regulatory processes involved in cognitive organization and cognitive adaptation allow children to gradually adjust their understanding of objects, the physical world, and others' points of view as they progress from one developmental stage to the next (e.g., sensorimotor to preoperational stage).

Developmental Milestones (Ages 3-5). Between birth and age 5, young children typically achieve multiple developmental milestones within social-emotional, language, cognitive, and physical domains (American Academy of Pediatrics, 2009). These developmental hallmarks complement the qualitative descriptions of young children's increasingly coherent thought structures noted by Piaget. At age three, when some enter preschool, many typically developing children can voluntarily display affection for friends without prompts, demonstrate concern for a friend who shows distress, show a variety of feelings, follow two- and three-step instruction, and play with puzzles among an assortment of other skills. By age five, the time during which preschool children transition to kindergarten, most children have further developed skills across multiple areas. They can cooperate; make, please, and fit in with their friends; tell straightforward stories using full sentences; count to at least ten; print some letters and numbers; and copy simple geometric shapes, among many other skills.

Between the ages of three and five years, children show dramatic growth in self-regulation, specifically in their executive functioning and their acquisition and demonstration of emotion management skills, which support learning and social competence in increasingly structured educational settings. This time is marked by transition to school, which places high demands on children's executive functioning (Zelazo & Carlson, 2012). Linked to the lateral prefrontal cortex and related neural circuits, the development of executive function undergoes especially rapid growth between ages three and five (Zelazo & Carlson 2012; Calkins & Marcovitch, 2010). For instance, it was found that five-year-old children were able to sort cards by two dimensions (e.g., color and shape) or sort solely by the second dimension (e.g., shape), whereas their three-year-old peers could only reliably do so on one dimension (e.g., shape) when asked to engage in the Dimensional Change Card Sort (DCCS; Zelazo, Frye, & Rapus, 1996).

During this period, children also become increasingly proficient and independent in modulating, inhibiting, and controlling their feelings by using strategies learned from one-on-one interactions with their caregivers and other important adults (Calkins & Markovitch, 2010). Children use their early experiences to apply their skillset across contexts in a voluntary, effortful manner (e.g., taking a deep breath and counting to five when upset) or in an involuntary, automatic way (e.g., decreasing vagal regulation of the heart to manage behavior) (Calkins, Graziano, Berdan, Keane, & Degnan, 2008). With their developing ability to understand false beliefs (theory of mind; Gweon & Saxe, 2013), suppress dominant and activate subdominant responses (Carlson, 2005; Carlson & Wang, 2005), and manage emotional display without adult help (Cole, 1986), three- and four-year-old children can grasp strategies for regulating sadness equally well (Cole et al., 2008). However, four-year-olds demonstrate a better understanding of anger management than their younger peers, which is likely related to better receptive and expressive language skills (Cole et al., 2008). By age five, most children are able to identify feelings associated with difficult or taxing situations, describe how to assuage negative emotions in a step-by-step fashion, and generate specific ways that may be used to manage daily stress (Denham, 1997). During the preschool years, despite their ability to identify emotions and coping strategies to alleviate stressful situations, children tend to suggest both suitable and unsuitable methods to regulate negative emotions, such as anger and frustration (Denham, 1998; Eisenberg & Fabes, 1992).

Conceptualization of Self-Regulation

Self-regulation broadly refers to the acquisition of information and environmental cues, evaluation of courses of action, and adaptive decision-making to achieve a desired goal (McClelland et al., 2015). Although researchers generally agree that self-regulation is an overarching category of skills, it has been studied using a variety of theoretical frameworks that involve top-down (executive functions) skills and bottom-up (effortful control) management of feelings and behaviors (McClelland et al., 2015; Zhou, Chen, & Main, 2012; Calkins & Markovitch, 2010; Blair & Ursache, 2010; Denham et al., 2014; Zins, Bloodworth, Weissberg, & Walberg, 2007). Two approaches that have been used to understand the role that self-regulation plays in the functioning of young children include (a) a combined model of top-down and bottom-up processes and (b) a socioemotional framework that integrates these essential processes and skills with other essential competencies that are necessary for optimal adjustment within the educational setting.

An integrated model of executive function and effortful control and a socioemotional learning framework were used to guide this study. The focus of this research is to examine the added value of a mindfulness component to an SEL program on the self-regulation of young children.

Integrated model of executive function and effortful control. Conceptualized as distinct, yet complementary aspects of self-regulation, executive function (EF) and effortful control (EC) are considered fundamental processes that make up the larger construct of self-regulation (Blair

& Razza, 2007; Calkins & Markovitch, 2010; Zhou et al., 2012). EF and EC are viewed as developmentally-sensitive, context-dependent components that make up an integrated model of top-down and bottom-up processes (Zhou et al., 2012; Calkins & Markovitch, 2010; Blair & Ursache, 2011). EF is generally characterized by top-down processes that reflect a cognitive, "cool" system of regulating behavior, whereas EC is described in terms of bottom-up processes that reflect an emotional, "hot" system of self-regulation (Zhou et al., 2012; Zelazo & Carlson, 2012). EF ("cognitive control") refers to an interrelated set of higher-order cognitive processes required to purposefully hold information in mind, mentally integrate and reorganize information, and resolve conflicting response options. It is essential for planning, monitoring, and working toward a goal (Zelazo & Carlson, 2012; McClelland et al., 2015; Blair & Ursache, 2011). EF involves volitional control of these cognitive processes in response to emotionally neutral stimuli (Zhou et al., 2012). In contrast, EC ("temperamental self-regulatory capacities") is generally described as "the efficiency of executive attention, including the ability to inhibit a dominant response, to activate a subdominant response, to plan, and to detect errors" (Rothbart & Bates, 2006, p. 129) that are based on individual temperamental differences. It involves regulation of emotion, attention, and behavior in emotion-laden contexts (Eisenberg, Valiente, & Eggum, 2010). Neuroscience research supports the EF-EC distinction, given that these processes relate to separate areas of the anterior cingulate cortex (Bush, Luu, & Posner, 2000).

Despite this difference, the integrated model of EF and EC suggests that EF and EC work together in complex problem-solving situations across contexts and share a common component (inhibition) and a common process (executive attention) (Zhou et al., 2012). Specifically, during ages 2 and 3, the development of a conscious attentional system enables children to use planful and effortful attentional strategies to engage in goal-directed behavior related to thoughts and feelings (Calkins & Markovitch, 2010). The interdependence of these EF- and EC-related skills, in turn, engenders positive social and academic functioning. The linkage between EF and EC can be viewed as adaptive control and observed at the level of multiple, interconnected processes (e.g., neural, attentional, emotional, social, behavioral).

In sum, the integrated model of EF and EC serves as a theoretical framework through which this study is examined and sets the stage for understanding the EF-EC relationship, which supports young children in learning how to learn in early childhood educational environments.

Socioemotional learning model. The socioemotional learning (SEL) model has also been used to study self-regulation in terms of school readiness and functioning. Overlap exists in the role that self-regulation plays in children's school adjustment, as described in the integrated, bidirectional EF-EC model and the SEL model. Whereas the integrated, bidirectional EF-EC model conceptualizes self-regulation on a smaller scale in terms of top-down and bottom-up processes, the SEL model conceptualizes self-regulation on a larger scale as part of an intricate network of cognitive, affective, and behavioral skills required for children to thrive in the educational setting.

Socioemotional competence encompasses a broad set of skills that enable individuals to excel at school, at work, and in relationships (Jones & Bouffard, 2012). As defined by the Collaborative for Academic, Social, and Emotional Learning (CASEL), it is the process through which children learn and apply five closely related, yet separate social, emotional, and cognitive competencies to function optimally. These core skills include self-awareness, self-management, social awareness, relationship skills, and responsible decision making (CASEL, 2015; Denham, Bassett, Zinsser, & Wyatt, 2014). Self-management refers to the ability to modulate feelings, thoughts, and actions adequately. Self-awareness is the ability to identify thoughts and feelings and understand how they affect behavior. Social awareness refers to the ability to take multiple perspective and to understand and share feelings with others. Relationship skills, such as active listening and conflict resolution, include the ability to form and maintain healthy relationships with others. Responsible decision making refers to the ability to make safe, ethical, and well-informed decisions regarding personal behavior and relationships.

One conceptualization of SEL specific to preschool children was identified by Denham and colleagues (2014). On a broad scale, they found that socioemotional competencies (cool and hot executive control, emotion knowledge, social problem solving, and socioemotional behavior) could be considered separate, yet interrelated elements of children's skill set. Within the general category of self-management, the cool, top-down processes ("cool executive control") were identified as a predictor of hot, bottom-up processes ("hot executive control"). Furthermore, a positive association existed between cool executive control in preschool and classroom adjustment in kindergarten. Each component of self-management separately predicted greater social awareness, lower levels of aggression (relationship skills), higher levels of responsible decision making, and school readiness in kindergarten. Social awareness significantly and positively correlated with relationship skills (prosociality). Multiple mediational relationships were also identified from the analysis. Specifically, positive relationship skills mediated the relation between social awareness and preschool adjustment, which predicted kindergarten adjustment. Responsible decision making mediated the relation between self-management (hot executive control) and kindergarten academic readiness. In sum, this conceptualization shows how core SEL competencies, such as self-regulation, directly and indirectly contribute to successful transition to elementary school.

Significance of Self-Regulation in Early Childhood

For children who attend preschool, early childhood educators are expected to help their students meet established developmental and pre-academic standards. These standards include the cultivation of self-regulation, such as appropriately expressing negative feelings, handling physical impulses effectively, and shifting and maintaining attention (National Association for Education of Young Children, 2015; National Center of Quality Teaching and Learning, 2015).

Self-regulation, the ability to effectively control one's own behaviors and emotions using a combination of top-down (executive functions) and bottom-up skills (effortful control) (e.g., McClelland et al.., 2015), has been widely recognized as an important contributor to school readiness and future achievement (e.g., Blair, 2002; Liew, 2012; Lewitt & Baker, 1995; Lin, Lawrence, & Gorrell, 2003). Competencies, such as maintaining focus to listen to the teacher deliver a lesson in a busy classroom, keeping hands to oneself despite the urge to do otherwise, and remaining calm in the face of frustration, enable young children to engage fully in and learn from experiences within increasingly structured educational environments (Liew, 2012; McClelland et al., 2015).

Data collected by the National Center for Education Statistics revealed that public kindergarten teachers (n = 1339) rated behaviors that allowed their students to learn optimally during their kindergarten year (Lewitt & Baker, 1995). It is particularly noteworthy that 84% of teachers recommended that children be able to express their needs, wants, and thoughts verbally. Furthermore, 60% of teachers considered a child's ability to follow directions and behave cooperatively to be critical skills. A separate, more recent study reported similar findings among teachers with a variety of backgrounds (e.g., age, race, and years of teaching experience) who taught in different geographical regions and types of schools (Lin et al., 2003). In contrast, few teachers from both studies considered a child's ability to use a pencil or paintbrush, recognize letters of the alphabet, or count to 20 as critically important for school readiness.

Over the years, teachers have continued to report similar concerns for their students, many of whom have demonstrated weak self-regulation skills as they transition to elementary school. In a national survey, kindergarten teachers rated 35% of their students as not being ready for kindergarten, based on their behavioral expectations (Lewitt & Baker, 1995). In a more recent survey conducted by the National Center for Early Development and Learning, 46% of kindergarten teachers (n = 3595) reported that at least half of their students showed difficulty in following directions at time of entry (Rimm-Kaufman, Pianta, & Cox, 2000). Taken together, these findings indicate that teachers generally express more concern for entering kindergarten students' ability to manage their behavior and emotions, than their academic skills.

The importance of self-regulation extends far beyond early childhood. Its advantages have been shown to persist past the early elementary school years and into adulthood. For example, a three decade-long prospective cohort study (Moffitt et al., 2011) highlighted the importance of cultivating these skills during early childhood when it found that higher levels of self-regulation in preschool (ages 3 to years) predicted better physical health, greater financial security, and educational attainment in adulthood. In contrast, low levels of self-regulation predicted a range of negative consequences by adulthood, including health problems, financial instability, school dropout, substance dependence, and criminal conviction.

The long-term relation between self-regulation and adjustment in adulthood – along with the high degree of neuroplasticity during the preschool years (Zelazo & Carlson, 2012) – underscores the importance of helping young children develop self-regulatory abilities. In line with these findings, a cost-benefit analysis conducted by economists found that investment in quality early education would lead to higher tax revenue, less criminal justice system spending, and lower welfare payment, all of which outweigh its initial cost (Belfield, Nores, Barnett, & Scweinhart, 2006). Additional economics research revealed that an investment in early education could generate 7 to 10 cents annually for every dollar initially spent (Heckman, 2011; Heckman et al., 2010).

Interventions that Promote Self-Regulation

Existing School-Based Preschool Interventions. Mounting evidence suggesting that self-regulatory skills are critical for school readiness and future academic success (Diamond & Lee, 2011) has led to the development of a variety of school-based interventions, many of which have been shown to promote self-regulation (e.g., Domotrovich, Cortes, & Greenberg, 2007; Tominey & McClelland, 2011; Razza, Bergen-Cico, & Raymond, 2015; Bierman et al. 2008; Thorell, Lindqvist, Nutley, Bohlin, & Klingberg, 2009). Programs include those designed to improve young children's socioemotional competence, school readiness, and aspects of self-regulation. Although school-based interventions have typically been implemented at the universal level, such that all students at a school or in a certain classroom receive instruction, some have also been delivered at the targeted level in small groups or with individual children.

At least four types of universal interventions have revealed promising results within the preschool setting. First, socioemotional learning (SEL) interventions, such as *Providing Alternative Thinking Strategies* (*PATHS*), provide evidence of improved self-regulation skills. For example, preschool *PATHS* has been found to significantly enhance social competence, one component of self-regulation (inhibitory control), and emotion knowledge skills, a key prerequisite for emotion management and the development of effortful control (Cole et al., 2008; Domotrovich et al., 2007). Second, preliminary research on mindfulness-based interventions targeting preschool students suggests improvements in various components of self-regulation. A quasi-experimental study that evaluated the effectiveness of *Mindful Yoga* revealed improvements in the ability to delay gratification and inhibit behavior and attention (Razza et al., 2015). A randomized-controlled study showed practical significance of the *Kindness Curriculum*, a mindfulness-based prosocial skills training program, on preschool students (Flook et al., 2015). Despite non-significant findings on the ability to delay gratification, the moderate effect size indicated promise in early educational settings. Third, behavioral interventions designed to target self-regulation in young children have also yielded positive effects on certain aspects of executive function and self-regulation. For example, one intervention that integrated music and movement-based games (e.g., *Red Light, Purple Light*) was found to improve working memory, attentional flexibility, and inhibitory control among Head Start preschool students (Schmitt, McClelland, Tominey, & Acock, 2015; Tominey & McClelland, 2011). Fourth, comprehensive interventions have also provided some evidence that participation can enhance self-regulation. Head Start *REDI*, a multi-part intervention that included emergent literacy enrichment and preschool *PATHS* to promote school readiness, was found to significantly correlate with emotional understanding, social problem-solving, and overall behavioral functioning (Bierman et al., 2008). Despite mixed findings, *Tools of the Mind*, another comprehensive intervention that integrates mindfulness with self-regulation, has also provided some evidence supporting its effectiveness in reducing overall problem behavior (Barnett et al., 2008) and in improving certain aspects of executive function, such as working memory, inhibitory control, and attention (Blair & Raver, 2014) in young children. Overall, irrespective of the type of intervention, these group studies generally found that children who demonstrated relatively greater difficulty in self-regulation than their peers at baseline made the most gains at the end of the interventions (e.g., Domotrovich et al., 2007; Flook et al., 2015; Schmitt et al., 2015).

In comparison to a variety of universally-delivered self-regulation interventions, few targeted interventions exist. Small-group and individualized interventions include targeted SEL intervention groups (e.g., *The Incredible Years: Small Group Dinosaur Curriculum*; Webster-Stratton, 1984), adaptations of class-wide behavioral interventions (e.g., *Good Behavior Game*; Swiezy, Matson, & Box, 1993; Rathvon, 2008), repeated practice of specific tasks (Dowsett & Livesey, 2000); and computerized training (Thorell et al., 2009). Studies that examined each of these targeted interventions have shown improved self-regulation in individual students, such as reductions in aggressive behavior (Swiezy et al., 1993) and increased levels of inhibitory control (Thorell et al., 2009; Dowsett & Livesey, 2000). Despite yielding increases in self-regulation, these findings are not generalizable across students and cannot be applied to different contexts. Specifically, individualized training sessions on specific tasks and conducted in lab settings most likely do not translate into improvements in classroom behavior (Diamond & Lee, 2011).

In sum, findings from studies that evaluated self-regulation interventions suggest that improvements in certain aspects of self-regulation can vary considerably, based on participant characteristics (e.g., age, gender, and level of risk), emphasis of the program types, the format of delivery, and content emphasis (e.g., social and emotional competence versus reduction in aggression). Nevertheless, these findings hold promise in supporting the self-regulation of preschool students.

Gaps in the Research Literature. Despite studies examining the effects of different types of interventions on the self-regulation of preschool-aged children, several research gaps persist. First, evaluations of promising interventions, which target preschool students and promote self-regulation, remain sparse. Even among some existing, well-established SEL programs shown to have positive effects among elementary and middle school students (e.g., *Second Step*), few published studies have examined self-regulation outcomes during the preschool years. As such, these programs require examination specific to the early childhood age group for which their downward extensions are designed. In addition, few relevant findings relating to mindfulness-based interventions generalize to preschool students, as the majority of these studies have been conducted on elementary and middle school students. Given the critical role that self-regulation plays in school readiness, additional research on the outcomes of SEL and mindfulness-based programs on preschool students would be valuable to further understand the benefits of each type of intervention.

Second, no comparisons have yet been made between the effectiveness of key ingredients that compose different types of self-regulation interventions in unique populations, particularly those who are currently receiving early childhood education. This lack of evidence warrants investigation because it prevents practitioners from making informed decisions regarding the most appropriate self-regulation intervention for specific student populations. Third, in line with the second gap, no studies have yet investigated the effectiveness of combining and implementing unique components of select interventions found to improve self-regulation separately. Specifically, the pairing of lessons from SEL and increasingly popular mindfulness-based interventions has yet to be examined. Addressing this gap serves as an important step toward informing implementation practices of teachers and other school personnel who typically adapt programs (Ringwalt et al., 2004). It may help to determine whether delivery of select lessons from a particular intervention or a combination of interventions has a positive effect or added benefit on certain components of self-regulation in young children.

Fourth, as indicated above, a paucity of studies use single-case research design to examine effects of these interventions on individual children. Kratochwill and colleagues (2013) suggest that additional research using this research design can contribute to a better understanding of intervention effectiveness. This is because dramatic changes in performance, which can be yielded from interventions that use single-case experimental design, allow for causal conclusions. These performance improvements or declines likely generalize across individual children to a greater extent than effects yielded from interventions using between-group design, which have likely only met a relatively weaker standard of statistical significance (Kratochwill et al., 2013).

Socioemotional Learning Programs

Definition of Socioemotional Learning (SEL) Programs. One method found to enhance the self-regulation of young children is SEL programming (Zins et al., 2007; Durlak et al., 2011). SEL refers to the ability to identify and handle feelings effectively, solve problems, make responsible decisions, develop caring and concern for others, and form positive relationships (Zins et al., 2007). Aiming to adjust thoughts, feelings, and behaviors, SEL involves the manner by which an individual learns and uses the information, competencies, and approach to accomplish the aforementioned prosocial and behavioral goals (CASEL, 2015). As such, a child considered to be socially and emotionally competent is able to calm himself/herself down when upset or excited, divert his/her attention away from a frustrating or distressing situation, make and keep friends, offer help, express empathy, and engage in effective peer conflict resolution.

Essential SEL Elements. A myriad of SEL programs exist, which generally aim to foster children's primary social and emotional skills (self-management, self-awareness, social awareness, relationship skills, and responsible decision making) and enhance ideas and viewpoints about themselves and others (CASEL, 2013). Many SEL programs integrate essential elements, such as certain teaching practices, found to help children work toward both aforementioned short-term goals (Hamre & Pianta, 2007). Specifically, the use of "SAFE", a suggested technique for teaching skills, is critical in skill acquisition and reinforcement (Payton et al., 2008; Weare & Nind, 2011). The Sequenced, Active, Focused, and Explicit (SAFE) method entails application of a planned sequence of activities to support gradual skill development; use of sufficient time to focus on SEL skill development; and ample opportunities to practice, role play, and apply targeted SEL skills to diverse real-life events. Students who received SEL instruction using the SAFE technique outperformed their counterparts who received SEL instruction without the SAFE technique in SEL skills, attitudes towards themselves and others, positive social behavior, conduct problems, emotional distress, and academic performance (Payton et al., 2008). Other instructional methods include modeling and coaching children to recognize personal emotions and those of others, as well as prompting and dialoguing (CASEL, 2015).

SEL Programs and Self-Regulation. Within the literature, multiple studies have found significant links between school-based SEL interventions and improvements in self-regulation in children and adolescents. Self-regulation, which encompasses effortful control and executive function (e.g., inhibitory control and anger management), maps onto multiple foundational SEL components, primarily self-awareness and self-management (CASEL, 2015). Recent studies indicating that exposure to SEL programs, such as *PATHS* and *Incredible Years*, is related to improvements in certain areas of self-regulation in preschool through high school students provide evidence that these constructs overlap in definition and conceptualization. Children who have received school-based SEL instruction have exhibited increased levels of focus and attention (Nix et al., 2016; Schultz et al., 2011; Morris et al., 2013), increased self-control (Morris et al., 2013), reduced levels of aggression (Nix et al., 2016; Schultz et al., 2011) and less hyperactivity (Schultz et al., 2011). Other research has also identified strong relationships between exposure to SEL programming and reductions in internalizing behaviors, such as anxiety and depression (Schultz et al., 2011; Gunter et al., 2012), as well as to emotion recognition and regulation (Gunter et al., 2012; Durlak et al., 2011).

Significance of SEL in Early Childhood. Over the past decade, empirical studies that have evaluated SEL effectiveness on enhancing early childhood behavior and emotion development have yielded conflicting results. Many investigations have revealed positive links between an assortment of SEL programs and children's emotional, behavioral, social, and academic outcomes in preschool and lower elementary school students. For example, a report that reviewed 317 studies on the effectiveness of universal, indicated, and afterschool SEL programs for children in kindergarten through eighth grade, demonstrated significant improvements in their views about themselves, their peers, and their school; socioemotional competence; social behaviors; conduct; and academic performance. These benefits were found across SEL programming during and after school; diverse ages and backgrounds; grade levels; and rural, urban, and suburban settings (Payton et al., 2008). Furthermore, follow-up data indicated that the effects of SEL interventions on child functioning were sustained over time after the completion of the intervention. A subsequent meta-analysis of 213 school-based SEL programs supported these earlier findings (Durlak et al., 2011).

In contrast, results from some large-scale studies have provided neither evidence nor support, for sustained SEL effectiveness on child developmental outcomes. For instance, a meta-analysis of sixteen studies conducted in Europe and North America on kindergarteners through twelfth graders (n = 15386) revealed non-significant changes in student- and teacher-reported bullying and victimization patterns, as well as in reductions in behavior and emotional problems when implementing SEL programs (Merrell, Gueldner, Ross, & Isava, 2008). A multi-center longitudinal study conducted on third- through fifth-grade students also found no statistically significant improvement among seven SEL programs, including *Second Step* and *Positive Action*, on social and emotional skills, behavior, and academic performance (Social and Character Development Research Consortium, 2010). Some of the SEL interventions in this study actually had detrimental effects across these areas, but most provided no benefit, and none led to positive sustained effects. A recent follow-up study on third graders found that, while students reaped short-term benefits in socioemotional and academic functioning when they first received SEL instruction during preschool, the SEL intervention did not yield sustained positive effects four years later (Zhai, Raver, & Jones, 2015).

Although research has yielded mixed findings, inconsistent findings have surfaced primarily from a lack of a standard definition and conceptualization of SEL, differences in measurement, and variations in implementation fidelity (Payton et al., 2008). Research evidence suggests, however, that high-quality evaluations that base their examinations on a well-aligned conceptualization of practice and SEL theory tend to facilitate positive effects on child outcomes (Durlak et al., 2011).

Despite conflicting findings, Denham's (2012) identification of four-year-old preschoolers' SEL profiles (SEL-Risk, SEL Competent-Social/Expressive, SEL Competent-Restrained) highlights the importance of high-quality SEL programs with respect to young children's development in specific areas. The SEL-Risk group, which contained an overrepresentation of young boys and socio-economically affected individuals, generally displayed difficulties in identifying and understanding emotions, managing their behaviors and emotions, cooperating with adults, and engaging in prosocial peer interactions. In contrast, both SEL Competent groups, which contained an overrepresentation of girls, demonstrated strengths in emotion knowledge and self-regulation, except in social problem-solving. Whereas SEL Competent-Restrained preschoolers tended to select angry, less interactive, and less prosocial methods of social problem-solving, their SEL Competent-Social/Expressive peers displayed more emotional, interactive, and productive social problem-solving approaches. Given that children undergo rapid cognitive and behavior changes through age seven (Diamond, Prevor, Callender, & Druin, 1997), these differing profiles underscore the need to support all young children, especially those identified as SEL-Risk, in developing emotion recognition and effective emotion management skills to cultivate effective social problem-solving.

A number of studies support the use of school-based SEL programming with young children during preschool through early elementary school. These studies have revealed positive relationships and sustained effects of a variety of SEL interventions, including *Providing Alternative Thinking Strategies* (*PATHS*) and *Strong Start PreK*, on multiple child outcomes. For example, a recent randomized control trial conducted on four-year-old Head Start preschoolers at entry found that recipients of the REDI intervention (i.e., program that integrated *PATHS* with an academic curriculum) had nearly two times the odds for exhibiting optimal developmental trajectories for social competence, low aggressive or oppositional behavior, low attention problems, low peer rejection, and high learning engagement than students who received the usual Head Start condition at year's end and at the end of five years (i.e., at the end of third grade) (Nix, Bierman, Heinrichs, Gest, Welsh, & Domotrovich, 2016). These findings align with those from earlier studies, which revealed improved emotion management, social behavior (e.g., assertiveness, communication), student-teacher closeness, and behavior (e.g., task engagement, self-control, reduction in internalizing behavior) in preschool children between ages three and five (Morris et al., 2013; Gunter et al., 2012; Schultz et al., 2011).

Second Step Early Learning Program. One promising SEL intervention for four- and five-year-old preschool children is *Second Step Early Learning Program* (Committee for Children, 2011). A downward extension of the widely researched *Second Step* program (Thomas & Gravert, 2011), *Second Step Early Learning Program* aims to build young children's school readiness by cultivating socioemotional competence and self-regulation. To meet this goal, the program includes daily lessons that teach self-regulatory skills necessary for learning and getting along with others. Other lessons teach skills like the management of positive and negative emotions and empathy, which encompasses identifying feelings, offering help, and providing comfort to a peer (Committee for Children, 2011). Brain Builders activities, or games embedded within the *Second Step Early Learning Program* curriculum intended to reinforce skills that children learn during the week, are typically integrated across lessons and have been shown to improve children's attention, working memory, and inhibitory control (Tominey & McClelland, 2010).

Currently, no published research that has evaluated *Second Step Early Learning Program* efficacy or effectiveness exists. Nevertheless, the original *Second Step* program has received satisfactory to high ratings for research quality and effectiveness. Based on a review of implementation materials, training and support resources, and quality assurance procedures, *Second Step* earned a rating of 3.8 out of 4.0 for effectiveness from the National Registry of Evidence-Based Programs and Practices (NREPP) (Department of Health and Human Services [DHHS], Substance Abuse and Mental Health Administration [SAMHSA], 2006). Furthermore, *Second Step* earned at least a 2.4 rating out of 4.0 for its overall research quality, based on six indicators (reliability and validity of measures, intervention fidelity, missing data and attrition, potential confounding variables, and appropriateness of analysis) in 2006 (NREPP, DHHS, SAMHSA, 2006). A number of studies have found that *Second Step* increased social competence, improved emotion management, reduced verbal and physical aggression, and decreased problem behaviors among elementary school-aged children (ages 6 through 12 years) (e.g., Frey et al., 2005; Grossman et al., 1997). Most recently, teacher-reported data revealed positive effects of *Second Step* for reducing problem behaviors (conduct problems, hyperactivity, and peer problems) and enhancing a variety of competencies (prosocial skills, social and emotional skills, skills for learning, emotion management, and problem solving) in kindergarten through second-grade students whose schools implemented the program (Low et al., 2015). These positive findings make the downward extension, *Second Step Early Learning* Program, a promising choice for younger children that merits further research.

Mindfulness-Based Interventions in School Settings

Definition of Mindfulness. An alternative approach to improving self-regulation in young children is through teaching young boys and girls to practice mindfulness (Zelazo & Lyons, 2012). Mindfulness generally involves the application of the universal, innate capacity of attention (Kabat-Zin, 2003). Mindfulness has been conceptualized from two main perspectives. One approach involves meditation and is based on over 2,500 years of Buddhist traditions, viewing mindfulness as the "fundamental attentional stance underlying all streams of Buddhist meditative practices" (Kabat-Zin, 2003, p. 146). Within the Buddhist traditions, the practice of mindfulness is embedded within a broader perspective and practice-based ethical framework that emphasizes "doing no harm". It includes an understanding of how "unexamined behavior" and "an untrained mind" can result directly in the suffering of oneself and of others, in addition to transforming this suffering using meditative practices to promote serenity, openness, attention, and behavior (Kabat-Zin, 2003, p. 146). In other words, this meditative-based approach to mindfulness focuses on cultivating a rich inner experience for the individual, with less focus on goal-directed, non-judgmental observation. In contrast, mindfulness, from the perspectives of cognitive and behavioral sciences, is approached empirically and viewed as a "consciousness discipline" that contributes to deep inquiry and insight (Kabat-Zin, 2003; Baer, 2003; Langer & Moldoveanu, 2000). For example, Langer's cognitive model of mindfulness focuses on the practice of "drawing distinctions" to enhance awareness of context and multiple perspectives and cultivate openness to novelty. This cognitive-based approach involves the use of materials external to the individual and active to engage in goal-oriented tasks, such as problem-solving (Baer, 2003).

In this study, the definition of mindfulness draws from both approaches. Defined as the capacity to focus on momentary or fleeting thoughts, feelings, or insights in a simple, tolerant way, mindfulness requires the simultaneous ability to focus attention, exercise control over impulses, and remain friendly and nonjudgmental (Kabat-Zinn, 2003). It entails the use of cognitive control strategies to reduce mindless behavior, or acting on autopilot, and instead encourage acting with intention (Langer & Moldoveanu, 2000). In other words, being mindful requires executive function and effortful control to regulate one's behaviors and emotions. To maintain the attentive, open, and calm state that defines mindfulness, a set of exercises may be used to strengthen it. These practices include meditation, breath awareness, the mindful awareness of one's five senses, and psychoeducation (Zenner, Herrnleben-Kurz, & Walach, 2014).

Essential Mindfulness Elements. Unlike SEL interventions, for which consensus exists concerning its conceptualization and guidelines for practices that promote positive child outcomes (Payton et al., 2008), school-based mindfulness interventions vary in practices and the ways in which they are delivered and assessed (Zenner et al., 2014; Felveret al., 2016); Meiklejohn et al., 2012). These interventions range from a collection of separate mindfulness practices (e.g., breathing, meditation) to manualized programs (Gould, Dariotis, Greenberg, & Mendelson, 2015; Zenner et al., 2014). Nevertheless, the majority of mindfulness-based interventions in educational settings across kindergarten through twelfth grades involve adaptations or components of Mindfulness-Based Stress Reduction (MBSR; Gould et al., 2015; Felver et al., 2016; Meiklejohn et al., 2012).Originally developed in the medical setting to help patients with a variety of chronic pain and stress-related conditions alleviate stress, pain, and illness, MBSR defines mindfulness as a commitment to engage in momentary sentience and awareness with openness, non-judgement, and an ability to withstand the desire to achieve or reject anything through meditative practices (Kabat-Zin, 2003). MBSR elements used in schools include formal (e.g., sitting, movement, walking meditation, compassion and gratitude exercises) and informal mindfulness practices (e.g., mindfully completing daily classroom activities, such as putting things back where they belong) (Burke, 2009; Gould et al., 2015). They also include regular group sessions to support development of mindfulness awareness. These sessions typically involve teacher-led discussions based on children's experiences and incorporate psychoeducation, such as the mind-body connection, stress management, and development of healthy coping (Burke, 2009; Erwin, Robinson, McGrath, & Harney, 2015). Though less often discussed and tested in the mindfulness literature, mindfulness researchers believe process components (e.g., group discussion and inquiry) to be just as essential as content components because the manner and skill in which the teacher delivers the intervention can greatly improve student responsiveness and, in turn, enhance mindfulness and self-regulation (Gould et al., 2015).

Mindfulness and Self-Regulation. Research that has examined mindfulness has found links to self-regulation in the school-aged population. Findings from research conducted by Langer and colleagues provide examples that demonstrate this relation. For instance, it was found that the act of being mindful, particularly when individuals notice novelty, relates to increased levels of attention, memory, engagement, and task performance. Studies conducted on children with attention problems (Langer, Carson, & Shih, 2000), Harvard undergraduate students (Langer & Bodner, 1997), and elderly adults (Levy & Langer, 2000) demonstrated that when participants – regardless of age and development – mindfully detected new things about the target of attention, their focus and attention improved. In another study, individuals participated in an activity that they disliked. Those who were asked to notice three, six, or nine new things about the activity liked it and chose to engage in the activity further; more novelty directly and positively related to the degree of liking and engagement in the originally disliked activity (Langer, 1997). In other studies, in which individuals were asked to mindfully attend to an activity (e.g., consider a different viewpoint with certain diction or a read a description from another individual's perspective), findings showed that mindfulness improved task performance, in addition to attention, memory, and engagement (Lieberman & Langer, 1995).

In addition to research conducted by Langer and colleagues, school-based mindfulness intervention studies support the relation between mindfulness and self-regulation. Although mindfulness interventions vary widely by the components and measurement methods used, a recent systematic review of 24 mindfulness-based intervention studies conducted in the elementary through high school settings found improvements in teacher-reported attention (cognitive problems), stress management, and positive and constructive emotions across grade levels (Zenner et al., 2014). Even in its current nascent state, research that has examined the effects of school-based mindfulness programs in children as young as those in preschool has revealed positive relationships with components of executive function and effortful control. Notably, preliminary evidence supports the relation between mindfulness interventions and young children's improvements in attention and engagement (Poehlmann-Tynan et al., 2016; Razza et al., 2015; Felver & Jennings, 2015; Flook et al., 2010; Napoli et al., 2005). Studies have also indicated other improvements, including higher levels of self-regulation (Flook et al., 2010, 2015; Poehlmann-Tynan et al., 2016), delay of gratification (Razza et al., 2015), inhibitory control (Razza et al., 2015), and positive affect (Zenner et al., 2014). In two studies, teachers reported fewer instances of hyperactivity and disruptive behavior (Napoli et al., 2005; Felver Jennings, 2015). Most recently, a pilot study conducted by the primary researcher, which used single-case experimental design to evaluate the effectiveness of individual lessons from a mindfulness-based curriculum (*MindUp*; The Hawn Foundation, 2011), found positive effects on inhibitory control in all three participants (Chen, 2016). However, some investigations have revealed conflicting findings concerning the relation between mindfulness and emotion. Whereas some studies found no effect (Poehlmann-Tynan et al., 2016), others identified a positive, direct link with emotions and cognitions (e.g., test anxiety; Napoli et al., 2005) and empathy (Flook et al., 2015).

Significance of Mindfulness in Early Childhood. In line with the conceptualization of self-regulation as a construct consisting of the bi-directional relationship between executive function (top-down processes) and effortful control (bottom-up processes), mindfulness is considered an ideal type of intervention that supports the development of self-regulation (Zelazo & Lyons, 2012). To ultimately allow children to consciously and deliberately practice top-down control, mindfulness targets the top-down process of reflection and can thus, indirectly affect bottom-up influences on self-regulation (e.g., anxiety) (Zelazo & Lyons, 2012). By definition, mindfulness refers to "being in the moment" and attending to the "here and now," which elevates awareness of oneself and of one's surroundings (Erwin et al., 2015). In this way, mindfulness involves young children becoming more attuned to their five senses, which results in the development of deeper awareness of their momentary inner thoughts and feelings, in addition to their environment.

Despite limited research on mindfulness, extant data supports it as a promising intervention with potential for young children. For example, mindfulness practices have been shown to alter electrical activity in the brains of college students, as measured during electroencephalogram (EEG) tests (Fan, Tang, Tang, & Posner, 2014). This altered brain activity has been found to reflect improved executive attention and self-control, skills that young children need to function optimally at school. Having been found to relate to enhanced ability to manage conflict as measured by the Stroop task (Stroop interference effect), these changes support possible use during early childhood. Existing research has demonstrated benefits of mindfulness across populations that vary by race (Semple, Lee, Rosa, & Miller, 2010), socioeconomic status (e.g., Poehlmann-Tynan et al., 2016), disability status (Singh et al., 2007), and grade level (e.g., Napoli et al., 2005) which provides additional compelling evidence for its potential benefits on young children. Preliminary findings have connected mindfulness to a heightened sense of well-being in children (Semple et al., 2010), in addition to greater attention and self-control (e.g., Razza et al., 2015; Felver & Jennings, 2015; Flook et al., 2010; Napoli et al., 2005).

MindUp. *MindUp Grades Pre-K-2* (The Hawn Foundation, 2011) is a promising mindfulness-based program specifically developed for preschool through second grade students. Designed for delivery in a variety of educational settings, *MindUp* incorporates many of the essential elements of school-based mindfulness interventions discussed above. It aims to nurture and build self-regulation and mindful awareness, acceptance of individuals' unique qualities, and ability to grow and learn (The Hawn Foundation, 2011). To meet these objectives, the program includes lessons that teach children to identify parts of the brain and their functioning, to attend to the present moment, and to think and behave thoughtfully in response to others using mindful practices. These lessons generally reinforce mindfulness skills by relating the brain and its functions to individual's thoughts and behaviors.

Currently, one study has investigated *MindUp* in the preschool population. Specifically, a pilot study, which was conducted by the primary researcher using single-case experimental design (n = 3) to evaluate two individual lessons, generated promising results (Chen, 2016). It provided preliminary evidence that at least one lesson led to increased levels of inhibitory control in all participants and diverse results for attentional focus and delay of gratification. Although no other studies have yet examined the efficacy and effectiveness of the *MindUp* curriculum in preschool children, findings from a randomized controlled trial that met quality standards of the Collaborative for Academic, Social, and Emotional Learning (CASEL) suggested it as a quality program for use with elementary school students (Schonert-Reichl et al., 2015). Of interest to this study, Schonert-Reichl and colleagues (2015) found that fourth- and fifth-grade students whose classes were randomly assigned to receive *MindUp* displayed a greater ability to focus attention and inhibit distraction at post-test, $F(1, 92) = 5.54$, $p = .02$, $d = -.31$. Data also revealed marked improvements in a variety of areas across students. These included a 24 percentile increase in social competence, a 20 percentile increase in prosociality (sharing, helpfulness, kindness, and perspective taking), and a 24 percentile reduction in peer-nominated aggressive behavior (rule-breaking and starting fights).

Socioemotional Learning and Mindfulness

Rationale. Although SEL programs and mindfulness-based curricula each highlight and teach skills in line with their distinctive goals, research has unveiled at least a significant relationship between these intervention approaches and self-regulation improvements due to alignment of their theoretical underpinnings (Felver, Doerner, Jones, Kaye, & Merrell, 2013). Both SEL and mindfulness-based programs aim to develop similar social and emotional competencies. As defined above, SEL programs teach children to recognize their own thoughts and feelings and their relationship with behavior (self-awareness); to manage their own thoughts, feelings, and behaviors, including stress management, impulse control, and motivation to work towards a goal (self-management); to empathize with others from diverse upbringings and perspectives (social awareness); to form and maintain healthy relationships (relationship skills); and to make responsible, ethical choices (responsible decision making) (CASEL, 2013). In line with SEL, research and theory also support the notion that mindfulness-based interventions target self-awareness (Meiklejohn et al., 2012); self-management of thoughts, emotions, and behaviors (Razza et al., 2015; Poehlmann-Tynan et al., 2016; Flook et al., 2015; Zenner et al., 2014); and social awareness (Meiklejohn et al., 2012; Flook et al., 2015; Schonert-Reichl et al., 2015). These similarities suggest the possibility that an integration of SEL and mindfulness-based interventions may provide more robust benefits by providing complementary approaches that cumulatively enhance self-regulation.

Unique Features and Added Value. The similarities of SEL and mindfulness-based interventions allow for seamless integration that may provide added value to children's self-regulation. Furthermore, unique, non-overlapping elements of each intervention type may also contribute to improvements because they provide instruction based on distinctive features. SEL programs that target preschool students use an "outside-in" approach with a focus on systematically preparing young children to transition to elementary school through explicit instruction and practice (Lantieri & Zakrzewski, 2015). In particular, *Second Step* Early Learning Program spends one unit each teaching preschool students skills for learning (e.g., focusing attention, following directions, and asking for what one needs), feeling identification and kindness, and management of strong feelings (Committee for Children, 2011). In contrast, mindfulness-based programs use an "inside-out" approach that emphasizes one's inner capacity to demonstrate empathy and compassion for oneself and for others, even during fleeting moments (Lantieri & Zakrzewski, 2015). These programs primarily teach children to focus on the present moment with acceptance and without judgment, which extends to demonstrating empathy and compassion for others, to gain a sense of wellbeing and psychological health (Burke, 2010; Felver et al., 2013). *MindUp*, one promising mindfulness-based program, explicitly teaches children to identify brain function and its influence on awareness and behavior, to practice of mindful awareness in everyday life, to express gratitude, and to perform acts of kindness (The Hawn Foundation, 2011).

Integrating content from SEL and mindfulness-based programming would likely benefit children, particularly because each cultivates similar competencies in complementary ways (e.g., self-regulation). Teaching SEL and mindfulness without strategically pairing them together (i.e., separate, consecutive implementation of each type of program) has limitations, even if they have both been found to enhance self-regulation. For example, a child who receives stand-alone or piecemeal SEL instruction may be able to follow directions and demonstrate calm-down strategies under artificial conditions; however, this knowledge and ability does not guarantee that he or she will be able to access these skills when needed in authentic situations (i.e., under duress). Similarly, a child who receives stand-alone or fragmented mindfulness-based instruction at school may be able to focus and calm down, but may continue to have trouble getting along with others and resolving conflict. Children still need targeted instruction and practice opportunities from both types of programs, even if taught separately and consecutively, to build their social and emotional competence, including self-regulation, because mindfulness intervention and SEL programming may each insufficiently target all aspects of self-regulation if implemented alone or as the only strategy to build self-regulation (Gueldner & Feuerborn, 2016). When paired together using a coordinated and integrated approach, an SEL program like *Second Step* and a mindfulness-based program like *MindUp* could yield optimal value for young children, particularly in self-regulation (Flook et al., 2015; Gueldner & Feuerborn, 2016; Felver et al., 2013).

Implementation. When practitioners decide to deliver evidence-based SEL and mindfulness-based interventions in applied settings, implementation issues arise (American Psychological Association, 2006; Domotrovich et al., 2008; Sanetti & Kratochwill, 2009). In schools, teachers often cite limited time, few training resources, and a desire to better cater to student needs among the reasons for adapting interventions (Domotrovich et al., 2008; Kratochwill & Shernoff, 2003). As such, teachers may adapt a selected program to facilitate delivery and to match it to students' developmental and academic needs. Under these real world conditions, questions arise concerning whether a given evidence-based intervention will produce effects similar to those found when it was implemented as intended.

Of particular interest, concerns of treatment integrity and transportability are prominent in the school setting. The extent to which a trained interventionist reliably and comprehensively delivers crucial intervention elements (treatment integrity; Dane & Schneider, 1998; Sanetti & Kratochwill, 2009) or transports and transforms the intervention beyond use for a particular participant group (transportability; Ingraham & Oka, 2006) are important issues in practical settings because they can influence participant access to treatment and can affect outcomes. Notably, it is generally assumed that practitioners must deliver an intervention as intended by the developers to be effective. Although a high level of fidelity generally corresponds to better outcomes, particularly for participants with similar characteristics as those in efficacy studies, a review of the literature suggested that interventions are not rigidly implemented and that fidelity and adaptation often occur together, such that some level of modification to the intervention is unavoidable and in fact, appropriate (Durlak & Dupre, 2008; Liaupsin, Ferro, & Umbreit, 2012).

Researchers generally view program adaptation as an "implementation failure" (Durlak & Dupre, 2008, p. 341), yet higher quality implementation occurs when interventionists modify and tailor the program to a certain degree based on the needs of the participants (e.g., developmentally and culturally appropriate); this typically results in the retention of essential ingredients necessary for successful implementation in diverse populations (Domotrovich et al., 2008). As a prerequisite, it is important for the practitioner to understand the causal mechanism that produces treatment benefit in order to effectively adjust the intervention to suit the context and needs of specific participant groups that differ from those of the original efficacy studies

(Hughes, 2000). In addition, the provider's understanding of the degree of significance that intervention components relate to positive outcomes, engagement in shared decision making with key stakeholders (e.g., teachers), and the ability to tailor and carry out key intervention components matter greatly (Durlak & Dupre, 2008; Hughes, 2000). Modifications to existing interventions may involve adjusting the frequency, intensity, or duration of the intervention to which target participants are exposed to address developmental needs and concerns specific to applied settings (Liaupsin, Ferro, & Umbreit, 2012). Given the inevitability of adaptation, determining the most appropriate fidelity-adaptation combination is crucial for high intervention effectiveness.

Research on the common elements, or modular, approach to treat children with a variety of disorders in the field of clinical psychology (Chorpita, Becker, & Daleidon, 2007) illustrates the possibility of maintaining the advantages of evidence-based interventions, while simultaneously allowing for flexibility based on clinical judgement. The distilling of a variety of evidence-based protocols into lower-order essential components (i.e., particular practices and procedures), this approach involves selecting the practice elements that pertain to specific participant characteristics. Furthermore, it suggests that "[p]rotocols are just the sum of the parts, and deconstructing them into specific procedures should not compromise outcomes" (Chorpita et al., 2007, p. 650).

Exposure. Exposure, which refers to the number of intervention sessions delivered, the duration of sessions, and the time period over which the entire intervention occurs, is one dimension of treatment integrity (Dane & Schneider, 1998) that many child- and adolescent-focused intervention studies have reported or assessed (Durlak & Dupre, 2008; Parker-McGowan et al., 2014). An increasing number of group and single-case studies and meta-analyses that evaluate a variety of interventions (e.g., school-based prevention, mindfulness, social, and behavioral programs) have shown that the degree to which students are exposed to interventions matters (e.g., Durlak & Dupre, 2008; Zenner, Hermleben-Kurz, & Walach, 2014; Luczynski & Hanley, 2013; Gottfredson, Gottfredson, & Hybl, 1993). Research in those areas suggests that interventions that occur with less frequency and shorter duration do not usually lead to meaningful changes in targeted outcomes (e.g., Luczynski & Hanley, 2013; Ferrer-Wreder et al., 2010; Durlak & Dupre, 2008). Drawing from meta-analytic findings, which indicate that good implementation "can lead to much stronger benefits for participants" (Durlak & Dupre, 2008, p. 334), exposure should be considered an important index in understanding effective intervention delivery because it provides data on the parameters related to the amount of an intervention that individuals and groups of individuals need to achieve intended outcomes in certain contexts (Wasik et al., 2013). In the context of early childhood education, in which young children learn and apply concrete skills (e.g., letters, counting, and emotion identification and management), frequent, yet brief intervention sessions have generally been found to be appropriate (Wasik et al., 2013).

Dosage. Dosage, or dosage received (Dane & Schneider, 1998; Hagermoser Sanetti & Kratochwill, 2009), is a related index of implementation that is important to consider in program evaluation. Defined as the number of intervention sessions attended by the participant and the duration of session attendance (Dane & Schneider, 1998), dosage has been found to relate to diverse child and adolescent outcomes (Durlak et al., 2011; Reynolds et al., 2014). Studies conducted on youth found that those who regularly attended program sessions intended to prevent teen pregnancy and school failure (Allen, Philliber, Herrling, & Kuperminc, 1997), prevent abusive parenting practices (Weinman, Schreiber, & Robinson, 1992), and reduce challenging behaviors and enhance peers relationships (Roth et al., 2010) were less likely to engage in problematic behaviors, respectively. Similar findings exist in the early childhood education literature. For instance, a study that investigated the number of days that two- and three-year-old low-birth-weight children attended a center-based childcare program found a larger, sustained effect on vocabulary skills on children with the highest levels of participation (Hill, Brooks-Gunn, & Waldfogel, 2003). Multiple studies have also found that young children (particularly those from at-risk populations) who consistently attended full-time early childhood education programs had a greater likelihood of demonstrating better socioemotional skills and higher cognitive, literacy, and math achievement scores than those who attended half-day programs (e.g., Reynolds et al., 2014; Lee et al., 2006). Overall, these findings suggest that individuals across age groups who participate in more intervention sessions are more likely to outperform their counterparts on social, behavioral, and academic outcomes.

Second Step and MindUp. Currently, no published study has investigated the specific integration of lessons from SEL and mindfulness-based curricula like *Second Step* and *MindUp*, respectively. Despite a dearth of the unique pairing of SEL and mindfulness, evidence from related fields supports the integration of other practices with a mindfulness component. For example, a randomized controlled trial that evaluated the efficacy of a group-based parent training program (Mindfulness-Enhanced Strengthening Families Program, or MSFP) infused with mindfulness theories and techniques found that this adapted version of SFP yielded similar treatment effects on child management practices and stronger effects on parent-youth relationship quality in comparison to the original SFP curriculum in 65 predominantly White families who enrolled their children in rural school districts (Coatsworth, Duncan, Greenberg, & Nix, 2010). Just as mindfulness was paired with a parenting curriculum to enhance parenting outcomes, mindfulness coupled with an SEL intervention may improve self-regulation outcomes for young children.

Research Questions and Hypotheses

The current study addresses four main research questions:

Research Question 1. *Does the delivery of the combination of Second Step Early Learning Program and MindUp result in improvements in mindfulness and self-regulation among preschool children?*

It was hypothesized that the delivery of *Second Step Early Learning Program* (an SEL program), in combination with *MindUp* (a mindfulness program), would result in an overall increase in mindfulness and self-regulation in preschool children. While efficacy studies have shown that fidelity and modification of interventions usually occur together, the extent to which modifications may be made before the intended outcomes are affected is unknown (Liaupsin, Ferro, & Umbreit, 2012). Nevertheless, scholars believe that high-quality implementation across diverse populations involves tailoring to the context and needs of the audience (Domotrovich et al., 2008). Doing so generally retains the essential elements of the intervention. In the current study, the key ingredients consist of non-overlapping SEL and mindfulness components in which individual lessons or units from each intervention are combined in order to enhance students' mindfulness and self-regulation. As noted, "[p]airing SEL programs with mindfulness technology is a natural fit" (Felver et al., 2013, p.537) because each type of program targets similar skills (e.g., self-regulation) using synergistic instructional approaches and theoretical rationales. Scholars have made recommendations to combine distinctive, non-overlapping elements of SEL and mindfulness programs to improve children's self-regulation in the school setting (e.g., Felver et al., 2013; Gueldner & Feuerborn, 2016), yet no published study has addressed this area. The use and effectiveness of the modular approach to treat a variety of disorders in clinical psychology certainly demonstrates the possibility of integrating essential SEL and mindfulness ingredients to yield optimal outcomes.

It was also hypothesized that a link would exist between intervention implementation (including dosage and exposure to *Second Step Early Learning Program* and supplemental *MindUp* lessons) and the extent to which preschool children develop mindfulness and self-regulation skills. A plethora of single-case and group design research in the areas of education, socioemotional learning, and mindfulness generally indicates that the number of delivered intervention sessions, the length of time each session lasts, and the duration of the overall intervention influence participant outcomes (Durlak & Dupre, 2008; Zenner, Hermleben-Kurz, & Walach, 2014; Luczynski & Hanley, 2013; Gottfredson, Gottfredson, & Hybl, 1993). In addition, frequency of attendance and the length of time that participants engage in sessions can determine their level of skill development and can also relate to intended or unintended program outcomes (Durlak et al., 2011). For example, children who attended preschool full-time were found to outperform children who attended part-time on socioemotional, cognitive, and academic skills (Reynolds et al., 2014). Drawing from these findings, it was expected that daily, brief instruction of *Second Step Early Learning Program* and *MindUp*, in addition to participant attendance, would affect the level of self-regulation and mindfulness skill development for participants who are full-time and part-time preschool students. However, participants who are full-time students will likely demonstrate more improvement in these skills (Reynolds et al., 2014; Lee et al., 2006).

Research Question 2. *Does the use of selected units of the Second Step Early Learning Program result in improvements in mindfulness (focused attention) and self-regulation* *(inhibitory control, delay of gratification, empathy, and emotion management) among preschool children?*

It was hypothesized that students' mindfulness and self-regulation skills would improve after students receive SEL instruction from *Second Step Early Learning Program*, which focuses on skills for learning, empathy, and emotion management. Research generally supports the use of SEL instruction to enhance children's behaviors and emotions. Specifically, school-based SEL instruction has been associated with lower levels of aggression, hyperactivity, and internalizing symptoms, in addition to increased emotion recognition and management across grade levels (e.g., Durlak et al., 2011). Although conflicting findings exist in this area with respect to young children (i.e., ages 7 and younger), several recent studies point to the significance of school-based SEL interventions for children in preschool through early elementary school, primarily in relation to competent emotion identification and regulation as a means to develop better social problem solving skills, positive interpersonal relationships, peer acceptance, low levels of hyperactivity or oppositional behavior, decreased attention problems, and greater task engagement (e.g., Denham, 2012; Nix et al., 2016).

Second Step Early Learning Program, a promising new curriculum developed specifically for preschool-aged children (ages 3 through 5) and a downward extension of the established *Second Step* intervention, explicitly teaches students prerequisite skills required to learn (e.g., focusing attention), engage in prosocial behavior, identify emotions accurately, and regulate emotional reactions under duress. Although no research has specifically examined the effects of the *Second Step Early Learning Program* on the mindfulness and self-regulation of preschool children, empirical evidence of at least adequate quality has found links between the original *Second Step* program and similar positive outcomes listed above in children as young as those in kindergarten (e.g., Frey et al., 2005; Low et al., 2015). Given the link between SEL programs, more specifically *Second Step*, and improvements in behavior and emotion management, it was expected that *Second Step Early Learning Program* would also help preschool students develop aspects of mindfulness and self-regulation.

Furthermore, dosage and exposure to *Second Step Early Learning Program* were postulated to relate to the extent to which preschool children would develop mindfulness and self-regulation skills. Specifically, full-time preschool students were expected to exhibit greater improvements in their self-regulation and mindfulness skills than their part-time peers, due to greater dosage and exposure to *Second Step*. Please refer to a brief rationale and discussion under *Research Question 1*.

Research Question 3. *If Second Step Early Learning Program results in improvements in mindfulness and self-regulation, do supplemental MindUp lessons provide added value beyond the benefits of Second Step Early Learning Program in preschool children?*

It was hypothesized that students' mindfulness and self-regulation skills would further improve beyond what students acquire from SEL instruction from *Second Step Early Learning Program* alone after they receive mindfulness-based instruction from *MindUp*, which explicitly teaches skills on getting focused, sharpening the senses, and taking action mindfully. Although SEL programming methodically teaches children specific skills and provides rehearsal opportunities under artificial conditions, children may not readily access these skills during truly stressful situations that require skill application. On the other hand, mindfulness-based programming, such as *MindUp*, teaches children to focus on their inner capability to demonstrate similar skills so that they can easily apply these skills when needed. Researchers concur that further study of these combined approaches is warranted (Felver et al., 2013). Despite the lack of published research conducted in this area, it was expected that the selected *MindUp* lessons would lend themselves to the further development of mindfulness and self-regulation skills beyond those taught using *Second Step Early Learning Program*.

Relatedly, dosage and exposure to selected *MindUp* lessons were expected to link to the degree to which preschool children would improve their mindfulness and self-regulation skills. Specifically, it was hypothesized that full-time preschool students would demonstrate more progress in these areas than their part-time peers, due to greater dosage and exposure to *MindUp*. Please refer to a brief rationale and discussion under *Research Question 1*.

CHAPTER 3: METHOD

Setting

Early Childhood Setting. The study occurred in a non-profit, private child development center that serves children ages 10 months through five years. Participants in this study were recruited from one classroom that served 4- and 5-year-old children in this play-based preschool in the Midwestern region of the United States.

The school adopted the *Second Step and MindUp* curriculum for class-wide delivery and the researcher worked with the staff to implement and evaluate the curriculum. The primary investigator taught selected *Second Step* and *MindUp* lessons in collaboration with both classroom teachers. As such, all children in one preschool classroom (n = 24) received instruction. Among these students, 6 were systematically chosen to participate in progress monitoring throughout the study. The rest of the students, whose parents provided consent for data collection, took part in three assessments during the school year.

The program, designed for 4- and 5-year-old children, maintained a teacher-student ratio of 1 teacher for every 9 students specific to this age range (i.e., up to 19 four- and five-year-old children under the supervision of 2 full-time teachers at any one time). Although children from culturally and socio-economically diverse backgrounds attend the center, most students came from White, middle-income families. This tuition-based program was accredited by the National Association for the Education of Young Children (NAEYC), an indicator of high-quality early childhood education (NAEYC, 2009).

Community. The center is located near a large, public research university in the Midwest. The city population consists of individuals from the following racial backgrounds: 72% non-Hispanic White, 7.4% Black, 4.3% Hispanic or Latino, 12.8% Asian, 0.2% American Indian, and 3.8% two or more races (U.S. Census Bureau, 2015). Furthermore, between 2011 and 2015, a vast majority (96.7%) of residents, aged 25 years and older, identified as being at least high school graduates. Nearly three-quarters of these individuals (70.1%) during the 2011 through 2015 period had earned at least a bachelor's degree. During the same four-year time frame, 34.4% of city residents owned a home. Despite the education level, nearly half (43.6%) of the city population lived below the poverty level; the median household income was $32,987.

Recruitment and Selection

Students. All students, including the 6 target participants, ranged in age between 3 and 5 years. The majority received a full day of preschool programming (9:00 AM to 4:00 PM) in the same classroom five days per week on a year-round schedule. Children in this class, whose parents provided consent, participated in the class-wide study. Students who were or had received special education services were excluded from the study. To rule out pre-existing intellectual disability and other current diagnoses that may confound intervention effects (e.g., Autism Spectrum Disorder), one item on the demographic questionnaire was used to qualify students in this study. Parent response (yes or no) indicating whether or not his or her child was currently receiving special education services served as a proxy for confounding conditions and used to exclude participants. Eligible children who displayed behavior and self-regulation difficulties were identified based on teacher and parent behavior ratings. From this group, a randomly selected sample participated in more intensive data collection.

A priori power analysis for the paired samples t-test using *G*Power* (version 3.1.6) suggested that a class-wide sample size of n = 14 would be needed to maintain 95% power and an effect size of 1.2. A priori power analysis for the one-way repeated measures ANOVA with 95% power and an effect size of 1.2 revealed a class-wide sample of n = 10. Prior investigations suggested a range of sample sizes that included the recommendations made by *G*Power*. A systematic review of meditation-based interventions among school-aged children in classroom, clinic, and community settings (median effect sizes ranged between .27 to .70 for psychological and behavioral outcomes) suggested a sample size of 19 (Black, Milam, & Sussman, 2009). A more recent evaluation of a mindfulness intervention that targeted 3- to 5-year-old children in a preschool setting indicated an effect size of 2.067 with a suggested sample that ranged between 5 and 16 (Razza et al., 2015). Most recently, an intervention aimed at enhancing the socioemotional competence and reducing the behavioral concerns of preschool aged children reported effect sizes ranging from 1.02 to 1.84 with a suggested sample size between 6 and 10 children (Thomson & Carlson, 2016). In sum, similar studies that investigated the effectiveness of SEL and mindfulness interventions on young children reported large effect sizes. Together with *G*Power* results, these studies indicated that a class-wide sample size ranging between 5 and 19 students was sufficient in maintaining 95% power with a large effect size (e.g., 1.2).

Recruitment Procedure. Two primary recruitment strategies were used to ensure sufficient participation. First, the preschool granted the researcher permission to access and use data from teacher- and parent-completed surveys of each child in the classroom to assist in the evaluation of the curriculum for the school pending consent from the parents.

Second, the teachers sent home consent packets in students' backpacks, addressed to parents or primary caregivers, to invite participation in the current study. Each consent packet included a letter that provided information about *Second Step Early Learning Program* and *MindUp*, which was implemented to the entire class, a parent consent form for study participation, and a demographic questionnaire. The teachers also posted a note in the private Facebook group for parents of children in this class about the study to encourage participation. This note included an introduction to the researcher and her schedule at the school.

Target Student Selection Procedure. Besides meeting criteria for general participation (parental consent and no exposure to special education services), target students must have met additional conditions. To select 6 participants who needed the most support, a multi-step process was used. First, the teachers nominated 6 students who demonstrated behavior concerns and showed difficulty in focusing attention, controlling impulses, and/or remaining calm despite strong, negative feelings. Second, parents' nominations were considered. Third, parent- and teacher-completed *Deveroux Early Childhood Assessment for Preschool, Second Edition* (*DECA-P2*; LeBuffe & Naglieri, 2013) and *Children's Behavior Questionnaire – Short Form* (*CBQ*; Putnam & Rothbart, 2006; Teglasi, 2012) were used to support and refine teacher and parent nominations. Prior to the start of instruction, the lead teacher completed *DECA-P2* and *CBQ* forms for each student in the class. Consenting parents of children in the class also filled out this survey. Children with a T-score of 49 or below (Percentile Rank < 50) on the Self-Regulation subscale and a T-score of 51 and above (Percentile Rank > 50) on the Behavioral Concerns subscale of the teacher- or parent-completed *DECA-P2* forms qualified as target participants. T-scores that fell within the lower half of the "Typical" or within the "Area of Need" range indicated areas that required additional support. In addition, children with a score of 4 or above on the teacher- or parent-completed *CBQ* Anger/Frustration and Impulsivity subscales qualified as target participants. Those who received a score of 4 or below on the teacher- or parent-completed *CBQ* Attentional Focusing and Inhibitory Control subscales also qualified. Fourth, use of the *HTKS* and *Disappointing Gift* tasks, which measure different 2 domains of self-regulation, further refined target participant selection. Students who scored 30 points or less out of 60, or 50% or less of the full score, on *HTKS* and those who earned 3 points or higher out of 9, or 33% or more of the full score, on *Disappointing Gift* were candidates. Six students who met the four criteria above were selected as the target participants.

Participants

Following this process, 6 target students, who gave their assent and whose parents provided prior consent, were selected for intensive, ongoing progress monitoring through behavioral observation of tasks completed in person and through four teacher-completed surveys throughout the study. Four boys (Chung, Brody, Ethan, and Caden) and 2 girls (Chloe and Ava) participated in this single-case investigation. Pseudonyms are used in place of real names to protect each participant's confidentiality.

Chloe. Chloe was a 4-year-old White female who attended preschool full time. At home, she spent equal time with both parents. On the pre-test, Chloe received low ratings of self-regulation on the *DECA-P2* by both her mother and teacher. Her mother and teacher reported few behavior concerns. Chloe scored high in anger/frustration and low in inhibitory control on the *CBQ* in educational and home settings. Despite these ratings, she scored above 50% on the *HTKS*, a behavioral measure of inhibitory control, and below 50% on the *Disappointing Gift* task, a behavioral measure of negative emotion (e.g., anger).

Chung. Chung was a 4-year-old Chinese male who attended preschool full time. His mother was identified as his primary caretaker at home. On the pre-test, Chung received low ratings of self-regulation on the *DECA-P2* at both home and in school, but he was not reported to demonstrate behavioral concerns in either setting. Chung scored low in attentional focus and inhibitory control and high in impulsivity on the *CBQ* by his father and teacher. In line with his low ratings on inhibitory control and anger/frustration, Chung received a score below 50% on the

HTKS. His score (below 50%) on the *Disappointing Gift* task supported his low anger/frustration score on the *CBQ*.

Ava. Ava was a 4-year-old White female who attended preschool full time. At home, her primary caretaker was her mother. On the pre-test, Ava received moderate scores (i.e., at least 50th percentile rank) of self-regulation on the *DECA-P2* by her mother and teacher and was not generally considered to exhibit behavioral concerns. Furthermore, Ava received higher scores of attentional focus, impulsivity, and inhibitory control at home than at school on the *CBQ*. Her low *HTKS* score supported her low rating of inhibitory control by her teacher. Her score (below 50%) on the *Disappointing Gift* task was consistent with her low anger/frustration score on the *CBQ*.

Brody. Brody was a 4-year-old mixed race male who attended preschool full time. At home, his mother and father were both identified as primary caretakers. Although he received high ratings in self-regulation and low ratings in behavioral concerns by his mother and teacher on the *DECA-P2* pre-test, Brody scored low on attentional focus and high in impulsivity on the *CBQ* completed by his teacher. He received low ratings in anger/frustration and high ratings in inhibitory control in both home and educational settings. His high *HTKS* score (above 50%) and low score on the *Disappointing Gift* task (below 50%) supported these parent and teacher *CBQ* ratings.

Ethan. Ethan was a 4-year-old mixed race male who attended preschool up to 3 afternoons per week. At home, his mother spent the most time taking care of him. Ethan received a lower rating in self-regulation and a higher rating in behavioral concerns at school than at home on the *DECA-P2* pre-test. A discrepancy in parent-teacher ratings also appeared consistently on the *CBQ*, such that Ethan scored significantly higher in anger/frustration and attentional focus and lower in inhibitory control at school. However, he received a higher rating of impulsivity at home than at school. His low *HTKS* score (below 50%) supported the low inhibitory control rating provided by his teacher, whereas his low *Disappointing Gift* task score (below 50%) supported his low anger/frustration score provided by his mother.

Caden. Caden was a 3-year-old White male, who turned 4 years old during the study and attended preschool three mornings per week. His father was identified as primary caretaker. Caden scored low in self-regulation by both his mother and teacher on the *DECA-P2*; however, his teacher indicated a higher level of behavioral concern than his mother. In contrast, Caden received lower scores in anger/frustration, impulsivity, attentional focus, and inhibitory control on the *CBQ* from his teacher than from his mother. In line with his teacher's rating of inhibitory control and anger/frustration, Caden received low scores (below 50%) on *HTKS* and *Disappointing Gift* task.

Class-Wide Participants. The parents of 12 students in the class consented to their children's participation in the class-wide evaluation of *Second Step* and *MindUp*. Including the 6 target students, 12 children were evaluated for their self-regulation and mindfulness by their lead teacher and parent before the study; however, 1 child discontinued participation. As such, 11 children were evaluated for self-regulation and mindfulness by their lead teacher and parents during and after the study through completion of *DECA-P2* and *CBQ* surveys. Of the 11 participants, three (25%) attended the preschool part time and nine (75%) attended full time. Their ages ranged from 3 to 5 years (M = 4.26 years; SD = .40) and the majority were female (58%). Eight (67%) of the students were White, 3 (25%) were multiracial, and 1 (8%) were Asian.

Teachers. Two full-time teachers who worked closely with their preschool students in the classroom assisted with intervention delivery. A description of each teacher is provided below.

Lead. The lead teacher of the preschool classroom, Ms. Nickleby, earned a bachelor's degree in Elementary Education with a minor in Biology and Language Arts and has nine years of teaching experience. She has served as the lead teacher in the current preschool classroom for 5 years.

Assistant. The assistant teacher, Ms. Ryan, has a total of 14 years of experience serving as an assistant for a variety of ages in the current preschool. For example, she assisted the lead teachers of the preschool classrooms that enrolled children ranging from 10 months through 4 years of age for two years. Ms. Ryan has served as assistant teacher for the current preschool classroom for 12 years.

Dependent Variables

This study examined the effect of the *Second Step* and *MindUp* interventions on mindfulness and self-regulation, which were operationalized in terms of 5 dependent variables: focused attention, inhibitory control, delay of gratification, empathy, and emotion management. Mindfulness refers to one's ability to attend to momentary thoughts, feelings, and perceptions in an objective, nonjudgmental manner (Kabat-Zinn, 2003). One indicator of mindfulness is **focused attention**, or the ability to focus voluntarily when distractions exist (Eisenberg, 2012; Eisenberg, Valiente, & Eggum, 2010). Self-regulation was assessed in 4 key areas. **Inhibitory control** was defined as one's ability to plan and to suppress inappropriate approach responses to events that occur under instruction or in new, unusual, or ambiguous situations (Kochanska et al., 1996; Eisenberg, Valiente, & Eggum, 2010). **Delay of gratification** referred to one's ability to resist temptation in the short term in order to earn a prize later on (Mischel & Ayduk, 2011; Luerssen & Ayduk, 2014). **Empathy**, a key component of prosocial behavior that often results in a feeling of concern for another person's situation or distress, was defined as an affective response to the expectation or understanding of another person's feelings or emotional state (Eisenberg, 2000; Edwards et al., 2015). **Emotion management**, considered to be voluntarily controlled instead of automatic or reflexive, referred to "the modulation of emotion and related physiological states, [in addition to] the regulation of overt behaviors that are associated with the experience of emotion (e.g., facial expressions of emotion, reactive aggression) and behaviors that are intended to modulate emotion through affecting social context" (Eisenberg & Spinrad, 2004, p. 337).

Two methods of measurement, surveys and behavioral tasks, were used to assess each DV at different time points. Table 1 provides the operational definition of each DV, the measures used, and the tasks of each DV. A description of each measurement method is provided in Table 1 on the following page.

Table 1:

The Operational Definition, Measures, and Tasks of Each Dependent Variable

Dependent Variable		Behavioral Task†	Survey Measure‡
Mindfulness: Mindful Awareness	Focused Attention	Number of seconds (and percentage of time) out of 5 minutes that one remains on task, or demonstrates active and passive engagement on an activity Focused attention: • Eyes on the worksheet • Intentionally moving finger or marker on the worksheet • Circling the hidden pictures	Pre- and post-test: • *CBQ-SF* & *CBQ-TSF* Attentional Focus subscale
Self-Regulation: Executive Function and Effortful Control	Inhibitory Control	Acting out verbal directions unnaturally (e.g., opposite or non-typical response) according to the instructions Inhibitory control: • <u>*HTKS*</u>: In response to “touch your head,” child touches toes instead of touching head <u>*Pencil Tap*</u>: Child taps pencil twice if the researcher taps the pencil once	Pre- and post-test (Beginning and End): • *CBQ-SF* & *CBQ-TSF* Inhibitory Control subscale Pre- and post-test of *Second Step* & pre- and post-test of *MindUp* (Beginning, Middle, and End): • *DECA-P2* Progress Monitoring*: • *DESSA-mini*

Table 1 (cont’d)

	Delay of Gratification	Wait to retrieve a reward (e.g., mini Oreo) under 10-, 20-, 30-, and 15-second delay conditions	Pre- and post-test (Beginning and End): • *CBQ-SF* & *CBQ-TSF* Impulsivity subscale Pre- and post-test of *Second Step* & pre- and post-test of *MindUp* (Beginning, Middle, and End): • *DECA-P2* Progress Monitoring*: • *DESSA-mini*
	Empathy	The average number and percentage of items (stickers or snacks) kept for oneself, instead of shared with the target recipient, across 4 trials Acts of kindness/generosity: • Sharing stickers or snacks	Pre- and post-test (Beginning and End): • *CBQ-SF* & *CBQ-TSF* Anger / Frustration subscale Pre- and post-test of *Second Step* & pre-and post-test of *MindUp* (Beginning, Middle, and End): • *DECA-P2* Progress Monitoring*: *DESSA-mini*
	Emotion Management	1. Choose to respond with the use of alternative response instead of with automatic, emotional reactions (e.g., screaming, kicking, cursing) when a favorite toy is removed 2. Choose the positive alternative to reducing anger or frustration in response to puppet scenario (e.g., “I should think about something else, like playing with my friend” and “I should find another toy”)	

Table 1 (cont'd)

		3. When finding out that anticipated gift is a wood chip after unwrapping it, show: • No negative facial expression (e.g., nose wrinkling; lowered brows puckered or pursed mouth; tight, straight-lined mouth) • Say "thank you" • Make eye contact with researcher • Make no negative comment (e.g., "I don't want this) or noise (e.g., "ugh") • No shoulder shrug	

Note: †All behavioral tasks were completed throughout the study by the 6 target participants only. ‡*DECA-P2* and *CBQ* surveys were completed by parents and the lead teacher for all students in the class before and after the intervention. The *DECA-P2* was also be completed by the teacher following completion of the *Second Step* implementation (prior to *MindUp* delivery) for all students. *****The *DESSA-mini*, a progress monitoring tool for socioemotional competence, was completed by the assistant teacher for the 4 target students 4 times during the study. *CBQ-SF = Children's Behavior Questionnaire – Short Form*. *CBQ – TSF = Children's Behavior Questionnaire – Teacher Short Form*. *DECA-P2 = Deveroux Early Childhood Assessment for Preschool, Second Edition*. *DESSA-mini = Deveroux Student Strengths Assessment Mini*. *HTKS = Head-Toes-Knees-Shoulders* task.

Survey Measures. The *Deveroux Early Childhood Assessment for Preschool, Second Edition* (*DECA-P2*; LeBuffe & Naglieri, 2013), *Children's Behavior Questionnaire – Short Form* (*CBQ-SF*; Putnam & Rothbart, 2006), *Children's Behavior Questionnaire – Teacher Short Form* (*CBQ-TSF*; Teglasi, 2012), and *Deveroux Student Strengths Assessment Mini* (*DESSA-mini*; Naglieri, LeBuffe, & Shapiro, 2014) are behavioral rating scales that were completed over the course of the study. Descriptions and psychometric properties of these instruments are provided below.

***Devereux Early Childhood Assessment for Preschool, Second Edition* (*DECA-P2*)**. The *DECA-P2* (LeBuffe & Naglieri, 2013) is a 38-item behavior rating scale used to identify the level at which a child displays specific protective factors and behaviors relevant to optimal social and emotional functioning. It is comprised of three 9-item subscales and an 11-item subscale. The *Self-Regulation* subscale assesses the child's ability to express feelings and effectively manage his or her behavior. A sample item includes "controls his/her anger." The *Attachment/Relationships* subscale measures the child's ability to form and maintain positive social connections with peers and adult caregivers. An example item asks the rater to indicate how often the child "appear[s] happy when playing with others." The *Behavioral Concerns* screens for behavioral concerns in children ages 3 through 5 years. Sample items include "have a short attention span (difficulty concentrating)" and "become upset or cry easily." Parents and teachers, who separately completed the form, reported the frequency (never, rarely, occasionally, frequently, and very frequently) with which the target child behaved a certain way during the previous 4 weeks.

On the *DECA-P2,* each rater's evaluation yielded separate T-scores, percentile ranks, and descriptions of skill level. The sum of assigned points per subscale were used to determine the T-scores (ranges from 28 to 72) and percentile ranks (ranges from 1 to 99) specific to the Self-Regulation (total raw score ranges from 0 to 36) and Behavioral Concerns (total raw score ranges from 0 to 44) based on the *DECA-P2 Manual*. The Interpretative Key at the bottom of the *DECA-P2* Individual Child Profile form provides the description for each scale (i.e., strength, typical, area of need). Following score determination, the researcher examined each participant's level of functioning at home and at school based on teacher- and parent-generated scores on the *DECA-P2*.

Research compiled by Devereux Center for Resilient Children (DCRC, 2012) provides evidence that the *DECA-P2* has strong technical adequacy with high reliability and validity. With regard to internal consistency, reported Total Protective Factor (TPF) coefficients for parent raters ($\alpha = .92$) were found comparable to teacher raters ($\alpha = .95$), which both exceed the suggested desirable standard of the .90 composite value recommended by Bracken (1987) (DCRC, 2012, p. 53). Similar Cronbach's alphas that met minimum standard were also found among parent raters ($\alpha = .80$) and teacher raters ($\alpha = .86$) on the Behavioral Concerns subscale. A separate investigation, which asked parents and teachers to rate the same children (74% White, mean age = 4 years and 5 months) on two separate occasions provided evidence for high test-retest reliability (DCRC, 2012). Although test-retest reliability for the three primary subscales was slightly higher for teacher raters (TPF coefficient = .95) than parent raters (TPF coefficient = .88), it was comparable among both raters on the Behavioral Concerns scale (parent TPF coefficient = .78, teacher TPF coefficient = .80). TPF scale correlations, which varied somewhat between parent (.51) and teacher (.72) raters, indicated adequate inter-rater reliability. Coefficients for the Behavioral Concerns scale differed greatly between parents (.46) and teachers (.70).

Data also support the validity of *DECA-P2*. Three types of validity provide evidence: (a) content validity, (b) criterion validity, and (c) construct validity. Based on a literature review on social and emotional competence and resilience in young children, feedback from focus groups made up of early childcare and education professionals, and a review by a National Advisory Committee, content validity of *DECA-P2* is regarded as high. Research that collected scores on two samples of children (diagnosed with emotional or behavioral disturbance matched with typically developing comparison group) documented large and significant differences between the mean scores of these groups (EBD Mean ± SD = 42.1 ± 9.1, comparison Mean ± SD = 47.4 ± 9.2, $p < .01$). Furthermore, d-ratios ranged from 0.58 to 1.09, which indicates large differences between the means of these groups. An evaluation of the appropriateness of the *DECA-P2* for use with minority children revealed similar scores earned by Black, White, and Hispanic children. Similar mean scores and standard deviations, along with d-ratios below .20 (indication of small differences), suggest appropriateness of *DECA-P2* for White, Black, and Hispanic children. With regard to construct validity, *DECA-P2* was found to show strong convergent validity with the parent and teacher ratings of the Total Protective Factors (TPF) score for *Preschool Emotional and Behavioral Rating Scale* (parent: $r = .65$, $p < .01$; teacher: $r = .78$, $p < .01$) and with the TPF and Behavioral Concerns score for *Conners Early Childhood* (parent: $r = -.37$, $p < .01$; teacher: $r = -.42$, $p < .01$).

Children's Behavior Questions – Short Form (CBQ-SF). Selected subscales of the *Children's Behavior Question – Short Form* (*CBQ-SF*; Putnam & Rothbart, 2006) were used to measure the self-regulatory ability of young children ages 3 to 8 years. A caregiver and a parallel teacher version of the *CBQ-SF* were developed to understand children's behavior at home and at school. The *CBQ-SF* caregiver and teacher forms each consist of 94 items assessing three broad dimensions of temperament (effortful control, negative affect, and extroversion/surgency). Although the survey is organized into 15 sub-scales, the teacher and parents each completed 4 subscales (Anger/Frustration, Attentional Focusing, Inhibitory Control, and Impulsivity) to assess these components of self-regulation across home-school settings. All four 6-item scales took no more than 10 minutes to complete per child.

Both the parent- and teacher-version of the *CBQ-SF*, yield a subscale score (1 – 7), which indicates the child's average functioning over 6 months within the given area of self-regulation. Subscale scores were computed by dividing the sum of all subscale ratings by the total number of subscale items that received a rating . Scores were computed for the Attentional Focus, Inhibitory Control, Impulsivity, and Anger/Frustration subscales. Following score determination, the researcher examined each participant's level of functioning at home and at school based on teacher- and parent-generated scores on the *CBQ* subscales.

Caregiver Form. The caregiver version of the 94-item *CBQ-SF* gathers parent ratings of children's self-regulation outside of the formal educational setting (Putnam and Rothbart, 2006). For this study, parents rated their children on four sub-scales using a 7-point Likert scale format (1= extremely untrue of your child, 7 = extremely true of your child) (Appendix F). First, they completed 6 Attentional Focusing scale items. A sample item is, "When practicing an activity, has a hard time keeping her/his mind on it." Second, parents rated their children on 6 Anger/Frustration scale items, such as, "Gets angry when s/he can't find something s/he wants to play with." Third, they completed 6 Inhibitory Control items, such as "Has trouble sitting still when s/he is told to (at movies, church, etc.)." Fourth, parents rated their children on 6 Impulsivity items, which included, "Usually rushes into an activity without thinking about it."

Putnam and Rothbart (2006) provided at least adequate psychometric support for these four scales of the *CBQ-SF*. All scales maintained acceptable internal consistency: Attentional Focusing (α = 0.75), Anger/Frustration (α = 0.76), Inhibitory Control (α = 0.72), and Impulsivity (α = 0.72). Furthermore, across three different samples, internal consistency remained at least acceptable for the Attentional Focusing scale (α = 0.73, 0.70, 0.70), Anger/Frustration scale (α = 0.78, 0.72, 0.69), Inhibitory Control scale (α = 0.62, 0.68, 0.72), and Impulsivity scale (α = 0.54, 0.62, 0.74). An investigation of maternal-paternal interrater reliability revealed correlations of 0.53 at 46 months specific to the Attentional Focusing scale. Similar correlations were found for the Inhibitory Control scale (0.49 at 46 months). Slightly lower correlations were found for the Anger/Frustration (0.51 at 46 months) and Impulsivity scales (0.42 at 46 months). Maternal rank order stability correlation from 33 to 45 months was found to be 0.61, while the corresponding paternal correlation was found to be 0.71 for Attentional Focusing scale items. It was found to be 0.70 and 0.52 for the 33- to 45-month maternal and paternal ranks, respectively. For Inhibitory Control items, the 33- to 45-month maternal rank order stability correlation was found to be 0.70; the corresponding paternal correlation was 0.64. The 33- to 45 month maternal and paternal ranks for Impulsivity items were identified as 0.75 and 0.51, respectively.

Teacher Form. The 94-item *CBQ Teacher Form* (*CBQ-T*), based on the *CBQ-SF*, was created by Teglasi (2012) with approval from its original developers (Putnam & Rothbart, 2006; Schussler, 2012). Twenty six items from the *CBQ-SF* were modified, yet maintained the fundamental meaning of each item and upheld the integrity of all 15 temperament characteristics. Like parents, the lead teacher completed the 6-item Attentional Focus, Anger/Frustration, Inhibitory Control, and Impulsivity scales on the same aforementioned 7-point Likert scale (1=

extremely untrue of your child, 7 = extremely true of your child) (Appendix G). The Attentional Focus and Impulsivity items were left unchanged and were identical, to the items completed by parents. The modified items included 3 of 6 Inhibitory Control and 3 of 6 Anger/Frustration scale items. A sample Inhibitory Control scale item was changed from “Has trouble sitting still when s/he is told to (movies, church, etc.)” to “Has trouble sitting still when s/he is told to (story time, etc.).” An example Anger/Frustration item was changed from “Gets angry when told s/he has to go to bed” to “Gets angry when told s/he has to remain still during rest time.”

Despite the modifications, the *CBQ-T* exhibited satisfactory psychometric properties (Schussler, 2012). An analysis revealed adequate internal consistency for the Attentional Focus ($\alpha = 0.79$), Anger/Frustration ($\alpha = 0.86$), Inhibitory Control ($\alpha = 0.82$), and Impulsivity ($\alpha = 0.83$) scales. Interrater reliability between teachers and parents on the *CBQ-SF* and *CBQ-T* scales was relatively high on Impulsivity ($r = 0.38$, $p < 0.001$) and Inhibitory Control ($r = 0.30$, $p < 0.01$). In contrast, parent-teacher interrater reliability exhibited a lower, non-significant correlation for Attentional Focus ($r = 0.14$, $p > 0.05$) and Anger/Frustration ($r = 0.21$, $p > 0.05$).

***Devereux Student Strengths Assessment-Mini* (*DESSA-mini*)**. The *DESSA-mini* (Naglieri, LeBuffe, & Shaprio, 2014) is an 8-item progress monitoring tool that assesses key areas from the 72-item *DESSA.* A strength-based instrument, it is intended for use among school-aged children, ranging from age 5 through 14 (i.e., kindergarten through eighth grade). The *DESSA-mini* measures socioemotional competence, or the degree to which a child successfully interacts with peers and adults in ways that show cognizance of, and capacity to regulate, emotions in an age- and context-appropriate manner (Naglieri, LeBuffe, & Shapiro, 2011).

The *DESSA-mini* has 4 equivalent 8-item forms that may be used interchangeably to monitor student progress repeatedly over the school year. The assistant teacher completed the *DESSA-mini* four times for the 6 target participants during the study. She indicated the frequency of certain behaviors that occurred over the past 4-week period on a 5-point Likert scale (0 = Never, 2 = Occasionally, 4 = Very Frequently). Example items include how often the child "pay[s] attention" and "do[es] something nice for somebody."

The *DESSA-mini* yields a Socioemotional Total (SET) score, which summarizes individual student's overall socioemotional competence. The SET score is based on the T-score (ranges from 28 to 72), which is calculated by summing the raw item scores and converting the total score to a derived score using a norms table. The T-score and its corresponding percentile rank fall in a particular category, which indicate whether the student's socioemotional competency needs improvement ($T \leq 40$), considered typical of same-aged children ($41 \leq T \leq 59$), or regarded as a strength ($T \geq 60$).

The *DESSA-mini* exhibits strong psychometric properties across its four forms. Reliability studies compiled by Committee for Children (2013) have universally found its internal consistency, alternate forms reliability, test-retest reliability, and inter-rater reliability to be high. Cronbach's alphas across all *DESSA-mini* forms were found to exceed .90 (α = .91 to .92), which suggests strong internal reliability (Center for Resilient Children, 2013). The similarity of item means and standard deviations across forms calculated by rating the same children (Mean ± SD range: 50.5 ± 9.9 to 50.7 ± 9.8), in addition to high alternate forms reliability coefficients (T-score range: .90 to .93), indicates strong alternate form reliability and supports substitutable use of forms. Test-retest reliability (correlations ranged from .88 to .94, p

< .01) and inter-rater reliability (correlations between ratings ranged from .70 to .81, $p < .01$) were found to be significant and high.

The validity of the *DESSA-mini* is also high. This measure has been found to correlate highly with *DESSA* Socioemotional Composite (SEC) T-Score, to identify struggling students consistently, and to distinguish between groups who differ in socioemotional competence (Committee for Children, 2013). Correlations of the *DESSA* SEC T-scores with the Socioemotional Total (SET) T-score of each *DESSA-mini* form were found to be significant and high (correlations ranged from .95 to .96, $p < .01$). Furthermore, each *DESSA-mini* T-score correlated strongly and significantly with the *DESSA* total item raw scores that excluded items from each *DESSA-mini* form (correlations ranged from .94 to .96, $p < .01$). Together, these correlations indicate that scores generated from the 4 *DESSA-mini* forms correlate strongly with *DESSA* scores. A separate examination provided support that a high degree of agreement exists between each *DESSA-mini* form and the *DESSA* SEC to determine a child's need for instruction. It found that the *DESSA-mini* accurately identified struggling students 94.5% to 95.3% of the time, which suggests that a teacher may confidently use it to identify students who need additional socioemotional support.

Behavioral Tasks. In addition to the 3 parent- and teacher-completed survey measures, each of the 6 target participants completed 8 behavioral tasks three times over a 5-day period at different points during the study to measure the extent to which they demonstrated the target behaviors, or dependent variables (DVs): focused attention, inhibitory control, delay of gratification, empathy, and emotion management. A description of each behavioral task, along with its theoretical and operational definitions, scoring method, and psychometric properties, is provided below.

Mindfulness: Focused Attention Task. Focused attention, a key aspect of mindfulness, was measured as the duration of time (number of seconds) within a 5-minute period in which the participant actively and passively engaged in a Hidden Pictures worksheet. Each child was asked to find a specific number of hidden pictures before he or she could end the activity. As the child identified the hidden pictures, an animation movie (e.g., *Frozen*, *Inside Out, Ice Age*, etc.) played from a laptop computer set in front of the child's work space. Indicators of focused attention included both eyes on the handout, intentional movement of finger or marker across the worksheet to indicate active picture seeking, and circling or coloring the hidden picture. Behaviors that were not considered to demonstrate focused attention included watching the video, staring off into space, looking up if a visitor knocked or entered the room, drawing or coloring on the handout that was unrelated to identifying the hidden pictures, and engaging in behavior outside of completing the handout (e.g., talking). A percentage of time of focused attention within the 5-minute period was calculated as the number of seconds of focused attention divided by the total number of seconds observed (i.e., 300 seconds). This task, developed for the current study, had a mean inter-observer agreement (IOA) of 83% (range, 32% - 100%). Other psychometric properties are unknown.

Head-Toes-Knees-Shoulders (HTKS). This task, used in children ages 3 through 8 with little to no ceiling effects, was one of 2 behavioral measures that assessed inhibitory control (Ponitz, McClleland, Jewkes, Connor, Farris, & Morrison, 2008; Cameron & McClelland, 2011). Developed as an extended form of the *Head-to-Toes* (*HTT*) task (Campbell et al., 2007), the *HTKS* is a structured observation designed to assess primarily inhibitory control, in addition to two other aspects of executive function (attentional focusing and working memory). *HTKS* required children to carry out a series of actions over 30 trials in an unexpected way following their response to two oral commands (e.g., “touch your head” and “touch your toes”). During the first 10 trials, children were asked to perform the opposite of what they would typically do in response to two types of oral commands. The second 10 trials added 2 additional rules that still required children to perform the opposite of their natural response (“touch your shoulders” and “touch your knees”). The third set of 10 trials required children to respond inconsistently to 4 types of oral commands that correspond to four body parts. For example, the correct response to “touch your toes” would be for the child to touch his or her head. Likewise, “touch your knees” would require the child to touch his or her shoulders. A child scored 2 points for every correct response and 1 point for each self-corrected response. Scores ranged from 0 to 60 points, with higher scores indicating a greater level of behavioral regulation. Total earned points over 30 trials were converted into a percentage score.

Research has shown that *HTKS* is a reliable and valid measure of self-regulation (McClelland & Cameron, 2012; Ponitz et al., 2009; McClelland, Cameron, Connor, et al., 2007). The original developers (Ponitz et al., 2008) demonstrated construct validity of *HTT*, the precursor of *HTKS*, by showing that age group consistently correlated with task improvements – instead of the number of tasks administered – in similar sample sizes of preschool children ages 36 through 66 months ($F(8, 1320) = 29.55$, $p<0.01$). Kindergarten children who scored higher on the *HTKS* at the beginning of the year were also found to earn higher parent ratings on the attentional focusing ($r = 0.25$, $p<0.01$) and inhibitory control ($r = 0.20$, $p<0.01$) scales of Putnam and Rothbart’s (2006) *CBQ-SF* (Ponitz et al., 2009). *HTKS* also exhibited strong predictive validity, with moderate to strong effect sizes found for the task predicting math ($d = 0.56$), literacy ($d = 0.27$), and vocabulary ($d = 0.16$) achievement levels at the end of the kindergarten year (Ponitz et al., 2009). Ponitz and colleagues (2008) established strong internal consistency (α

= 0.87 to 0.92) of *HTT* for eight self-regulation items. Given the high level of similarity between *HTKS* and *HTT*, Ponitz and colleagues (2009) suggested that *HTKS* maintained a similarly high internal consistency to its precursor. A 66% scoring consistency (overall) and a 75% scoring consistency for self-corrects for *HTKS* by 12 examinees across 2 sites was also reported (Ponitz et al., 2009). Strong inter-rater reliability (0.98) in the assessment of first-grade students using *HTKS* was found in another study (Skibbe et al., 2012). Test-retest reliability was found to be high over a 3-month timeframe (α = 0.93) (McClelland & Cameron, 2012). In the current study, the mean inter-observer agreement (IOA) of this task was 93% across all target participants, ranging from 0% to 100% agreement.)

Pencil Tap. The second behavioral task that assessed inhibitory control in this study was the *Pencil Tap* (Smith-Donald, Raver, Hayes, & Richardson, 2007) (Appendix J), which was adapted from the *Peg-Tapping* task (Diamond & Taylor, 1996; Luria, 1966). In this task, each target participant was instructed to tap his or her pencil once when the primary researcher tapped her pencil twice. When the researcher tapped her pencil once, the child was expected to tap his or her pencil twice. Following up to 6 practice trials, during which feedback was provided, the researcher administered a series of 16 feedback-free trials comprised of the researcher's taps and the child's responses. The child received earned a score of "1" on each item if the correct number of pencil taps was provided and 0 for an incorrect number of taps. A premature discontinuation of the task earned a final score of -1. Scores ranged from -1 to 16, with higher scores suggesting more developed inhibitory control skills. *Pencil Tap* has high validity and reliability with an internal consistency of KR-20s = 0.89 and 0.91 at pre- and post-test, respectively (Willoughby, Kupersmidt, & Voegler-Lee, 2012). Two separate studies have also noted adequate inter-rater reliability. Smith-Donald and colleagues (2007) calculated an ICC = 1.00 for *Pencil Tap*, while

Diamond and Taylor (1996) reported α = 0.87 for *Peg Tap*. The mean inter-observer agreement (IOA) of this task in the current study was 97% across all target participants, ranging from 81% to 100% agreement.

Snack Delay. The *Snack Delay* task (Kochanska et al., 1996; Smith-Donaldson et al., 2007) was used to assess delay of gratification. This task measured each child's capacity to wait for a reward (e.g., a sticker, goldfish cracker, or a mini-Oreo cookie) located under a clear plastic cup, across four trials with specific time delay conditions (20-, 40-, 60-, and 30-second delays). A bell was rung to signal when the snack could be eaten. A 4-point coding system that reflects the length of delay in seconds before the child eats the snack in relation to the bell was used: 0 = eats the snack before the bell is lifted, 1 = eats the snack after the bell is lifted, 2 = touches the bell or cup before the bell is lifted, 3 = touches the bell or cup after the bell is lifted, and 4 = waits for the bell to ring before touching the cup or bell. Each observer calculated a final score by averaging the 4 trial scores, in addition to the percentage of trials each child waited for the bell to ring before he or she touched the cup or bell. In 2 separate studies that examined 4- and 5-year-old children, *Snack Delay* demonstrated adequate reliability for this age group. In 4-year-old children, one study quantified reliability as κ = 0.97 (Murray & Kochanska, 2002). A separate examination conducted with 5-year-old children found the reliability to be κ = .84 (Smith-Donald, Raver, Hayes, & Richardson, 2007). The mean inter-observer agreement (IOA) of this task in the current study is 98% across all target participants, ranging from 50% to 100% agreement. No validity data are available.

Sharing Task. The *Sharing* task, which also likely required generosity and kindness, was used to measure empathy. Adapted from *Sharing* task (Flook et al., 2015), this task required that students share items, such as stickers and snacks. It involved 4 separate trials in which participants were asked to hand out an item to a target recipient, who included a most- and least-liked classmate identified by the participant, an unfamiliar peer, and an absent or sick peer. Each participant was given a plastic sandwich bag with his or her name and a bag with the recipient's name for each trial. The researcher gave participants (depending on their preference) 10 stickers or snack items (e.g., snack size mini cookies) at the beginning of each trial and instructed them to keep as many as they preferred and to give as many as they would like to the recipient. A percentage of the items shared across the four trials was calculated from the total number of kept items ($1 - [\frac{total\ number\ stickers\ kept}{10\ stickers\ total}]$ = percentage of items shared). Lower average scores of kept items and higher percentages indicated greater levels of empathy. Although the technical adequacy of this task is largely unknown, the mean inter-observer agreement (IOA) of this task in the current study was 100% across all target participants.

Toy Removal Task. The *Toy Removal* task (Hirschler-Guttenberg et al., 2015) was one of 3 behavioral measures of emotion management. In this task, the researcher provided each participant with a favored toy as indicated by the teacher or child prior to task administration. After the child played with this toy for 2 minutes, the researcher removed the toy and placed it in a location that was visible, but out of arm's reach, to the child for 2 minutes. The toy was then returned to the child for another minute. Behavior codes were based on self-regulation research conducted by Hirschler-Guttenberg and colleagues (2015) and Cole and colleagues (2008). Observation of each child's behavior with the *School Psychology Tools* application (YoungStone Innovations, LLC., 2015) occurred using partial time sampling (5-second intervals) during the 2 minutes when the toy was removed. Observed behaviors included support-seeking, withdrawal, gaze aversion, and substitutive play. Support-seeking referred to one's attempt to find help to retrieve the toy, such as asking for help. Withdrawal was defined as behaviors used in order to avoid the toy after it has been presented, such as turning or twisting the body away from it, hiding the face or entire body, walking away, or leaving the room. Gaze aversion referred to looking away from the toy or closing one's eyes. Substitutive play referred to turning focus away from the toy to play with another object or to self-soothe with his or her body (e.g., tapping feet or rocking body back and forth). Separate percentages of time were calculated for each of the aforementioned behaviors that occurred during the 2 minutes when the toy was taken away from each target participant. Although the psychometric properties for this task are largely unknown, the mean inter-observer agreement (IOA) of this task in the current study was 56% (range, 0% - 100%) across coding categories and target participants.

Puppet Task. The second behavioral task used to assess emotion management was the *Puppet* task. In this task, the researcher presented each target participant with a scenario between two puppets, read from a script (Appendix K), and asked him or her to help the puppets "stop" feeling sad or angry (Cole et al., 2008). This task required each participant to select a forced-choice response between two courses of action concerning "what [the puppet] can do to stop feeling so [target emotion]" (Cole et al., 2008). Each child was provided two opportunities (i.e., two forced-choice questions) to identify an effective, appropriate strategy to manage sadness and anger. Selection of a forced-choice response that indicates an effective strategy to regulate anger and sadness earned a score of "1," while selection of an ineffective strategy received a "0." A percentage (0%, 50%, or 100%) of the number of trials in which the participant chose an effective strategy was calculated. Children who modulated sadness and anger skillfully were able to select the effective strategy 100% across both trials. Although the technical adequacy of this task is largely unknown, the mean inter-observer agreement (IOA) of this task in the current study is 93% (range, 0% to 100%) across all target participants.

Disappointing Gift. The third behavioral measure (Appendix K) used to measure emotion management was the *Disappointing Gift* (Carlson & Wang, 2007). Target participants completed this task by unwrapping a nicely-wrapped gift and discovering that the gift was a brown landscaping wood chip of no value. A total of 9 facial expressions and behaviors were coded as “0” (absent) or “1” (present). Each observer coded the child’s facial expression within 15 seconds of unwrapping the gift, or until the child clearly finished reacting to the gift. After the child’s reaction was coded, the researcher pretended to realize that she mistakenly wrapped the wrong gift and presented the child with a favorable gift. Children who demonstrated adequate regulation of negative emotions were those who showed no or infrequent instances of negative facial expression (e.g., nose wrinkling; lowered brow that indicates frustration or anger; puckered or pursed mouth; tight, straight-line mouth), eye contact avoidance, shoulder shrugging, or negative commenting or noisemaking (e.g., snort, “ugh”) when they were provided with an opportunity to unwrap an anticipated gift and discover that it was just a wooden chip (Carlson & Wang, 2007). Demonstration of any of these 9 indicators earned a “1.” A “0” was coded for any indicator not displayed. The sum of these expressions was calculated from the 9 total possible indicators. A lower score on the *Disappointing Gift* task indicated better emotion management skills. Although psychometric data are largely unknown for this task, the mean inter-observer agreement (IOA) of this task in the current study was 90% (range, 56% - 100%) across all target participants.

Interventions

This study examined the effects of 2 classroom-wide curricula on preschool students’ self-regulation and motivation: *Second Step Early Learning Program* (Committee for Children,

2011) and *MindUp* (The Hawn Foundation, 2011). A description of both programs, in addition to the empirical evidence that supports their effectiveness, is provided below.

Second Step Early Learning Program. *Second Step Early Learning Program* (Committee for Children, 2011) is a universal, classroom-based program that consists of 5 units designed to promote social competence and self-regulation skills in 4- and 5-year-old preschool students. Designed to be delivered up to 5 days per week for 5 to 10 minutes daily over 28 weeks, *Second Step* consists of 28 weekly scripted lessons and a Teaching Materials Notebook for teachers. Engaging visual and interactive content, which includes color photo Weekly Theme Cards, a CD of songs, colorful classroom posters, Listening Rules Cards, Feelings Cards, and boy and girl puppets for use during the mini-lessons, facilitates delivery of all lessons across units. Unit 1 (Skills for Learning) teaches important learning skills (listening, focusing attention, self-talk, following directions, and assertiveness). Unit 2 (Empathy) focuses on empathy and teaches children to identify different feelings (e.g., anger), recognize and respond to accidents, and help a peer when needed. Unit 3 (Emotion Management) teaches children to manage strong feelings, disappointment, and waiting. Unit 4 (Friendship Skills and Problem Solving) teaches children skills needed to interact with others and to engage in social problem-solving with peers. Children are presented with fair ways to play, initiating and joining play, and resolving social problems. Unit 5 (Transitioning to Kindergarten) reviews skills taught in the previous units and focuses on school readiness, particularly on the behaviors needed for children to succeed in elementary school (e.g., listening, calming down, and making friends).

For the purposes of this study, the first and second lessons of each week per unit were combined and presented on one day. Lessons 3 and 4 of each week per unit were occasionally combined and presented, although lesson 3 of each unit was usually implemented instead of both. The pre-requisite skills for learning, emotion identification, and emotion management were addressed, as *Second Step* teaches these specific foundational skills that relate to long-term social and academic functioning in young children (Committee for Children, 2011). However, Units 4 and 5 were not implemented, as they targeted less basic competencies, including friendship skills, problem solving, and the transition to kindergarten. This deviation from the standard delivery of *Second Step* resulted in the implementation of up to two 5-minute lessons five times a week that comprised Units 1 through 3. This instructional schedule resulted in the implementation of up to 16 lessons in Unit 1, up to 20 lessons in Unit 2, and up to 22 lessons in Unit 3 across eleven weeks for a total of 54 lessons. Therefore, target students received concentrated instruction on and opportunities to practice prerequisite skills that enhance learning, to improve empathy, and to develop emotion management skills.

MindUp. The *MindUp Grades Pre-K-2* (The Hawn Foundation, 2011) curriculum is designed for 3- to 8-year-old students and teaches students to engage in mindful and prosocial practices. Designed to be implemented across 30 weeks, *MindUp* includes 15 two-week lessons that teachers may use to guide instruction. It also includes activity sheets and a colorful poster with a variety of facts about the brain, which should be used to introduce and reinforce the brain-behavior connection. The curriculum consists of 4 units, which range between 3 and 6 lessons. Unit 1 introduces children to the brain, how it works, and its connection to mindful awareness, or the ability to attend to the present moment in a thoughtful, open-minded manner (The Hawn Foundation, 2011; Kabat-Zinn, 2003). In addition, the practice of mindful breathing is introduced. Unit 2 focuses on the integration of mindfulness with the senses and teaches children how to remain mindful of their behavior. Unit 3 presents students with information about, and the opportunity to practice, perspective taking, optimistic thinking, and appreciation of happy experiences. Unit 4 teaches children to express gratitude and apply mindfulness to interactions with others, such that they make the decision to and demonstrate caring kindness, even if these acts are random. Supplemental storybooks and music recommended in the curriculum lesson are used to facilitate lessons.

This study implemented 6 of the 15 lessons. Each lesson was delivered over 1 week, instead of over 2 weeks, for a total of 6 weeks. Selected lessons included 2 lessons from Units 1 (Getting Focused), 2 (Sharpening Your Senses), and 4 (Taking Action Mindfully). These particular lessons were chosen because they complemented the *Second Step* content and taught skills unique to mindfulness and the mind-body connection, yet promote development of self-regulation skills and socioemotional competence taught in *Second Step*. Lessons 1 and 2 from Unit 1 specifically introduced students to the mind-body connection and to apply this knowledge to focus their attention in real-world situations using mindfulness techniques. Lessons 5 and 8 from Unit 2 were chosen, as they extend and complement the self-regulation skills presented in *Second Step* with the use of mindfulness exercises intended to cultivate these competencies from the "inside out". Lessons 13 and 14 from Unit 4 were selected to further build on children's empathy and emotion management skills that were introduced in *Second Step* using mindfulness techniques. Selective delivery of lessons from each *MindUp* unit occurred to address at least 3 criteria while retaining essential ingredients from each lesson: (a) align instruction of target skills with those taught in *Second Step* lessons, (b) help students meet NAEYC early childhood standards (e.g., Standard 2.B.03, "Children have varied opportunities to learn the skills needed to regulate their emotions, behavior, and attention") to which the preschool adheres, and (c) be sensitive to common real world conditions (e.g., limited time, supporting students' specific needs, etc.). Instruction introduced and provided opportunities for children to learn about brain physiology and understand how the brain responds to stress, to engage in mindful movement, to express gratitude, and to perform acts of kindness.

Research Design

This research used group design and single-case, multiple probe design, across behaviors (Gast & Ledford, 2014). One part of the study used a group design with repeated measures of all participants in class with consenting parents (n = 12). The teachers and parents of all students completed behavior rating scales at pre-test followed by the class-wide implementation of *Second Step* and subsequently, by class-wide delivery of *MindUp*. Class-wide *Second Step* implementation involved instruction of three 6-lesson units by the researcher, followed by the teacher's completion of a class-wide behavior rating scale and the researcher's class-wide *MindUp* delivery of 3 groups of 2 lessons. At the conclusion of *MindUp* implementation, the teachers and parents of every participating student filled out the same surveys completed at pre-test.

The other part of the study used a single-case, multiple probe across behaviors, design with a subset of students (n = 6). (Refer to Figures 9 through 14 for target participants' multiple-probe-across-behavior graphs, which illustrate the order in which the interventions and assessment sessions occurred.) This particular design provided more in-depth analysis of individual change, as it involved survey- and task-based behavioral formative assessment. Direct intra-subject replication allowed for confirmation of reliability of effect following affirmation and verification of a cause-effect relationship between the intervention and target behaviors (Gast & Ledford, 2014). Direct inter-subject replication across the 6 participants helped to establish generalization of findings (Gast & Ledford, 2014). Meanwhile, measurement of all behaviors after participants demonstrated a difference in the response level of a target behavior tested the assumption that non-targeted behaviors remained at comparably low levels as the initial probe condition (Plavnick, Kaid, & MacFarland, 2015).

The information necessary to evaluate the added value of *MindUp* beyond *Second Step* at the individual level was gathered through participant completion of 8 tasks over 3 separate probe sessions prior to and following *Second Step* implementation to assess mindfulness (focused attention), inhibitory control, delay of gratification, empathy, and emotion management. Furthermore, after each set of *MindUp* lessons was implemented, the 6 students completed 5 of the original tasks that measured mindfulness (focused attention), inhibitory control, delay of gratification, empathy, and emotion management at 3 separate times across 1 week. Three of the tasks (*HTKS*, *Disappointing Gift*, and *Puppet Task*) were only completed three times during the study for various reasons, including prior investigations' use as pre- and post-test measures in group studies. In addition, anecdotal evidence from a pilot study of the current investigation (Chen, 2016) suggested that *HTKS* was likely too cognitively taxing for participants to complete 3 times every 3 weeks over 3 months (i.e., 12 times); misbehavior (e.g., noncompliance) was observed to escalate as participants were asked to engage in *HTKS* this frequently over time. *Disappointing Gift* was only administered three times, due to the ethical implications of frequently presenting a non-preferred present to an excited participant. Following completion of the *MindUp* instructional and probe conditions, each participant completed all 8 behavioral tasks once to assess maintenance of these skills. During *Second Step* and *MindUp* delivery, the assistant teacher also completed a brief progress monitoring instrument for these students 4 times, twice during *Second Step* implementation and twice during *MindUp* implementation.

Procedures and Data Collection

The current study followed a sequence of 6 phases, starting from *Second Step* pre-test and ending with maintenance. Outlined below, the procedures for each phase of the study occurred as depicted in Figure 1. Refer to Table 2 for specific measures that were administered during each phase. The entire battery of 8 behavioral tasks was administered to each child (n = 6) for a total of three times: once at phase 1, once at phase 3, and once at phase 6. Up to 3 indirect measures were completed by the teachers and parents, though what and when each was filled out depended on the phase.

Figure 1:

Phase Sequence of the Current Study

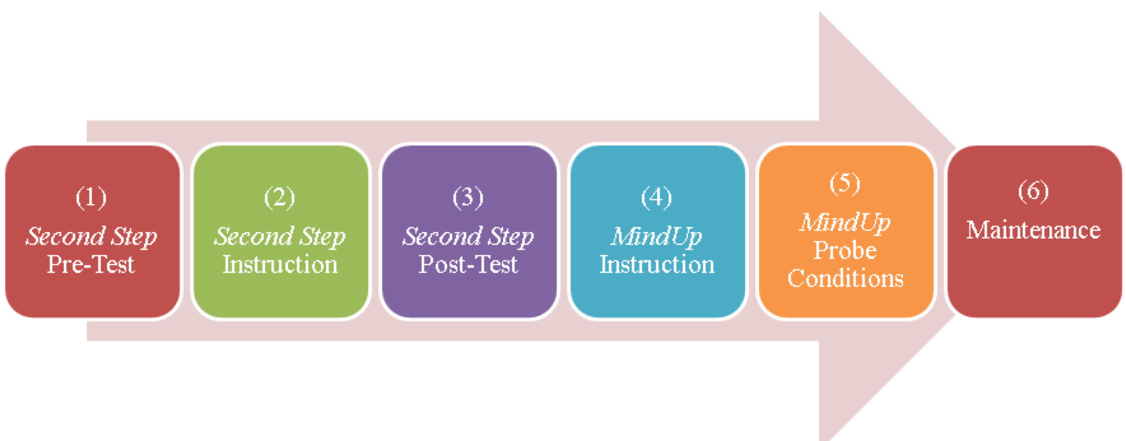


Table 2:

Measures Completed During Each Phase

Study Phase	Measure	Completed by Whom
1. *Second Step* Pre-Test	*CBQ-SF* *DECA-P2*	Parents
	CBQ-TSF *DECA-P2*	Lead Teacher
	8 Behavioral Tasks: • Mindfulness • HTKS • Pencil Tap • Snack Delay • Sharing • Toy Removal • Puppet • Disappointing Gift	Researcher and 1 Research Assistant (RA)
	Social Validity (n = 6 children)	Researcher and 1 RA
2. *Second Step* Instruction	*DESSA-mini* (2 times): • Week of 12/5/16: Second full week of instruction • Week of 1/30/17: Fifth full week of instruction	Assistant Teacher
3. *Second Step* Post-Test (*MindUp* Probe 1)	*DECA-P2*	Lead Teacher
	8 Behavioral Tasks (see above)	Researcher and 1 RA
	Social Validity (n = 6 children)	Researcher and 1 RA
4. *MindUp* Instruction	No measures administered	NA
5. *MindUp* Probe Conditions (*MindUp* Probes 2 through 4)	*DESSA-mini* (2 times): • Week of 2/27/17: Week following first set of *MindUp* lessons (*MindUp* Probe 2) • Week of 3/20/17: Week following second set of MindUp lessons (*MindUp* Probe 3)	Assistant Teacher

Table 2 (cont'd)

	5 Behavioral Tasks: • Mindfulness • Pencil Tap • Snack Delay • Sharing • Toy Removal	Researcher and 1 RA
6. Maintenance	*CBQ-SF* *DECA-P2*	Parents
	CBQ-TSF *DECA-P2*	Lead Teacher
	Social Validity Questionnaires	Lead Teacher, Assistant Teacher, and Researcher
	8 Behavioral Tasks (see above)	Researcher and 1 RA
	Social Validity (n = 6 children)	Researcher and 1 RA

Second Step Pre-Test. The teacher and primary caregiver of each child completed the *DECA-P2* and 4 subtests of the *CBQ – SF* (parents) and *CBQ-TSF* (teacher) before *Second Step* implementation. In addition to *DECA-P2* and *CBQ-SF* completion, all 8 behavioral tasks (see Table 2) were administered individually to the 6 target participants three times over 5 days) in an unused classroom or office at the school. Task administration occurred in the morning for the 4 full-time participants and 1 part-time participant and in the afternoon for the other part-time participant. Each behavioral task consisted of up to 4 trials, or opportunities, for participants to demonstrate each target behavior. Each target behavior per trial was linked to a distinct antecedent stimulus (e.g., verbal directions, snack, etc.). The researcher remained a silent observer if participants engaged in each trial within 15 seconds. Those who did not perform the task within the initial 15-second timeframe were reminded of the instructions. If another 15 seconds passed without engagement, the participant was encouraged to "give it your best shot." Following each trial, participants were given either a high-five or a small tangible (e.g., sticker) that was non-contingent on their performance.

Second Step Instruction. Following *Second Step* pre-test, the three selected *Second Step* units were delivered by the researcher to the entire class for up to 15 minutes, or up to two combined lessons, five times per week in the morning (9:30 am – 9:45 am) or afternoon (3:15 pm – 3:30 pm). These were times during which children typically engaged in free-choice or play-based activities (e.g., coloring, blocks, and reading). The morning time period immediately preceded usual pre-academic instruction and recess and the afternoon time period followed nap time. All children were expected to sit in their usual assigned spots on the rug, as the lead and assistant teachers provided classroom management.

Second Step instruction involved use of a scripted mini-lesson and guided practice of skills. Each 6-lesson *Second Step* unit taught students up to 6 concrete skills. During the first 2 days of each lesson, the researcher presented the skill during the 5- to 10-minute instruction, which incorporated music, puppets, and storytelling. On the third day, students received opportunities to practice these skills in the form of a game or another activity. Each child was provided with an opportunity to rehearse the given skill as outlined in the scripted lesson during practice activities. If a child performed the requested behavior correctly, the researcher provided him or her with verbal acknowledgement. If a child performed the behavior incorrectly, specific corrective feedback was provided to the entire class by the primary researcher. She invited all students, including the specific child, to perform this behavior for the class once more before receiving verbal acknowledgement. All lessons and practice activities occurred on the rug. During the second and fifth full weeks of *Second Step* implementation (i.e., weeks of 12/5/2016 and 1/23/2017), the assistant teacher completed the *DESSA-mini* as formative assessment of self-regulation for the 6 target students.

Second Step Post-Test / Initial MindUp Probe Condition. After the completion of *Second Step* implementation, the initial *MindUp* probe condition (*Second Step* post-test condition) took place and occurred before *MindUp* delivery. It involved collection of class-wide survey data and individual target student behavior task data. The lead teacher completed the *DECA-P2* for all participating students in the class (n = 12). In addition, all 8 behavioral tasks administered during *Second Step* pre-test (see Table 2) were administered to the 6 target participants in the gym on 3 separate days of the week at the same time that intervention implementation would typically occur. The other participating students did not complete any behavioral tasks.

MindUp Instruction and Probe Conditions. *MindUp* instruction began after the *Second Step* post-test / initial *MindUp* probe condition. Three pairs of lessons from *MindUp* (The Hawn Foundation, 2011) were conducted with the entire class for up to 15 minutes five times per week over 30 instructional days at the same time during the day that *Second Step* instruction had occurred. Both teachers provided classroom management.

MindUp instructional sessions involved use of weekly lesson plans that the researcher developed from the lesson guides, which provided generic scripts for parts of lessons and suggestions for instructional extensions and practice opportunities. Each pair of *MindUp* lessons taught students 1-2 concrete skills related to mindfulness. The researcher presented these skills during a 5-minute instructional period that incorporated multimedia and storytelling. A 10-minute practice session immediately followed, in which children were asked to apply the skill to a pre-selected everyday activity (e.g., I Spy, Simon Says, mindful walking). Each practice session also involved peer interaction and whole-group discussion on what students learned from the activity. Similar to *Second Step* instruction, children were asked to sit in their assigned spot on the rug during *MindUp* lessons. Practice activities took place on the rug or at a large round table in the classroom. The protocol for practice remained the same as that followed during *Second Step* lessons.

The first pair of *MindUp* lessons (How Our Brains Work and Mindful Awareness), which introduced students to the mind-body connection and taught them to focus their attention, was introduced after the initial *MindUp* probe condition. Following delivery of these first 2 lessons, target participants engaged in the second *MindUp* probe condition, which included 5 behavioral tasks. This probe condition entailed data collection of the focused attention (mindfulness) task on 3 separate days (i.e., 3 data points for focused attention) and data collection of the *Snack Delay* (delay of gratification), *Pencil Tap* (inhibitory control), *Sharing* (empathy), and *Toy Removal* (emotion management) tasks on 1 day (i.e., 1 data point each for delay of gratification, inhibitory control, empathy, and emotion management).

The second pair of *MindUp* lessons (Mindful Seeing and Mindful Movement I), which taught students to manage their behaviors (e.g. inhibit impulses), followed the second probe condition and before the third probe condition. The final pair of *MindUp* lessons (Expressing Gratitude and Performing Acts of Kindness), which targeted empathy, perspective taking, and managing strong negative feelings, was presented after the third probe condition and before the fourth probe condition. Identical third and fourth probe conditions followed the second pair (Mindful Seeing and Mindful Movement I) and third pair of *MindUp* lessons (Expressing Gratitude and Performing Acts of Kindness), respectively. The third *MindUp* probe condition involved data collection of the *Pencil Tap* (inhibitory control) and *Snack Delay* tasks (delay of gratification) on 3 separate days (i.e., 3 data points for inhibitory control and delay of gratification); data collection of the other tasks occurred once (i.e., 1 data point each for focused attention, empathy, and emotion management). The fourth *MindUp* probe condition entailed data collection of the *Sharing* (empathy) and *Toy Removal* (emotion management) tasks on 3 separate days (i.e., 3 data points for empathy and emotion management); data collection of the other tasks took place once (i.e., 1 data point each for focused attention, inhibitory control, and delay of gratification).

As during *Second Step* implementation, the assistant teacher completed the *DESSA-mini* as formative assessment of self-regulation for the 6 target students twice. She filled it out once during the probe week following delivery of the first *MindUp* lesson set and once during the probe week immediately preceding delivery of the third *MindUp* lesson set.

Maintenance Phase. Following the fourth probe condition, the researchers administered all 8 behavioral tasks (see Table 2) to the 6 target students once (i.e., 1 data point per behavior) to evaluate the level of behavioral maintenance 2 weeks following the end of the study. During the 2-week break between end of *MindUp* delivery and the maintenance phase, the teacher and parents of each participant completed *DECA-P2* and *CBQ* subscales.

Procedural Fidelity

During the study, the primary researcher implemented 19 of 30 days of *Second Step* and 30 of 30 days of *MindUp* lessons. The lead and assistant teachers took turns implementing 11 of 30 days of *Second Step* during the primary researcher's absence. To assess implementation accuracy, a research assistant observed 20% of the *Second Step* lessons (or 6 of 30 days of *Second Step* instruction) and 17% of the *MindUp* lessons (or 5 of 30 days of *MindUp* instruction) using the fidelity checklist specific to each intervention. Intermittent fidelity checks were intended to identify implementation mistakes that could be corrected (Gast & Ledford, 2014).

A fidelity checklist, which included essential components required for successful delivery of these lessons, was created and followed by the primary researcher. The checklist contained items that were divided into separate parts, including preparedness of the researcher for whole-class instruction, components of the *Second Step* and *MindUp* lessons, and the presence of each part of the practice activities. The *Second Step* fidelity checklist contained 13 items, although the number of items assessed depended on the specific day that comprised the lesson. For example, Day 1 of each *Second Step* lesson (e.g., Puppet Script) consisted of up to 12 items. (A 4-item user-friendly fidelity checklist was also designed to assist the teachers to deliver *Second Step* enrichment activities, such as songs and brain builder games, but it was not used by either teacher.) The *MindUp* fidelity checklist consisted of 14 items. Like the *Second Step* checklist, the number of assessed items varied by the day of the lesson taught. For example, Day 5 of each *MindUp* lesson (e.g., Literature Link) consisted of up to 13 items. A research assistant used each intervention-specific checklist to indicate whether or not the section of the lesson or practice activity was present, carried out correctly, or followed the prescribed outlined lesson components. A "-" indicated that the component was absent, delivered incorrectly, or deviated greatly from the outline. A "+" or a checkmark indicated that it was present and was implemented accurately.

The following formula was used to calculate procedural fidelity, or the extent to which the primary researcher followed the procedures without deviation: $\left(\frac{\text{number of} +}{\text{total number of items}}\right) \text{x } 100.$ Maintenance of at least 90% procedural fidelity was achieved throughout implementation across curricula. See Table 3 for mean procedural fidelity data by implementer and intervention.

Table 3:

Procedural Fidelity of Implementation (Mean and Range) Across Implementers

Implementer	*Second Step**	*MindUp***
Primary Researcher	91% (85% - 95%)	98% (88% - 100%)
Lead Teacher	95%	--
Assistant Teacher	92% (90% - 94%)	--

Notes: *During *Second Step* implementation, the primary researcher was observed 4 times across 5 weeks; the assistant teacher was observed 2 times across 2 weeks; the lead teacher was observed 1 time across 1 week. **During *MindUp* implementation, the primary researcher was observed 5 times across 6 weeks.

Inter-Observer Agreement

Inter-observer agreement (IOA) was calculated to establish the quality of measurement procedures and ensure data collection objectivity (Gast and Ledford, 2014). Two 3-hour training sessions occurred before and during data collection to ensure at least 80% IOA across the researcher and research assistants (Kratochwill et al., 2013). The four individuals who conducted behavioral observations practiced coding and scoring at least 8 practice videos of each task. Operational definitions were clarified and disagreements were discussed and reconciled during these sessions to address coding variations.

During data collection, IOA data was collected in 28% of *Second Step* pre-test sessions, 33% of *Second Step* post-test sessions, 33% of sessions from *MindUp* probes 1 and 2, 22% of *MindUp* probe 3 sessions, 33% of *MindUp* probe 4 sessions, and 100% of maintenance phase by two trained individuals (i.e., primary researcher and research assistant) (Kratochwill et al., 2013). Separate observations and ratings were independently recorded by each observer on personal data sheets for each behavior task

Following each observation, each individual's recording sheet was collected and compared across behaviors. If both observers recorded the occurrence or absence of a target behavior, or recorded identical time durations and calculated scores for certain tasks, it was scored as an agreement. If one observer did not mark an occurrence, while the other observer recorded it as having occurred – or the duration of time or task scores differed by more than 20%, then it was considered to be a disagreement. The formula used to calculate IOA for the occurrence of tasks was as follows: $\left(\frac{number\ of\ agreements}{number\ of\ agreements + number\ of\ disagreements}\right)\ x\ 100.$ The formula used to calculate IOA for duration of time, momentary time sampling, or task scores was as follows: $1 -$

$$\left(\frac{[First\ Observer's\ recorded\ time\ in\ seconds] - [Second\ Observer's\ recorded\ time\ in\ seconds]}{[First\ Observer's\ recorded\ time\ in\ seconds]}\right)\ x\ 100.$$

When IOA estimates reached below 80% during data collection, the observers reviewed the definitions of each dependent variable together and practiced coding each behavior until at least an 80% IOA was reached. Tables 4 through 6 display IOA data across probe sessions and targeted behaviors by participant for *Second Step* and *MindUp*, respectively.

Table 4:

Inter-Observer Agreement (Mean and Range) of 4 Coders Across Target Participants, Domains, and *Second Step* Conditions

Participant	***Second Step* Pre-Test**			***Second Step* Post-Test / *MindUp* Probe 1**		
	MI	SR: Behavior	SR: Emotion	MI	SR: Behavior	SR: Emotion
Chloe	95%	100%	76% (25% - 100%)	76%	96% (93% - 100%)	75% (0% - 100%)
Chung	97%	100%	94% (75% - 100%)	100%	93% (81% - 100%)	88% (50% - 100%)
Ava	98%	100%	97% (89% - 100%)	98%	100%	88% (50% - 100%)
Brody	99%	96% (87% - 100%)	100%	99%	99% (97% - 100%)	77% (50% - 100%)
Ethan	--	--	--	60%	96% (94% - 100%)	91% (75% - 100%)
Caden	--	100%	89%	73%	94% (81% - 100%)	76% (50% - 100%)

Notes: Domains include MI (mindfulness) and SR (self-regulation). MI refers focused attention, self-regulation: behavior refers to inhibitory control and delay of gratification, and self-regulation: emotion refers to empathy and emotion management.

Table 5:

Inter-Observer Agreement (Mean and Range) of 4 Coders Across Target Participants, Domains, and *MindUp* Conditions

Participant	***MindUp* Probe 2**			***MindUp* Probe 3**			***MindUp* Probe 4**		
	MI	SR: Behavior	SR: Emotion	MI	SR: Behavior	SR: Emotion	MI	SR: Behavior	SR: Emotion
Chloe	90%	100%	75% (50% - 100%)	90%	100%	75% (50% - 100%)	94%	100%	63% (25% - 100%)
Chung	98%	100%	75% (50% - 100%)	82%	100%	75% (50% - 100%)	97%	100%	75% (50% - 100%)
Ava	80%	100%	63% (25% - 100%)	93%	97% (94% - 100%)	75% (50% - 100%)	100%	100%	100%
Brody	88%	97% (94% - 100%)	75% (50% - 100%)	94%	100%	63% (25% - 100%)	95%	100%	63% (25% - 100%)
Ethan	75%	--	--	--	--	25%	78%	72% (50% - 94%)	100%
Caden	32%	--	--	--	--	--	66%	94% (88% - 100%)	75% (50% - 100%)

Notes: Domains include MI (mindfulness) and SR (self-regulation). MI refers focused attention, self-regulation: behavior refers to inhibitory control and delay of gratification, and self-regulation: emotion refers to empathy and emotion management.

Table 6:

Inter-Observer Agreement (Mean and Range) of 4 Coders Across Target Participants, Domains, and Maintenance Condition

Participant	**Maintenance**		
	MI	SR: Behavior	SR: Emotion
Chloe	100%	99% (97% - 100%)	59% (0% - 100%)
Chung	98%	100%	84% (75% - 100%)
Ava	100%	100%	96% (90% - 100%)
Brody	98%	100%	100%
Ethan	--	100%	75% (0% - 100%)
Caden	92%	100%	92% (75% - 100%)

Notes: Domains include MI (mindfulness) and SR (self-regulation). MI refers focused attention, self-regulation: behavior refers to inhibitory control and delay of gratification, and self-regulation: emotion refers to empathy and emotion management.

Social Validity

Information on social validity, which refers to stakeholders' approval of an intervention (Wolf, 1978; Schwarz & Baer, 1991), was collected from both teachers and the 6 target students. High social validity among teachers was operationalized by their high ratings (i.e., 5 or 6 on a scale of 6 on *BIRS*) of *Second Step* and *MindUp*'s joint level of appropriateness, suitability for participants' behavior, effectiveness, sustained improvement, and acceptability (e.g., likelihood of referral to other teachers). In addition, identification of fewer than 3 concerns with these interventions and more than 3 benefits on participants' behavior contributed to teachers' high social validity. In contrast, target participants' high social validity was operationalized by their individual selection of an object or activity that represented *Second Step* or *MindUp*. Selection of free choice or usual pre-academic activity suggested low social validity of the interventions.

Teachers. The lead and assistant teachers completed a social validity questionnaire and the *Behavior Intervention Rating Scale* (*BIRS*; Von Brock & Elliot, 1987) after the study (i.e., Maintenance phase) to determine their perception of the intervention's acceptability, feasibility, and effectiveness of the *Second Step* and *MindUp* interventions.

Social Validity Teacher Questionnaire. The social validity teacher questionnaire (Appendix H) is a 6-item rating scale with 3 open-ended questions designed to inform the primary researcher of both teacher's perceptions of socioemotional learning (SEL) and mindfulness programs at the end of the study. It specifically asked the teachers to rate and comment on whether or not they each believed that SEL skills and mindfulness practices would improve their teaching effectiveness and enhance their student's focus and self-regulation. Questions also asked the teachers to specify whether they believed SEL skills or a combination of SEL skills and mindfulness practices would improve their students' behavior. Ideally, the teachers' comments would also inform the primary researcher about concerns and benefits that they believed the intervention would have for their students, in addition to the likelihood of their implementation of one or both interventions in the future.

Behavior Intervention Rating Scale (BIRS). A 24-item rating scale, the *BIRS* (Von Brock & Elliot, 1987) was used to gather information regarding perceptions of treatment acceptability (Appendix I). The lead and assistant teachers answered each item on a 6-point Likert scale to indicate the degree to which they agreed or disagreed with each statement (1 = strongly disagree, 6 = strongly agree). Factor analysis of the *BIRS* yielded Acceptability, Effectiveness, and Time of Effectiveness factors (Elliot & Von Brock Treuting, 1991). Higher mean item scores (e.g., 5 or 6) indicated higher acceptability, effectiveness, and time of effectiveness. All three factors were found to have high internal consistency. Acceptability, which consists of 15 items, had an alpha of 0.97 and was found to account for 63% of the total variance. A sample acceptability item included "I would be willing to use this in the classroom setting." Effectiveness, which is made up of 7 items, yielded an alpha of 0.92 and was found to account for 6% of the total variance. A sample effectiveness item included "The child's behavior will remain at an improved level even after the intervention is discontinued." Time of Effectiveness, which contained 2 items regarding how quickly the intervention could lead to behavior improvement, yielded an alpha of 0.87 and was found to account for 4.3% of the variance. A sample time of effectiveness item included, "The intervention would quickly improve the child's behavior."

Findings. Overall, survey results indicated that the teachers held neither a strong preference for or against *Second Step* and *MindUp*. The *BIRS* Acceptability mean score ranged from 3.80 to 4.53 on a 6-point Likert scale for both educators, suggesting the teachers' general acceptability of these interventions. The *BIRS* Effectiveness mean score ranged from 2.71 to

3.71, which suggested that the teachers' general view of the interventions' effectiveness was less positive. Part of their hesitation to fully endorse *Second Step* and *MindUp* stemmed from their concern with the length of each program and their ability to effectively progress monitor individual and class-wide self-regulation to inform intervention effectiveness. Despite the lower *BIRS* Effectiveness mean score, the lead teacher noted during an informal interview that teaching SEL skills and mindful practices would likely help some of her students to focus better and manage their behavior and feelings more effectively, particularly when paired with another program. Both teachers agreed that SEL and mindfulness instruction would likely enhance their effectiveness as early educators.

Target Participants. Twice during the study (during *Second Step* Post-Test and during *MindUp* Probe 4), each target participant was asked to complete a social validity task adapted from Schwarz and Baer (1991).

Assessment of Child Social Validity. Children privately selected between 3 different items that symbolize different options: usual pre-academic activity, an activity from the intervention (*Second Step* or *MindUp*), or free-choice. The chosen item was recorded and the child was provided 5 minutes to spend on the chosen activity. If an activity from the intervention was chosen, then the child completed a brief activity (e.g., brief mindfulness exercise like breathing) (not a mini lesson) that had already been presented in class.

Findings. Following completion of *Second Step* implementation, results of the *Child Behavior Task* indicated that 3 of the 6 target participants (Chloe, Ava, and Brody) preferred *Second Step* to their usual morning or afternoon pre-academic activity (e.g., tracing letters, counting, and calendar) and free choice activity (e.g., coloring, puzzles, and toys). In contrast, only one, (17%, Caden) favored the pre-academic activity (calendar) to *Second Step* and two (33%, Chung and Ethan) preferred free choice.

After the three sets of *MindUp* lessons were delivered, results of the social validity activity indicated that two, (33%, Chloe and Ethan) favored *MindUp* over *Second Step*, their usual pre-academic activity, and free choice. Another two, (33%, Chung and Brody) preferred *Second Step* to *MindUp*, their usual pre-academic activity, and a free choice activity. The last two students (33%, Ava and Caden) chose to engage in a free choice activity.

Overall, results of the child social validity assessment suggested that the target participants did not demonstrate a strong preference for either *Second Step* or *MindUp* by the end of the study. Only one target participant (Chloe), who previously favored *Second Step* following its delivery and prior to *MindUp* instruction, preferred *MindUp* to *Second Step* by the end of the study. Another child (Brody) maintained a preference for *Second Step*, even after *MindUp* implementation. However, the majority of the students did not maintain favorability for either intervention, as suggested by the selection of alternative activities from one time point to the next.

CHAPTER 4: RESULTS

The following chapter describes the results of three research questions by target participant (n = 6) and by group (n = 12). Results are also discussed in terms of formative and summative evaluation, which measure growth at *Second Step* post-test and during *MindUp* and maintenance conditions (Gast & Ledford, 2014). Behavior tasks and survey measures were used to accomplish both types of assessment.

Individual-level performance on behavior tasks involved visual analysis and Tau-U effect size calculations (Vannest, Parker, Gonen, & Adiguzel, 2016; Vannest & Ninci, 2015; Parker et al., 2011). (Research Questions 1 and 2 includes Tau-U only, whereas Research Question 3 includes both visual analyses and Tau-U.) Tau-U, which uses a "distribution-free, non-parametric technique" (Vannest et al., 2016) appropriate for small data sets (e.g., single-case design), refers to a "continuous index of improvement" (Vannest & Ninci, 2015, p. 408) or a percentage improvement trend for non-overlapping data that controls for positive baseline data in baseline and intervention phases (Parker et al., 2011). The particular calculator used to generate Tau-U effect sizes in the current study can be found at singlecaseresearch.org. According to Vannest and Ninci (2015), a 0.2 effect size suggests a small improvement, 0.2 to 0.6 effect size indicates a moderate improvement, 0.6 to 0.8 effect size suggests a large improvement, and above 0.8 effect size indicates a large to a very large improvement. Refer to Figures 9 through 14 for individual performance and to Tables 8, 23, and 24 for corresponding Tau-U effect sizes and intervention by target participant. See Table 25 for a summary of visual analysis results by research question.

Individual-level performance also involved examination of each target participant's survey data by risk level (Research Questions 1 and 2). Each child's initial risk was determined during the recruitment process using scores from the *DESSA-mini*, a measure of socioemotional competence. Two additional definitions of risk were applied, as all target participants were found to be at-risk for socioemotional difficulties. Therefore, risk level was described in three ways, or in terms of (a) socioemotional competence (*DESSA-mini*), (b) overall self-regulation and behavioral concerns (*DECA-P2*), and (c) four sub-areas of self-regulation (*CBQ*). With regard to (a) socioemotional competence (*DESSA-mini*) and (b) overall self-regulation and behavioral concerns (*DECA-P2*), certain T-score ranges defined four risk categories: strength, typical, at-risk, and area of need (The Devereux Foundation, 2011, 2012). With regard to (c) the four subareas of self-regulation, certain means earned on the 7-point *CBQ* measure aligned with markers of risk for attentional focus, inhibitory control, impulsivity, and anger/frustration. Refer to Table 7 for descriptive categories of risk by measure.

Table 7:

Descriptive Categories of Risk by Measure

Risk Level	*DESSA-mini**	*DECA-P2**		*CBQ*	
	SEC T-Score Range	SR Subscale T-Score Range	BC Subscale T-Score Range	AF & IC Mean Score Range	IMP & A/F Mean Score Range
Strength	$T \geq 60$	$T \geq 60$	--	6 – 7	1 – 2
Typical	$50 \leq T \leq 59$	$50 \leq T \leq 59$	$T \leq 50$	3 – 5	3 – 5
At-Risk	$41 \leq T \leq 49$	$41 \leq T \leq 49$	$51 \leq T \leq 59$	--	--
Area of Need / Weakness	$T \leq 40$	$T \leq 40$	$T \geq 60$	1 – 2	6 – 7

Note: SEC = Socioemotional Competence, SR = Self-Regulation, BC = Behavioral Concerns, AF = Attentional Focus, IC = Inhibitory Control, IMP = Impulsivity, A/F = Anger / Frustration. *Mean: T-score = 50; strength ≥ 1 SD above the mean, at-risk ≤ 1 SD below the mean, area of need ≥ 1 SD below the mean.

Group performance of the aforementioned areas was evaluated using a variety of parametric and non-parametric statistical tests, including one-way repeated measures analyses of variance (ANOVA), Friedman test, exact sign test, and paired samples *t*-test. Group-level analyses were conducted in order to answer Research Questions 1 through 3.

Research Question 1

The first objective of this study was to determine whether implementation of a combination of *Second Step Early Learning Program* and *MindUp* would result in improvements in mindfulness and self-regulation among preschool children. Exposure and dosage to these programs, which were also explored, were expected to affect outcomes in both areas.

Individual-Level Analyses. Summative assessments of each participant's mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) were conducted with (a) Tau-U effect size calculations of individual behavioral tasks and (b) parent- and teacher-rated risk level using *DECA-P2* and *CBQ* completed before and after implementation of both *Second Step* and *MindUp*. No maintenance data were included in the evaluations. Socioemotional competence was also evaluated by child using the *DESSA-mini* progress monitoring tool at the beginning and near the end of the study.

Chloe. Results of *Second Step* and *MindUp* intervention implementation on Chloe's mindfulness and self-regulation are presented in Tables 8 through 12. Tau-U suggested that these interventions altogether had a moderately negative effect on Chloe's mindfulness (-0.39, p = 0.67), based on her performance on the individual focused attention task; however, this 39% negative trend in mindfulness was not statistically significant.

With regard to the behavioral aspects of self-regulation, *Second Step* and *MindUp*, together, had a large positive effect on Chloe's inhibitory control, with a 67% improvement trend (0.67, p = 0.11), and no effect on her delay of gratification, with a 0% improvement trend (0, p = 1). Both trends were not statistically significant. When assessed using a separate

Table 8:

Tau-U Effect Size: Cumulative Effectiveness of *Second Step* and *MindUp* by Target Participant

Participant	Domain		Tau-U	Z	90% CI
Chloe	Mindfulness	Focused Attention	-0.39	-0.90	(-1.00, 0.23)
	Self-Regulation	Inhibitory Control	0.67	1.60	(-0.02, 1.00)
		Delay of Gratification	0	0	(-0.69, 0.69)
		Empathy	-1.00*	-2.45	(-1.00, -0.33)
		Substitutive Play	0.38	0.92	(-0.30, 1.00)
Chung	Mindfulness	Focused Attention	-0.39	-0.90	(-1.00, 0.32)
	Self-Regulation	Inhibitory Control	0.33	0.80	(-0.35, 1.00)
		Delay of Gratification	0	0	(-0.69, 0.69)
		Empathy	0.13	0.31	(-0.55, 0.80)
		Substitutive Play	0.92*	2.25	(0.25, 1.00)
Ava	Mindfulness	Focused Attention	-0.67	-1.55	(-1.00, 0.04)
	Self-Regulation	Inhibitory Control	0.90*	2.17	(0.22, 1.00)
		Delay of Gratification	-0.29	-0.68	(-0.97, 0.40)
		Empathy	-1.00*	-2.45	(-1.00, -0.33)
		Substitutive Play	0.75†	1.84	(0.08, 1.00)
Brody	Mindfulness	Focused Attention	-0.33	-0.77	(-1.00, 0.38)
	Self-Regulation	Inhibitory Control	0.81†	1.94	(0.12, 1.00)
		Delay of Gratification	0.29	0.68	(-0.40, 0.97)
		Empathy	0.50	1.22	(-0.17, 1.00)
		Substitutive Play	0.04	0.10	(-0.63, 0.71)
Ethan	Mindfulness	Focused Attention	-0.56	-1.29	(-1.00, 0.15)
	Self-Regulation	Inhibitory Control	0.81†	1.94	(0.12, 1.00)
		Delay of Gratification	-0.05	-0.11	(-0.74, 0.64)
		Empathy	0.50	1.22	(-0.17, 1.00)
		Substitutive Play	0.42	1.02	(-0.26, 1.00)
Caden	Mindfulness	Focused Attention	-0.11	-0.26	(-0.82, 0.60)
	Self-Regulation	Inhibitory Control	0.71†	1.71	(0.03, 1.00)
		Delay of Gratification	-1.10**	-2.62	(-1.00, -0.41)
		Empathy	-0.33	-0.82	(-1.00, 0.34)
		Substitutive Play	-0.46	-1.12	(-1.00, 0.21)

Notes: †p < .10, *p < .05, **p < .01

Table 9:

Inhibitory Control Demonstrated on the *Head-Toes-Knees-Shoulders* (*HTKS*) task

Target Student	Inhibitory Control		
	Pre-Test	Mid-Test	Post-Test
	HTKS Raw Score (% Correct)	*HTKS* Raw Score (% Correct)	*HTKS* Raw Score (% Correct)
Chloe	31 (52%)	35 (58%)	59 (98%)
Chung	21 (35%)	19 (32%)	22 (37%)
Ava	0 (0%)	0 (0%)	0 (0%)
Brody	39 (65%)	52 (87%)	47 (78%)
Ethan	0 (0%)	18 (30%)	18 (30%)
Caden	0 (0%)	2 (3%)	4 (7%)

**Notes*: Pre-Test takes place before *Second Step* implementation. Mid-Test occurs after *Second Step* implementation and before *MindUp* delivery. Post-Test takes place after *MindUp* implementation.

Table 10:

Percentage of Positive Emotionality and Strategy Selection Displayed by Target Participant

Target Participant	Management of Negative Emotions					
	Pre-Test		Mid-Test		Post-Test	
	Puppet Mean (%)	*Disappointing Gift* Raw Score (%)	*Puppet* Mean (%)	*Disappointing Gift* Raw Score (%)	*Puppet* Mean (%)	*Disappointing Gift* Raw Score (%)
Chloe	0.5 (50%)	3 (33%)	1 (100%)	4 (44%)	1 (100%)	3 (33%)
Chung	0.5 (50%)	3 (33%)	1 (100%)	4 (44%)	1 (100%)	4 (44%)
Ava	1 (100%)	2 (22%)	0.5 (50%)	3 (33%)	1 (100%)	1 (11%)
Brody	1 (100%)	4 (44%)	1 (100%)	5 (56%)	1 (100%)	6 (67%)
Ethan	0.5 (50%)	2 (22%)	0 (0%)	5 (56%)	0.5 (50%)	4 (44%)
Caden	--	3 (33%)	1 (100%)	2 (22%)	0.5 (50%)	2 (22%)

measure (*HTKS*), she was similarly observed to increase dramatically in inhibitory control, from 52% to 98% correct responses (see Table 9).

With regard to emotion-based subdomains of self-regulation, *Second Step* and *MindUp* had a moderately negative effect on Chloe's empathy (-0.33, p = 0.01), with a 33% decline trend that was statistically significant, that was based on individual performance on the *Sharing* task. In contrast, these interventions had a moderately positive effect on Chloe's use of active emotion management strategies, such as substitutive play (0.38, p = 0.36) (Supplee et al., 2009), with a 38% improvement trend, based on her *Toy Removal* performance; however, this effect was not statistically significant. On a separate measure, Chloe maintained the same high level of emotion management, such that she demonstrated 33% negative emotion (e.g., anger, frustration) in response to receiving a disappointing gift at *Second Step* pre-test and at post-test (see Table 10). Similarly, her selection of appropriate anger management strategies in response to a puppet vignette remained at 100% before and after the study (Table 10).

Chloe's level of self-regulation generally increased following implementation of both *Second Step* and *MindUp*, as indicated by higher parent- and teacher-rated *DECA-P2* scores (see Tables 11 and 12). The similarity in her parent- and teacher-rated scores suggested agreement in behavior across the home-school contexts before and after the study. Before implementation of either intervention, she earned a parent-rated self-regulation *T*-score of 42 and a teacher-rated *T*-score of 45. Following study completion, Chloe made a 6-point increase in her parent-rated self-regulation score (*T*-score = 48) and a 5-point increase in her teacher-rated self-regulation score (*T*-score = 50). Her increased rating placed her near or at the mean (*T*-score = 50), or within the Typical range. Despite her progress in self-regulation, Chloe's parent- and teacher-rated behavioral concerns on the same measure remained similar from before to after the study. Her parent-rated behavioral concerns on the same measure decreased from a *T*-score of 56 to 54 during this period, whereas her teacher-rated behavioral concerns increased from a *T*-score of 52 to 53. In other words, Chloe remained at-risk for demonstrating difficulty in behavior management throughout the current study.

Within four related areas of self-regulation, Chloe maintained mean scores on the parent- and teacher-rated *CBQ* that suggested typical functioning from before to after the study. Her primary caretaker and teacher ratings indicated general home-school agreement regarding her level of attentional focus (AF), inhibitory control (IC), impulsivity (IMP), and anger or frustration (A/F). Before the study, Chloe earned parent- and teacher-rated mean scores that indicated typical behavior across these four domains of self-regulation (range, 3.33 to 4.50). These scores remained similar following implementation of *Second Step* and *MindUp* (range, 3.33 to 4.83).

In terms of socioemotional competence, Chloe's 3-point increase in her *DESSA-mini* Socioemotional Total (SET) scores from the second week of *Second Step* implementation (*T*-score = 41) through the fifth week of *MindUp* implementation (*T*-score = 44) suggest that both interventions, when used successively, were minimally effective in enhancing Chloe's self-regulation (Naglieri, LeBuffe, & Shapiro, 2011). Although her SET score mostly remained within the at-risk range throughout implementation of both interventions, the score increase suggested that Chloe may have been less at-risk of teacher-reported concerns toward the end of the study. See Figure 2 for Chloe's individual progress.

Figure 2:

Progress Monitoring of Socioeotional Competence for Chloe using *DESSA-mini*

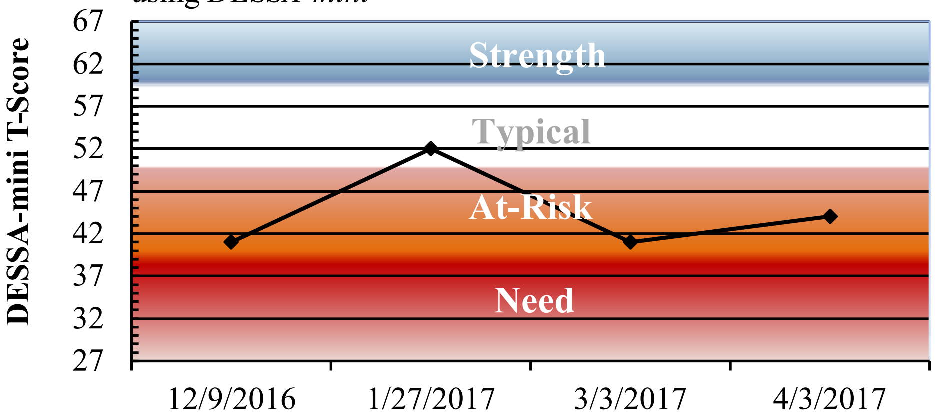


Table 11:

Parent Ratings on the *Devereux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Questionnaire – Short Form* (*CBQ-SF*; Putnam & Rothbart, 2006) for Chloe

Variable	**Parent: Chloe's Pre-Test**			**Parent: Chloe's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2						
SR	42 (21)	--	At-Risk	48 (42)	--	At-Risk
BC	56 (73)	--	At-Risk	54 (66)	--	At-Risk
CBQ-SF						
AF	--	4.50	Typical	--	5.17	Typical
IC	--	4.17	Typical	--	5.33	Typical
IMP	--	3.83	Typical	--	5.00	Typical
A/F	--	4.83	Typical	--	3.33	Typical

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

Table 12:

Teacher Ratings on the *Deveroux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Question – Teacher Short Form* (*CBQ-TSF*; Teglasi, 2012) for Chloe

Variable	**Teacher: Chloe's Pre-Test**			**Teacher: Chloe's Mid-Test**			**Teacher: Chloe's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2									
SR	45 (31)	--	At-Risk	57 (76)	--	Typical	50 (50)	--	Typical
BC	52 (58)	--	At-Risk	47 (38)	--	Typical	53 (62)	--	At-Risk
CBQ-SF									
AF	--	4.50	Typical	--	--	--	--	3.33	Typical
IC	--	3.33	Typical	--	--	--	--	4.83	Typical
IMP	--	3.83	Typical	--	--	--	--	4.33	Typical
A/F	--	4.33	Typical	--	--	--	--	4.17	Typical

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

Chung. Results of *Second Step* and *MindUp* implementation on Chung's mindfulness and self-regulation are presented in Table 8 to 10, 13, and 14.

Tau-U suggested that these interventions altogether had a moderately negative effect on Chung's mindfulness, with a 39% decline trend that was not statistically significant (-0.39, p = 0.37), based on his performance on the individual focused attention task. With regard to self-regulation, *Second Step* and *MindUp* had a moderately positive effect on Chung's inhibitory control, with a 33% improvement trend (0.33, p = 0.43), but no effect on his delay of gratification. Despite the 33% improvement trend in his inhibitory control, this trend was not statistically significant. On a separate measure of inhibitory control (*HTKS*), Chung's score remained similar (35% and 37%; see Table 9), providing additional evidence that his inhibitory control did not change. *Second Step* and *MindUp* had a near-negligible effect on Chung's empathy, with a 13% improvement trend that was not statistically significant (0.13, p = 0.76), based on his performance on the *Sharing* task. In contrast, these interventions altogether had a large, significant positive effect on his use of active emotion management strategies (e.g., substitutive play), with a 92% improvement trend that was statistically significant (0.92, p = 0.02), based on his performance on the *Toy Removal* task. On a separate task, Chung maintained a similar level of emotion management in which he showed 33% negative emotion at *Second Step* pre-test and 44% negative emotion at post-test in response to a disappointing gift (see Table 10). In response to a puppet vignette, his selection of appropriate anger management strategies increased from 50% before the study to 100% two weeks after the study (see Table 10).

Chung's level of self-regulation substantially increased following implementation of both *Second Step* and *MindUp*, as indicated by higher parent- and teacher-rated *DECA-P2* scores. His primary caretaker consistently rated his self-regulation lower than his teacher, yet both raters indicated growth in this general area. Before implementation of either intervention, he earned a parent-rated self-regulation *T*-score of 35 and a teacher-rated *T*-score of 46. Following study completion, Chung made a 15-point increase in his parent-rated self-regulation score (*T*-score = 50) and an 11-point increase in his teacher-rated self-regulation score (*T*-score = 57). The large increase in parent-rated self-regulation should be interpreted with caution, as his self-regulation was not evaluated by the same parent before and after intervention implementation. Nevertheless, his increased scores placed him solidly within the typical range for his age. Despite his progress in self-regulation, Chung's parent- and teacher-rated behavioral concerns on the same measure increased from before to after the study. His parent-rated behavioral concerns on the same measure increased from a *T*-score of 48 to a *T*-score of 60 during this period, whereas his teacher-rated behavioral concerns increased from a *T*-score of 45 to a *T*-score of 47. The large increase in his parent-rated behavioral concerns *T*-score indicates that Chung, who initially displayed behaviors typical for his age, most recently demonstrated difficulty in managing his behavior at home. Similar to parent-rated self-regulation, Chung's parent-rated behavioral concerns should be interpreted with caution. In contrast, his teacher-rated *T*-score indicated that he has continued to demonstrate typical behavior at school.

Within four related areas of self-regulation, Chung earned mean scores on the parent- and teacher-rated *CBQ* that suggested varying levels of functioning from before to after the study. His primary caretaker and teacher ratings indicated general home-school agreement regarding his level of attentional focus (AF) over time. In contrast, disagreement in mean scores of inhibitory control (IC), impulsivity (IMP), and anger or frustration (A/F) existed across this period. Before the study, Chung earned parent- and teacher-rated mean scores that indicated typical behavior in inhibitory control and impulsivity. Both parent and teacher initially rated his attentional focus as an area of weakness (range, 2.00 to 2.67). However, parent and teacher ratings indicate disagreement with regard to his level of anger and frustration, such that his caretaker considered it to be typical at home (4.17) and his teacher considered it to be an area of strength at school (2.33). These scores remained similar following implementation of the *Second Step* and *MindUp*, except for a lower teacher-rated inhibitory control indicative of an area of weakness. After the study, Chung earned parent- and teacher-rated mean scores that indicated maintenance of most behavioral functioning from before the study, along with inhibitory control that became an area of weakness over time. See Tables 13 and 14 for Chung's parent and teacher ratings.

In terms of socioemotional competence, Chung's nearly identical *DESSA-mini* Socioemotional Total (SET) scores from the second week of *Second Step* implementation (*T*-score = 37) through the fifth week of *MindUp* implementation (*T*-score = 36) indicated that both interventions, when used successively, were generally ineffective in enhancing Chung's self-regulation (Naglieri, LeBuffe, & Shapiro, 2011). Throughout implementation of both interventions, Chung's SET score remained a teacher-reported concern (see Figure 3).

Figure 3:

Progress Monitoring of Socioemotional Competence for Chung using *DESSA-mini*

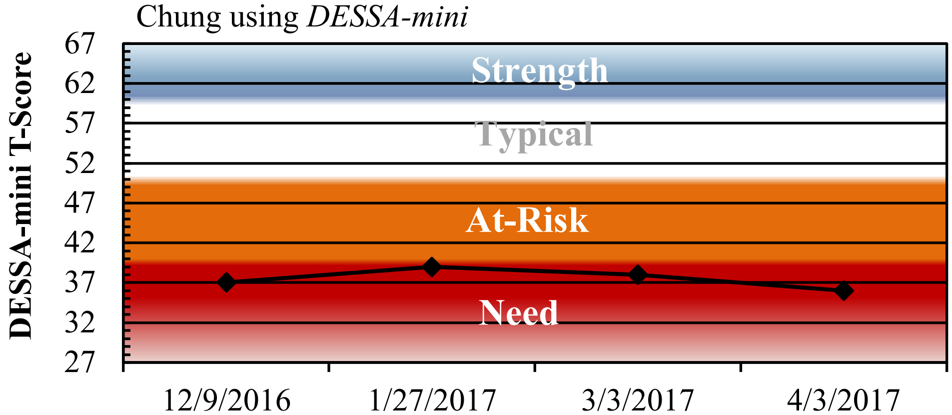


Table 13:

Parent Ratings on the *Devereux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Questionnaire – Short Form* (*CBQ-SF*; Putnam & Rothbart, 2006) for Chung

Variable	**Parent: Chung's Pre-Test**			**Parent: Chung's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2						
SR	35 (7)	--	Area of Need	50 (50)	--	Typical
BC	48 (42)	--	Typical	60 (84)	--	Area of Need
CBQ-SF						
AF	--	2.67	Weakness	--	2.00	Weakness
IC	--	4.17	Typical	--	5.00	Typical
IMP	--	4.50	Typical	--	4.67	Typical
A/F	--	4.17	Typical	--	4.00	Typical

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

Table 14:

Teacher Ratings on the *Deveroux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Questionnaire – Teacher Short Form* (*CBQ-TSF*; Teglasi, 2012) for Chung

Variable	**Teacher: Chung's Pre-Test**			**Teacher: Chung's Mid-Test**			**Teacher: Chung's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2									
SR	46 (34)	--	At-Risk	46 (34)	--	At-Risk	57 (76)	--	Typical
BC	45 (31)	--	Typical	46 (34)	--	Typical	47 (38)	--	Typical
CBQ-SF									
AF	--	2.33	Weakness	--	--	--	--	1.67	Weakness
IC	--	3.00	Typical	--	--	--	--	2.33	Weakness
IMP	--	4.50	Typical	--	--	--	--	3.50	Typical
A/F	--	2.33	Strength	--	--	--	--	1.00	Strength

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

Ava. Results of *Second Step* and *MindUp* intervention implementation on Ava's mindfulness and self-regulation are presented in Table 8 to 10, 15, and 16.

Tau-U suggested that these interventions altogether had a large negative effect on Ava's mindfulness, with a 67% decline trend that was not statistically significant (-0.67, p = 0.12), based on her performance on the individual focused attention task. With regard to self-regulation, Ava made noticeable progress in inhibitory control and demonstrated a decline in delay of gratification. Overall, *Second Step* and *MindUp* had a very large, significant positive effect on Ava's inhibitory control, with a 90% improvement trend that was statistically significant (0.90, p = 0.03), based on her *Pencil Tap* performance. However, on a separate measure of inhibitory control (*HTKS*), her score remained 0% during these time points (see Table 9). In contrast, these interventions had a moderately negative effect on her delay of gratification based on her *Snack Delay* performance; however, this trend was not considered reliable. Ava's mean level of empathy, or willingness to share preferred snacks with identified peers, noticeably declined over time. Overall, *Second Step* and *MindUp* had a very large, significant negative effect on Ava's empathy (-1.00, p = 0.01), with a 100% decline trend that was statistically significant, based on her performance on the *Sharing* task. In contrast, these interventions had a large, near significant positive effect on her use of active emotion management strategies, such as substitutive play (0.75, p = 0.07), with a 75% improvement trend that was borderline statistically significant, based on her *Toy Removal* performance. On another measure, Ava demonstrated a similarly high level of emotion management. At *Second Step* pre-test, she showed 22% negative emotion in response to a disappointing gift, which decreased to 11% at post-test (see Table 10). When shown a vignette of two upset puppets, she maintained

100% selection of appropriate anger management strategies at *Second Step* pre-test and at post-test (see Table 10).

Ava's level of self-regulation generally remained the same following implementation of both *Second Step* and *MindUp*, as indicated by her parent- and teacher-rated *DECA-P2* scores. The similarity in her parent- and teacher-rated scores suggested agreement in behavior across the home-school contexts. Before implementation of either intervention, she earned a parent-rated self-regulation *T*-score of 50 and a teacher-rated *T*-score of 55. Following study completion, Ava made a 2-point increase in her parent-rated self-regulation score (*T*-score = 52) and a 5-point decrease in her teacher-rated self-regulation score (*T*-score = 50). Her *T*-score declined, yet it placed her at the mean (*T*-score = 50), or within the Typical range. Likewise, Ava's parent- and teacher-rated behavioral concerns on the same measure remained similar from before to after the study. Her parent-rated behavioral concerns on the same measure increased from a *T*-score of 46 to a *T*-score of 54 during this period. Similarly, her teacher-rated behavioral concerns increased from a *T*-score of 47 to a *T*-score of 52, which suggested that she was at risk for developing behavior difficulty following the interventions.

Within four related areas of self-regulation, Ava earned mean scores on the parent- and teacher-rated *CBQ* that suggested varying levels of functioning from before to after the study. Her parent and teacher ratings indicated general home-school agreement regarding her level of impulsivity (IMP) over time (range, 3.33, 4.17). In contrast, disagreement in mean scores of attentional focus (AF), inhibitory control (IC), and anger or frustration (A/F) existed across this period. Before the study, Ava earned parent- and teacher-rated mean scores that indicated typical behavior in impulsivity. Both her parent and teacher initially rated her level of anger and frustration as an area of strength (range, 1.83, 2.67). However, these ratings indicated disagreement with regard to her level of attentional focus and inhibitory control; her primary caretaker considered them to be typically functioning at home (AF 5.33; IC 4.67), but her teacher considered them both to be areas of weakness at school (AF 1.83; IC 2.83). These scores remained similar following implementation of *Second Step* and *MindUp*, except for an increase in teacher-rated attentional focus indicative of typical functioning in this area (AF range, 4.0, 4.17; IC range, 2.83, 4.83). After the study, Ava earned parent- and teacher rated mean scores that indicated maintenance of a typical level of impulsivity and a low level of anger and frustration from before the study. Although her parent-rated attentional focus remained within the typical range, her teacher-rated attentional focus improved over time. Refer to Tables 15 and 16 for Ava's scores.

In terms of socioemotional competence, Ava's 4-point decrease in her *DESSA-mini* Socioemotional Total (SET) scores from the second week of *Second Step* implementation (*T*-score = 36) through the fifth week of *MindUp* implementation (*T*-score = 32) indicate that both interventions, when used successively, were generally ineffective in enhancing Ava's self-regulation (Naglieri, LeBuffe, & Shapiro, 2011). Although her SET score progressed from an area of need to a level considered to be at-risk toward the end of *Second Step* and beginning of *MindUp* implementation, it once again became an area of need identified by her teacher toward the end of the study (see Figure 4).

Figure 4:

Progress Monitoring of Socioemotional Competence for Ava using *DESSA-mini*

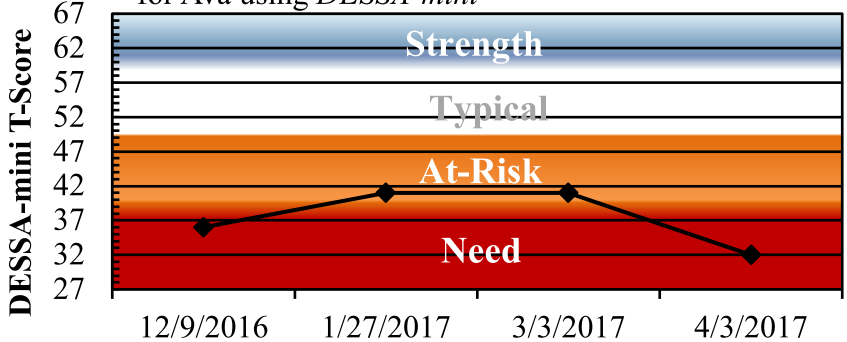


Table 15:

Parent Ratings on the *Devereux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Questionnaire – Short Form* (*CBQ-SF*; Putnam & Rothbart, 2006) for Ava

Variable	**Parent: Ava's Pre-Test**			**Parent: Ava's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2						
SR	50 (50)	--	Typical	52 (58)	--	Typical
BC	46 (34)	--	Typical	54 (66)	--	At-Risk
CBQ-SF						
AF	--	5.33	Typical	--	4.17	Typical
IC	--	4.67	Typical	--	4.83	Typical
IMP	--	4.17	Typical	--	4.17	Typical
A/F	--	2.67	Strength	--	2.33	Strength

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

Table 16:

Teacher Ratings on the *Deveroux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Questionnaire – Teacher Short Form* (*CBQ-TSF*; Teglasi, 2012) for Ava

Variable	**Teacher: Ava's Pre-Test**			**Teacher: Ava's Mid-Test**			**Teacher: Ava's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2									
SR	55 (69)	--	Typical	57 (76)	--	Typical	50 (50)	--	Typical
BC	47 (38)	--	Typical	47 (38)	--	Typical	53 (62)	--	At-Risk
CBQ-SF									
AF	--	1.83	Weakness	--	--	--	--	4.00	Typical
IC	--	2.83	Weakness	--	--	--	--	2.83	Weakness
IMP	--	3.33	Typical	--	--	--	--	3.33	Typical
A/F	--	1.83	Strength	--	--	--	--	2.17	Strength

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

Brody. Results of *Second Step* and *MindUp* intervention implementation on Brody's mindfulness and self-regulation are presented in Tables 8 through 10, 17, and 18.

Tau-U suggested that these interventions altogether had a moderately negative effect on Brody's mindfulness (-0.33, p = 0.44), with a 33% decline trend, based on his performance on the individual focused attention task; however, this trend was not considered statistically significant. With regard to self-regulation, Brody showed growth in both inhibitory control and delay of gratification. *Second Step* and *MindUp* had a large, near significant positive effect on Brody's inhibitory control, with a 90% improvement trend that was borderline statistically significant (0.90, p = 0.05), based on his *Pencil Tap* performance. In line with this trend, his score on *HTKS*, another measure of inhibitory control, increased from 65% to 78% correct responses (see Table 9). These interventions also had a moderately positive effect on his delay of gratification, with a 29% improvement trend (0.29, p = 0.49), based on his *Snack Delay* performance, but this trend was not statistically significant. *Second Step* and *MindUp* had a moderately positive effect on Brody's empathy, with a 55% improvement trend (0.55, p = 0.22), and no effect on his use of active emotion management strategies, such as substitutive play (0.04, p = 0.92), based on his *Sharing* and *Toy Removal* task performances, respectively. Both of these effect sizes were not statistically significant. On a related measure, Brody demonstrated a lower level of emotion management. He displayed an increase in negative emotion, from 44% to 67%, in response to a disappointing gift (see Table 10). When shown a vignette of two angry puppets, Brody maintained 100% appropriate selection of anger management strategies at these two time points (see Table 10).

Brody's level of self-regulation shifted following implementation of both *Second Step* and *MindUp*, as indicated by his parent- and teacher-rated *DECA-P2* scores. Each set of scores indicated a lack of agreement in Brody's progress in self-regulation across the home-school contexts over time. Before implementation of either intervention, he earned comparable parent and teacher ratings of self-regulation, or a parent-rated self-regulation *T*-score of 58 and a teacher-rated *T*-score of 61. Following study completion, Brody made an 8-point increase in his parent-rated self-regulation score (*T*-score = 66) and a 10-point decrease in his teacher-rated self-regulation score (*T*-score = 51). His increase in self-regulation at home indicated that it had become an area of strength over time within the family context. However, his decline in self-regulation at school indicated a shift from it being an area of strength to it becoming an area of typical functioning in an educational context. Consistent with his parent-rated self-regulation score, his parent-rated behavioral concerns on the same measure remained minimal, decreasing slightly from a *T*-score of 30 to 28 during this period. In contrast, his teacher-rated behavioral concerns increased from a *T*-score of 36 to 43. Despite differences in parent and teacher ratings, his parent- and teacher-rated behavioral concerns *T*-score indicated that Brody continued to display behaviors typical for his age at home and at school.

Within four related areas of self-regulation, Brody earned mean scores on the parent- and teacher-rated *CBQ* indicating diverse levels of functioning from before to after the study. His primary caretaker and teacher ratings indicated general home-school agreement regarding his initial level of inhibitory control (IC), impulsivity (IMP), and anger or frustration (A/F). In contrast, disagreement in mean scores of attentional focus (AF) existed during this period. Before the study, Brody earned parent- and teacher-rated mean scores that indicated areas of strength in inhibitory control and management of anger and frustration. Both parent and teacher initially rated his impulsivity as an area of weakness (IMP 6.00). However, parent and teacher ratings indicated disagreement with regard to his level of attentional focus; his caretaker considered it to be an area of typical functioning at home (AF 4.67), but his teacher considered it to be an area of weakness at school (AF 2.00). Whereas Brody's parent-rated scores remained similar following implementation of the *Second Step* and *MindUp*, all teacher-rated scores shifted to areas of typical functioning. After the study, Brody earned parent- and teacher-rated mean scores that indicated a divergence in ratings by context. Whereas Brody's primary caretaker's ratings indicated maintenance of his areas of strengths, weakness, and typical functioning at home, his teacher's ratings suggested improvement in attentional focus (AF 3.67) and impulsivity (IMP 5.50) and limited growth in inhibitory control (IC range, 5.83, 6.33) and management of anger and frustration (A/F range, 1.00, 3.67) at school. See Tables 17 and 18 for details.

In terms of socioemotional competence, Brody's 1-point decrease in his *DESSA-mini* Socioemotional Total (SET) scores from the second week of *Second Step* implementation (*T*-score = 46) through the fifth week of *MindUp* implementation (*T*-score = 45) indicate that both interventions, when used successively, were generally ineffective in enhancing Brody's self-regulation (Naglieri, LeBuffe, & Shapiro, 2011). Throughout implementation of both interventions, Brody's SET score remained within the at-risk range for children his age (see Figure 5 below).

Figure 5:

Progress Monitoring of Socioemotional Competence for Brody using *DESSA-mini*

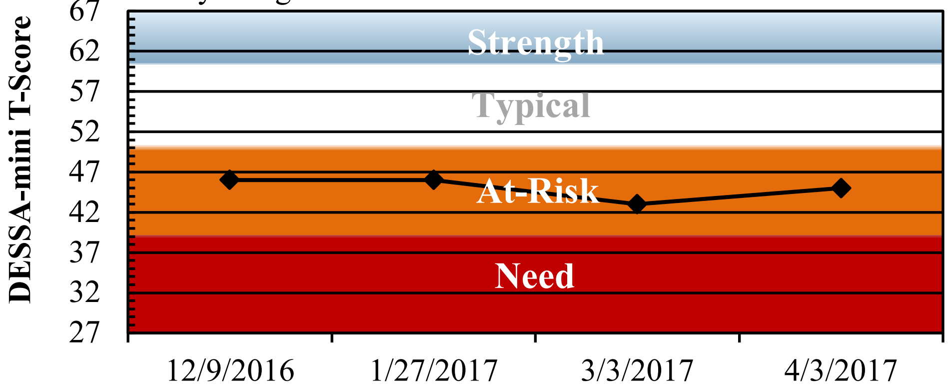


Table 17:

Parent Ratings on the *Deveroux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Questionnaire – Short Form* (*CBQ-SF*; Putnam & Rothbart, 2006) for Brody

Variable	**Parent: Brody's Pre-Test**			**Parent: Brody's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2						
SR	58 (79)	--	Typical	66 (95)	--	Strength
BC	30 (2)	--	Typical	28 (1)	--	Typical
CBQ-SF						
AF	--	4.67	Typical	--	4.00	Typical
IC	--	6.50	Strength	--	7.00	Strength
IMP	--	6.00	Weakness	--	6.33	Weakness
A/F	--	1.00	Strength	--	2.00	Strength

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

Table 18:

Teacher Ratings on the *Deveroux Early Childhood Assessment for Preschoolers*, Second Edition, (*DECA-P2*) and *Children's Behavior Questionnaire – Teacher Short Form* (*CBQ-TSF*; Teglasi, 2012) for Brody

Variable	**Teacher: Brody's Pre-Test**			**Teacher: Brody's Mid-Test**			**Teacher: Brody's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2									
SR	61 (86)	--	Strength	51 (54)	--	Typical	51 (54)	--	Typical
BC	36 (8)	--	Typical	45 (31)	--	Typical	43 (24)	--	Typical
CBQ-SF									
AF	--	2.00	Weakness	--	--	--	--	3.67	Typical
IC	--	6.33	Strength	--	--	--	--	5.83	Typical
IMP	--	6.00	Weakness	--	--	--	--	5.50	Typical
A/F	--	1.00	Strength	--	--	--	--	3.67	Typical

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

Ethan. Results of *Second Step* and *MindUp* intervention implementation on Ethan's mindfulness and self-regulation are presented in Tables 8 through 10, 19, and 20.

Tau-U suggested that these interventions altogether had a moderately negative effect on Ethan's mindfulness, with a 56% decline trend (-0.56, p = 0.20), based on his performance on the individual focused attention task; however, this trend was not statistically significant. With regard to self-regulation, *Second Step* and *MindUp* had a large, near significant positive effect on Ethan's inhibitory control, with an 81% improvement trend that was borderline statistically significant (0.81, p = 0.05), based on his *Pencil Tap* performance. On a separate measure of inhibitory control (*HTKS*), his score increased from 0% to 18% during these time points (see Table 9). In contrast, these interventions had a negligible negative effect on his delay of gratification, with a 5% decline trend that was not statistically significant (-0.05, p = 0.91), based on *Snack Delay* performance. *Second Step* and *MindUp* had a moderately positive effect on Ethan's empathy, with a 50% improvement trend (0.50, p = 0.22), based on his *Sharing* task performance. Data also showed a 42% improvement trend on his use of active emotion management strategies, such as substitutive play (0.42, p = 0.31), based on his *Toy Removal* performance. Both improvement trends were not statistically significant. On a related measure, Ethan demonstrated a decrease in emotion management, as he displayed 22% negative emotion in response to a disappointing gift at *Second Step* pre-test, which increased to 44% at post-test (see Table 10). When presented with a puppet vignette, his selection of 50% appropriate anger management strategies remained the same at *Second Step* pre- and post-test (see Table 10).

Ethan's level of self-regulation remained similar following implementation of both *Second Step* and *MindUp*, as indicated by his parent- and teacher-rated *DECA-P2* scores. Each set of scores indicated a lack of agreement in Ethan's progress in self-regulation across the home-school contexts initially and over time. He consistently received lower ratings by his teacher than by his primary caretaker. Before implementation of either intervention, he earned a parent-rated self-regulation *T*-score of 46 and a teacher-rated *T*-score of 34. Following study completion, Ethan made a 6-point increase in his parent-rated self-regulation score (*T*-score = 52) and a 3- point decrease in his teacher-rated self-regulation score (*T*-score = 31). His increase in self- regulation at home indicated that it had become an area of typical functioning over time within the family context. However, his decline in self-regulation score at school indicated that it continued to be an area of weakness in the educational context. Consistent with his parent-rated self-regulation score, his parent-rated behavioral concerns on the same measure improved, decreasing from a *T*-score of 48 to a *T*-score of 41 during this period. In contrast, his teacher-rated behavioral concerns increased from a *T*-score of 68 to a *T*-score of 72. His parent- and teacher-rated behavioral concerns T-score indicated that Ethan continued to display behaviors typical for his age at home, but demonstrated behavioral difficulties at school.

Within four related areas of self-regulation, Ethan earned mean scores on the parent- and teacher-rated *CBQ* indicating diverse levels of functioning from before to after the study. His primary caretaker and teacher ratings indicated home-school disagreement regarding his level of attentional focus (AF), inhibitory control (IC), impulsivity (IMP), and anger or frustration (A/F). Before the study, Ethan earned parent-rated mean scores suggesting that attentional focus, impulsivity, and management of anger and frustration were areas of typical functioning at home. This set of scores also indicated inhibitory control as his area of strength. In contrast, he earned teacher-rated mean scores that indicated inhibitory control and management of anger and frustration (A/F 7.00) as areas of weakness at school. Attentional focus and impulsivity were viewed as areas of strength by his teacher. Ethan's parent- and teacher-rated scores remained

Table 19:

Parent Ratings on the *Deveroux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Questionnaire – Short Form* (*CBQ-SF*; Putnam & Rothbart, 2006) for Ethan

Variable	**Parent: Ethan's Pre-Test**			**Parent: Ethan's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2						
SR	46 (34)	--	At-Risk	52 (58)	--	Typical
BC	48 (42)	--	Typical	41 (18)	--	Typical
CBQ-SF						
AF	--	3.50	Typical	--	3.83	Typical
IC	--	6.00	Strength	--	5.33	Typical
IMP	--	5.83	Typical	--	5.83	Typical
A/F	--	3.33	Typical	--	1.83	Strength

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

Table 20:

Teacher Ratings on the *Deveroux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Questionnaire – Teacher Short Form* (*CBQ-TSF*; Teglasi, 2012) for Ethan

Variable	**Teacher: Ethan's Pre-Test**			**Teacher: Ethan's Mid-Test**			**Teacher: Ethan's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2									
SR	34 (5)	--	Area of Need	40 (16)	--	Area of Need	31 (3)	--	Area of Need
BC	68 (96)	--	Area of Need	69 (97)	--	Area of Need	72 (99)	--	Area of Need
CBQ-SF									
AF	--	6.17	Strength	--	--	--	--	7.00	Strength
IC	--	1.67	Weakness	--	--	--	--	2.83	Weakness
IMP	--	1.50	Strength	--	--	--	--	1.17	Strength
A/F	--	7.00	Weakness	--	--	--	--	7.00	Weakness

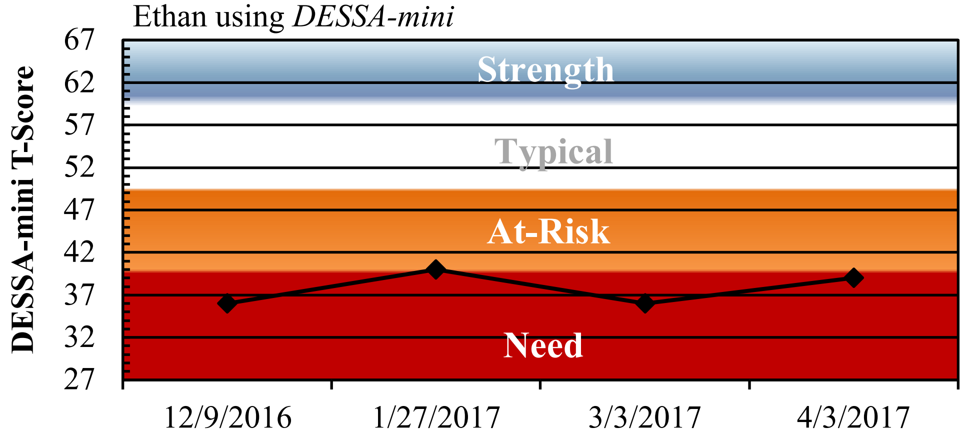
Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

similar in most areas of self-regulation following implementation of the *Second Step* and *MindUp*. After the study, Ethan earned parent- and teacher-rated mean scores that continued to indicate a difference in ratings by context. Whereas Ethan's primary caretaker's ratings indicated maintenance of his areas of typical functioning, increase in management of anger and frustration, and limited growth in inhibitory control at home, his teacher's ratings suggested a decline in attentional focus and maintenance of his areas of need and strength in the educational setting. Refer to Tables 19 and 20 for Ethan's parent and teacher ratings.

In terms of socioemotional competence, Ethan's 3-point increase in his *DESSA-mini* Socioemotional Total (SET) scores from the second week of *Second Step* implementation (*T*-score = 36) through the fifth week of *MindUp* implementation (*T*-score = 39) suggest that both interventions, when used successively, were minimally effective in enhancing Ethan's self-regulation (Naglieri, LeBuffe, & Shapiro, 2011). Throughout implementation of both interventions, Ethan's SET score remained an area of need relative to children his age. However, toward the end of the study, it neared the at-risk range (see Figure 6 below).

Figure 6:

Progress Monitoring of Socioemotional Competence for Ethan using *DESSA-mini*



Caden. Results of *Second Step* and *MindUp* intervention implementation on Caden's mindfulness and self-regulation are presented in Tables 8 through 10, 21, and 22.

Tau-U suggested that these interventions altogether had a small negative effect on Caden's mindfulness, with an 11% decline trend (-0.11, p = 0.80), based on his performance on the individual focused attention task; however, this trend was not statistically significant. With regard to self-regulation, *Second Step* and *MindUp* had a large, near significant positive effect on Caden's inhibitory control, with a 71% improvement trend that was borderline statistically significant (0.71, p = 0.09), based on his *Pencil Tap* performance. On a separate measure (*HTKS*), his inhibitory control improved from 0% to 7% (see Table 9). In contrast, these interventions had a very large, significant negative effect on his delay of gratification (-1.10, p = 0.001), likely influenced by his defiance to engage in the interventions. *Second Step* and *MindUp* had a moderately negative effect on Caden's empathy, with a 33% decline trend (-0.33, p = 0.41), based on his performance on *Sharing*. Likewise, data also showed a moderately negative effect, or a 46% decline trend, on his use of active emotion management strategies, such as substitutive play (-0.46, p = 0.26), based on his performance on *Toy Removal*. However, these trends were not considered statistically significant. On a related measure, Caden displayed a slightly increased level of emotion management, as he demonstrated 33% negative emotion in response to a disappointing gift at *Second Step* pre-test and 22% negative emotion at post-test (see Table 10). When presented with a vignette featuring upset puppets, Caden selected 50% appropriate anger management strategies at post-test, a decline from his 100% performance immediately following *Second Step* implementation two months earlier (see Table 10).

Caden's level of self-regulation shifted following implementation of both *Second Step* and *MindUp*, as indicated his parent- and teacher-rated *DECA-P2* scores. Each set of scores generally indicated agreement in Caden's progress in self-regulation across the home-school contexts over time. Before implementation of either intervention, he earned similar parent-teacher ratings of self-regulation, or a parent-rated self-regulation *T*-score of 44 and a teacher-rated *T*-score of 45. Following study completion, Caden made an 8-point increase in his parent-rated self-regulation score (*T*-score = 52) and a 6-point decrease in his teacher-rated self-regulation score (*T*-score = 40). His increase in self-regulation at home indicated that it had become an area of typical functioning over time within the family context. However, his decline in self-regulation at school indicated a shift from it being an area of typical functioning to it becoming an area of need in an educational context. Despite an improvement in his parent-rated self-regulation score, his parent-rated behavioral concerns on the same measure remained the same (*T*-score = 46) during this period. In contrast, his teacher-rated behavioral concerns increased from a *T*-score of 52 to 64. His parent- and teacher-rated behavioral concerns *T*-score indicated that Caden continued to display behaviors typical for his age at home, but demonstrated behavioral difficulties at school by the end of the study.

Within four related areas of self-regulation, Caden earned mean scores on the parent- and teacher-rated *CBQ* indicating diverse levels of functioning from before to after the study. His primary caretaker and teacher ratings indicated general home-school agreement regarding his initial level of attentional focus (AF). In contrast, disagreement in mean scores of inhibitory control (IC), impulsivity (IMP), and anger or frustration (A/F) existed during this period. Before the study, Caden earned parent- and teacher-rated mean scores that indicated an area of typical functioning in attentional focus. However, parent and teacher ratings indicated disagreement with regard to his level of inhibitory control, impulsivity, and management of anger and frustration. His caretaker considered these three areas to be areas of typical functioning at home.

Table 21:

Parent Ratings on the *Deveroux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Questionnaire – Short Form* (*CBQ-SF*; Putnam & Rothbart, 2006) for Caden

Variable	**Parent: Caden's Pre-Test**			**Parent: Caden's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2						
SR	44 (27)	--	At-Risk	52 (58)	--	Typical
BC	46 (34)	--	Typical	46 (34)	--	Typical
CBQ-SF						
AF	--	4.50	Typical	--	4.17	Typical
IC	--	3.33	Typical	--	4.33	Typical
IMP	--	4.67	Typical	--	4.17	Typical
A/F	--	4.17	Typical	--	2.50	Strength

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

Table 22:

Teacher Ratings on the *Deveroux Early Childhood Assessment for Preschoolers, Second Edition*, (*DECA-P2*) and *Children's Behavior Questionnaire – Teacher Short Form* (*CBQ-TSF*; Teglasi, 2012) for Caden

Variable	**Teacher: Caden's Pre-Test**			**Teacher: Caden's Mid-Test**			**Teacher: Caden's Post-Test**		
	T-Score (PR)	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*	*T-Score (PR)*	*Mean*	*Description*
DECA-P2									
SR	45 (31)	--	At-Risk	57 (76)	--	Typical	50 (50)	--	Typical
BC	52 (58)	--	At-Risk	47 (38)	--	Typical	53 (62)	--	At-Risk
CBQ-SF									
AF	--	4.33	Typical	--	--	--	--	4.00	Typical
IC	--	2.33	Weakness	--	--	--	--	1.00	Weakness
IMP	--	2.33	Strength	--	--	--	--	1.83	Strength
A/F	--	2.17	Strength	--	--	--	--	5.00	Typical

Note: SR = Self-Regulation; BC = Behavioral Concerns; AF = Attentional Focus; IC = Inhibitory Control; IMP = Impulsivity; A/F = Anger / Frustration

In contrast, his teacher considered inhibitory control to be an area of weakness and impulsivity and management of anger and frustration to areas of strength in the educational setting. After the study, Caden earned parent- and teacher-rated mean scores that indicated maintenance in most areas of self-regulation. Caden's primary caretaker's ratings indicated maintenance of his areas of typical functioning and improvement in attentional focus at home. Likewise, his teacher's ratings suggested maintenance of his areas of typical functioning, weakness, and strength at school; however, he demonstrated limited growth in the management of anger and frustration in the educational setting. Refer to Tables 21 and 22 for Caden's parent and teacher ratings.

In terms of socioemotional competence, Caden's 1-point increase in his *DESSA-mini* Socioemotional Total (SET) scores from the second week of *Second Step* implementation (T-score = 31) through the fifth week of *MindUp* implementation (T-score = 32) indicate that both interventions, when used successively, were generally ineffective in enhancing Caden's self-regulation (Naglieri, LeBuffe, & Shapiro, 2011). Throughout implementation of both interventions, Caden's SET score remained an area of need relative to children his age (see

Figure 7:

Progress Monitoring of Socioemotional Competence for Caden using *DESSA-mini*

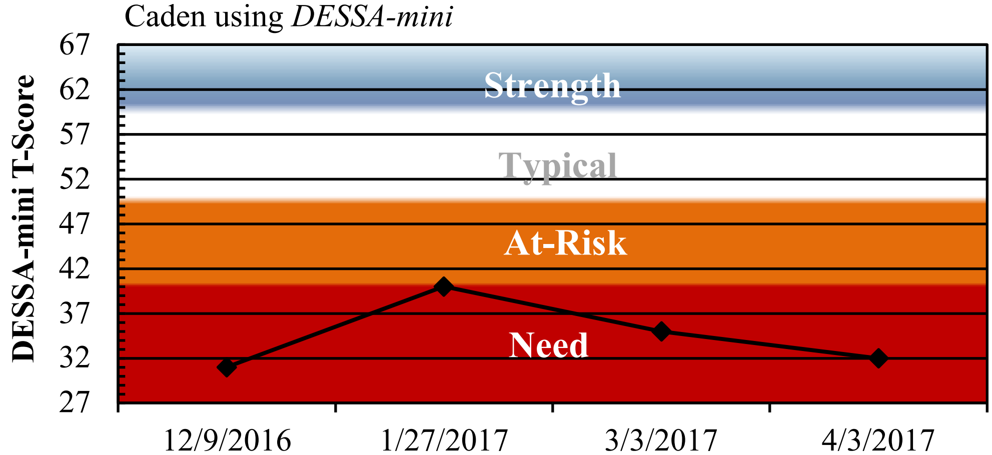


Figure 7).

Exposure and Dosage. The 6 target participants, along with the rest of their classmates, were exposed to a total of 15 ten-minute *Second Step* lessons and 15 ten-minute *MindUp* lessons, which were delivered over 60 daily sessions. Although the majority of students exposed to these interventions attended preschool on a full-time basis, several were part-time, attending only a few days per week.

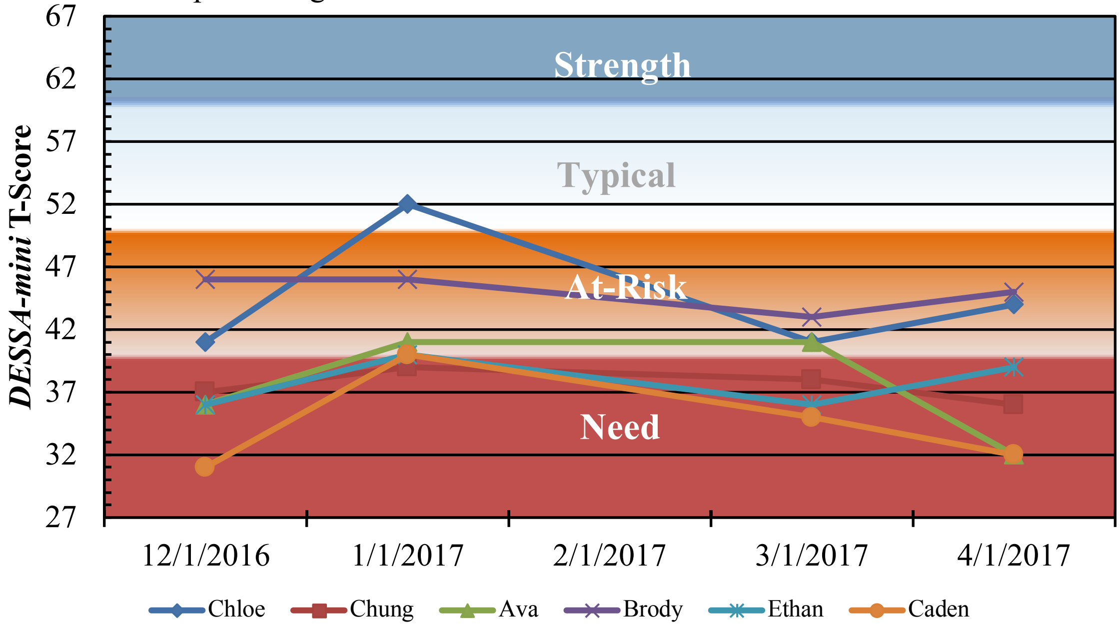
Part-Time Attendance. Two target participants, Caden and Ethan, attended the preschool on a part-time basis. Caden attended school up to three mornings per week and Ethan, up to three afternoons per week. The times during which they attended school did not usually align with the implementation schedule of *Second Step* and *MindUp*. As such, Caden attended up to one full session of intervention per week (or a total of 12 out of 60 (20%) sessions), whereas Ethan attended up to two full sessions per week (or a total of 24 out of 60 (40%) sessions) across 16 weeks compared to up to 60 sessions for the full-time students.

With regard to mindfulness (focused attention), *Second Step* and *MindUp* had a moderately negative effect on the part-time students' mindfulness (-0.39, $p = 0.19$), with a 39% decline trend, but this trend was not statistically significant. With regard to self-regulation, these interventions altogether had a large, significant positive effect on the part-time students' inhibitory control, with an 82% improvement trend that was statistically significant (0.82, $p = 0.004$). In contrast, they had a large, significant negative effect in their delay of gratification, with a 62% decline trend considered statistically significant (-0.62, $p = 0.03$). Ethan displayed increased levels of empathy, whereas Caden exhibited decreased levels. Overall, *Second Step* and *MindUp* had a negligible positive effect on the part-time students' empathy, with a 9% improvement trend that was not statistically significant (0.09, $p = 0.74$). They also had a negligible negative effect on their use of active, higher-order emotion management strategies, such as support seeking, with am 8% decline trend that was not statistically significant (-0.08, $p = 0.77$). Furthermore, Ethan demonstrated more negative emotion, while Caden displayed less, in response to a disappointing gift (see Table 10). Both students also maintained selection of 50% appropriate selection of anger management strategies from before to after *Second Step* and *MindUp* implementation (see Table 10).

Generally, summative assessment of Caden and Ethan's functioning (across the entire study duration) using indirect measures of mindfulness and self-regulation suggested unique patterns of behavior in the home and school contexts. Both children consistently received higher parent ratings of mindfulness, self-regulation, and behavior than teacher ratings in these areas on the *DECA-P2* and *CBQ* before and after implementation of *Second Step* and *MindUp*. Furthermore, each child earned parent ratings suggesting growth in at least one area, but received teacher ratings suggesting decline for the same areas at the end of the study. Related to self-regulation, socioemotional competence was also measured using the teacher-rated *DESSA-mini* near the beginning and end of the study and found to remain a general area of need for both Caden and Ethan. Refer to Tables 19 through 22 and Figures 13 and 14 for details.

Figure 8:

Progress Monitoring of Socioemotional Competence by Target Participant using *DESSA-mini*



Full-Time Attendance. Four students, Chloe, Chung, Ava, and Brody, attended the preschool on a full-time basis. As such, each child attended up to every session of *Second Step* and *MindUp*, or a total of 60 sessions across 16 weeks.

With regard to mindfulness (focused attention), *Second Step* and *MindUp* had a moderately negative effect on the full-time participants' mindfulness (-0.27, p = 0.20), with a 27% decline trend; however, this trend was not considered statistically significant. With regard to self-regulation, *Second Step* and *MindUp* had a moderate positive significant effect on the full-time participants' inhibitory control (0.43, p = 0.03), with a 43% improvement trend that was statistically significant. They also had no effect on their delay of gratification (0.01, p = 0.95), with a 1% improvement trend that was not statistically significant. *Second Step* and *MindUp* had a small negative effect on the full-time participants' empathy (-0.19, p = 0.34), with a 19% decline trend. Similarly, they altogether had a negligible effect on their use of active, higher-order emotion management strategies like support seeking, with a 9% decline trend (-0.09. p = 0.65). Trends in empathy and emotion management were not considered statistically significant. When presented with a puppet vignette, Chloe and Chung showed 50% improvement in their selection of appropriate anger management strategies, while Ava and Brody maintained 100% performance (see Table 10). In response to receiving a disappointing gift, Chloe, Chung, and Ava continued to display low negative emotion below 50%; however, Brody displayed an increase in negative emotion above 50% (see Table 10).

Summative assessment of Chloe's, Chung's, Ava's, and Brody's functioning (i.e., pre-test and post-test) using indirect measures of mindfulness and self-regulation suggested unique behavioral trends in the home and school contexts. Generally, parent-teacher ratings remained consistent across general and specific areas of self-regulation for Chloe. However, these ratings differed somewhat for Chung, Ava, and Brody. Refer to Tables 11 through 18 and Figures 2 through 5 and 9 through 12 for details.

Group Analyses. Parent- and teacher-rated *DECA-P2* Self-Regulation and Behavior Concerns subscale scores, in addition to parent- and teacher-rated *CBQ* mean scores for attentional focus, inhibitory control, impulsivity, and anger and frustration were analyzed using a variety of tests. Preliminary analyses were conducted to ensure no violations in assumptions. Graphical analyses of boxplots were used to examine whether outliers were present. Statistical analyses (e.g., Shapiro-Wilk's test) were used to determine normal distribution of the data.

A one-way repeated measures ANOVA was conducted to determine whether there was a statistically significant difference in teacher-rated self-regulation using the *DECA-P2* over the course of 16-week implementation of *Second Step* and *MindUp* interventions. Prior to conducting this analysis, a series of assumption checks using graphical and statistical tests were completed to ensure no violations. Two outliers were present, as assessed by boxplot; however, neither was removed, as they were not considered extreme values. In addition, data were normally distributed at each time point, as evaluated by Shapiro-Wilk test ($p > .05$). The assumption of sphericity was met, as assessed by Mauchly's test of sphericity, $\chi^2 = 2.278$, $p = .32$. The interventions, *Second Step* and *MindUp*, did not cumulatively result in statistically significant changes in teacher-rated self-regulation over the course of 4 months, $F(2, 22) = 0.674$, $p = .52$, partial $\eta^2 = .058$. Although teacher-rated self-regulation *T*-scores improved from pre-intervention ($M = 51.17$, $SD = 10.58$) to immediately following *Second Step* implementation ($M = 53.17$, $SD = 7.93$), it declined to its original level after *MindUp* implementation ($M = 51.08$, $SD = 9.424$).

A Friedman test, the non-parametric test analogous to the parametric one-way repeated measures ANOVA, was conducted to determine whether there were differences in teacher-rated behavioral concerns on the *DECA-P2* before, during, and after the implementation of *Second Step* and *MindUp*. Preliminary analyses revealed 1 outlier, considered to be an extreme value greater than 1.5 box-lengths from the edge of the box in a boxplot. In addition, Shapiro-Wilk's test ($p = .02$) indicated a violation of the assumption of normality. To address the non-normal distribution, the Friedman test was used in lieu of the one-way repeated measures ANOVA. Teacher-rated behavioral concerns T-score decreased from pre-intervention ($Mdn = 47.00$) to immediately following implementation of *Second Step* ($Mdn = 45.00$). However, it increased at post-intervention, or after implementation of *MindUp* ($Mdn = 48.50$). The differences were not statistically significant, $\chi^2(2) = 2.364$, $p = .307$.

Two exact sign tests were used to compare the differences in parent ratings on the *DECA-P2* before and after implementation of *Second Step* and *MindUp* interventions. Assumption checks unveiled an outlier and non-normal distribution prior to examination of parent-rated self-regulation and behavioral concerns. As such, a non-parametric test was used to address these assumption violations. Although the Wilcoxon signed-rank test was considered for each analysis, the individual distributions each failed to meet the pre-requisite; neither was symmetrically shaped. Therefore, a pair of exact sign tests, non-parametric tests that did not require normal distribution, was conducted to examine the aforementioned differences. The first exact sign test was conducted to assess the differences in parent-rated self-regulation at these 2 time points and the second was conducted to evaluate the differences in parent-rated behavioral concerns during the same period. Of the 11 parents who rated their children, intervention implementation elicited improved parent-rated self-regulation in 10 children compared to before implementation, whereas 1 child displayed decreased parent-rated self-regulation. Overall, participants demonstrated an improved level of parent-rated self-regulation (*Mdn* = 52.00) following intervention implementation than before implementation (*Mdn* = 46.00), a statistically significant increase in the median of the *T*-score difference of 6 points, $z = 2.412$, $p = .012$. However, delivery of these interventions yielded more behavioral concerns in 6 parents compared to 4 parents who rated fewer behavioral concerns in their children. Despite this difference in parent ratings, the level of parent-rated behavioral changes before implementation (*Mdn* = 46.00) generally remained at the same level afterwards (*Mdn* = 46.00). Implementation of these interventions did not elicit a statistically significant median increase in parent-rated behavioral concerns *T*-score from pre-test to post-test, $z = .316$, $p = .754$.

Four paired samples *t*-tests were used to determine whether there was a statistically significant mean difference between teacher ratings of mindfulness (attentional focus) and self-regulation (inhibitory control, impulsivity, and anger/frustration) on the *CBQ* following the completion of both *Second Step* and *MindUp* implementation compared to before their delivery. Inhibitory control and impulsivity were analyzed separately due to high multicollinearity ($r > .90$, $p < .001$). Assumption checks completed before paired samples *t*-test for focused attention, inhibitory control, and anger/frustration identified no outliers that were more than 1.5 box-lengths from the edge of the box in a boxplot. Although one outlier was detected prior to conducting the paired samples *t*-test to examine changes in teacher-rated impulsivity, it was kept in the analysis, as inspection of its value did not reveal it to be extreme. Assumption checks also revealed approximately normal distribution prior to conducting each analysis, as assessed by Shapiro-Wilk's test ($p > .05$).

With regard to teacher-rated mindfulness, participants demonstrated an improved level of attentional focus after the selected *Second Step* and *MindUp* lessons were delivered ($M = 3.74$, $SD = 1.34$) in contrast to before they had been delivered ($M = 3.33$, $SD = 1.59$). However, this mean increase of .41 was not statistically significant, 95% CI [-.49, 1.30], $t(11) = .99$, $p = .34$.

With regard to teacher-rated impulsivity, participants demonstrated a decreased level of impulsivity after the selected *Second Step* and *MindUp* lessons were delivered ($M = 4.21$, $SD = 1.74$) in contrast to before they had been delivered ($M = 4.44$, $SD = 1.70$). However, this mean decrease of .23 was not statistically significant, 95% CI [-.63, .16], $t(11) = -1.32$, $p = .22$.

With regard to teacher-rated inhibitory control, participants demonstrated an increased level of inhibitory control after the selected *Second Step* and *MindUp* lessons were delivered ($M = 4.36$, SD = 2.05) in contrast to before they had been delivered ($M = 4.13$, $SD = 1.92$). However, this mean increase of .24 was not statistically significant, 95% CI [-.57, 1.04], $t(11) = .64$, $p = .53$.

With regard to teacher-rated emotion management, participants demonstrated a decreased level of anger and frustration after the selected *Second Step* and *MindUp* lessons were delivered ($M = 2.85$, $SD = 1.92$) in contrast to before it had been delivered ($M = 2.99$, $SD = 2.10$). However, this mean decrease of .24 was not statistically significant, 95% CI [-1.22, .95], $t(11) = -.28$, $p = .78$.

Four paired samples *t*-tests were also used to determine whether there was a statistically significant mean difference between parent ratings of mindfulness (attentional focus) and self-regulation (inhibitory control, impulsivity, and anger/frustration) on the *CBQ* after the delivery of both *Second Step* and *MindUp* compared to before implementation. Like the analyses completed on the teacher-rated *CBQ* subscale scores, inhibitory control and impulsivity were analyzed separately because of high multicollinearity ($r > .90$, $p < .001$). Preliminary analyses conducted prior to paired samples *t*-test to examine each area revealed that the assumption of normality was not violated, as assessed by Shapiro-Wilk's test ($p > .05$). Assumption checks also detected no outliers that were more than 1.5 box-lengths from the edge of the box in a boxplot prior to conducting paired samples *t*-test for focused attention, inhibitory control, and anger/frustration. However, 3 outliers were identified prior to examining parent-rated impulsivity. Despite these data points, a decision was made to retain them and to conduct a paired samples *t*-test due to small sample size and an approximately normal distribution.

With regard to parent-rated mindfulness, participants demonstrated a lower level of attentional focus after the selected *Second Step* and *MindUp* lessons were delivered ($M = 3.92$, $SD = .88$) compared to before they had been delivered ($M = 4.05$, $SD = .82$). However, this mean decrease of .13 was not statistically significant, 95% CI [-.53, .29], $t(10) = -.66$, $p = .53$.

With regard to parent-rated impulsivity, participants demonstrated a higher level of impulsivity after the selected *Second Step* and *MindUp* lessons were delivered (M = 5.42, SD = 1.14) compared to before they had been delivered (M = 5.21, SD = 1.08). However, this mean increase of .21 was not statistically significant, 95% CI [-.23, .66], t(10) = 1.06, p = .31.

With regard to parent-rated inhibitory control, participants demonstrated an increased level of inhibitory control after the selected *Second Step* and *MindUp* lessons were delivered (M = 5.30, SD = 1.15) in contrast to before they had been delivered (M = 5.12, SD = 1.19). However, this mean increase of .18 was not statistically significant, 95% CI [-.32, .69], t(10) = .80, p = .44.

With regard to parent-rated emotion management, participants demonstrated a decreased level of anger and frustration after the selected *Second Step* and *MindUp* lessons were delivered (M = 2.83, SD = 1.09) compared to before it had been delivered (M = 3.23, SD = 1.31). However, this mean decrease of .40 was not statistically significant, 95% CI [-.95, .17], t(10) = -1.566, p = .15.

Research Question 2

The second objective of this study was to examine whether delivery of selected units of the *Second Step Early Learning Program*, along with exposure and dosage to them, would result in improvements in mindfulness and self-regulation among preschool children.

Analyses of Individual Participant Performance. Summative assessments of each participant's mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) were conducted with (a) Tau-U effect size calculations of individual behavioral tasks and (b) parent- and teacher-rated risk level using *DECA-P2* and *CBQ* completed before and after implementation of the 7-week *Second Step* intervention. Socioemotional competence was also evaluated by child using the *DESSA-mini* progress monitoring tool at the beginning and near the middle of the study.

Chloe. Results of *Second Step* intervention implementation on Chloe's mindfulness and self-regulation are presented in Tables 9 through 12 and 23.

Tau-U suggested that *Second Step* had a large borderline statistically significant negative effect on Chloe's mindfulness (-1.00, p = 0.05), with a 100% decline trend that was statistically significant, based on her performance on the individual focused attention task. With regard to self-regulation, *Second Step* had a large positive effect on Chloe's inhibitory control (0.67, p = 0.35), with a 67% improvement trend, based on her *Pencil Tap* performance, but this trend was not statistically significant. On a separate measure (*HTKS*), her score improved slightly, from 52% to 58% during these time points (see Table 9). In contrast, *Second Step* had no effect on her delay of gratification, with a 0% improvement trend (0, p = 1.00). *Second Step* had a very large, significant negative effect on Chloe's empathy, with a 100% decline trend that was borderline significant (-1.00, p = 0.05), based on her *Sharing* task performance. It also had a small positive effect on her use of active emotion management strategies, such as substitutive play (0.11, p = 0.83), with an 11% improvement trend, based on her Toy Removal response; however, this improvement trend was not statistically significant. On another measure, Chloe demonstrated a decrease in emotion management, as she displayed 33% negative emotion (e.g., anger, frustration) upon receiving a disappointing gift at *Second Step* pre-test and 44% following *Second Step* instruction at *Second Step* post-test (see Table 10). In contrast, Chloe showed an increased understanding of appropriate selection of anger management strategies in response to a puppet vignette during this period, as she scored 50% at *Second Step* pre-test and 100% at *Second Step* post-test (see Table 10).

Table 23:

Tau-U Effect Size: Effectiveness of *Second Step* by Target Participant

Participant	Domain		Tau-U	Z	90% CI
Chloe	Mindfulness	Focused Attention	-1.00*	-1.96	(-1.00, -0.16)
	Self-Regulation	Inhibitory Control	0.67	0	(-0.84, 0.84)
		Delay of Gratification	0	1.31	(-0.17, 1.00)
		Empathy	-1.00*	-1.96	(-1.00, -0.16)
		Substitutive Play	0.11	0.22	(-0.73, 0.95)
Chung	Mindfulness	Focused Attention	-0.56	-1.09	(-1.00, 0.28)
	Self-Regulation	Inhibitory Control	0.11	0.22	(-0.73, 0.95)
		Delay of Gratification	0	0	(-0.84, 0.84)
		Empathy	0	0	(-0.84, 0.84)
		Substitutive Play	0.78	1.53	(-0.06, 1.00)
Ava	Mindfulness	Focused Attention	-0.78	-1.53	(-1.00, 0.06)
	Self-Regulation	Inhibitory Control	0.78	1.53	(-0.06, 1.00)
		Delay of Gratification	-0.33	-0.65	(-1.00, 0.50)
		Empathy	-1.00*	-1.96	(-1.00, 0.16)
		Substitutive Play	0.56	1.09	(-0.28, 1.00)
Brody	Mindfulness	Focused Attention	-0.56	-1.09	(-1.00, 0.28)
	Self-Regulation	Inhibitory Control	0.89†	1.75	(0.16, 1.00)
		Delay of Gratification	0.33	0.65	(-0.50, 1.00)
		Empathy	0.44	0.87	(-0.39, 1.00)
		Substitutive Play	0.11	0.22	(-0.73, 0.95)
Ethan	Mindfulness	Focused Attention	-1.00†	-1.96	(-1.00, 0.16)
	Self-Regulation	Inhibitory Control	0.56	1.09	(-0.28, 1.00)
		Delay of Gratification	-0.67	-1.31	(-1.00, 0.17)
		Empathy	0.44	0.87	(-0.39, 1.00)
		Substitutive Play	0.11	0.22	(-0.73, 0.95)
Caden	Mindfulness	Focused Attention	0.33	0.65	(-0.50, 1.00)
	Self-Regulation	Inhibitory Control	0.30	0.65	(-0.50, 1.00)
		Delay of Gratification	-0.89†	-1.75	(-1.00, -0.05)
		Empathy	0	0	(-0.84, 0.84)
		Substitutive Play	-0.11	-0.22	(-0.95, 0.73)

Notes: †$p < .10$, *$p < .05$

On survey measures, Chloe's level of teacher-rated self-regulation improved by 12 points on the *DECA-P2* from before to after *Second Step* implementation, from a *T*-score of 45 to a *T*-score of 57, respectively. Likewise, her level of teacher-rated behavioral concerns on the same measure decreased from a *T*-score of 52 to 47 during this period. Although her *T*-scores in both areas fell within the typical ranges during this period, they improved from borderline to well within the typical ranges. In line with her improved self-regulation and behavioral concern *T*-scores on the teacher-rated *DECA-P2*, Chloe demonstrated a large, positive change in socioemotional competence from the second through the fifth week of *Second Step* instruction, as measured using the *DESSA-mini* (see Figure 2). Within four weeks of instruction, her *DESSA-mini T*-score (Socioemotional Total; SET) improved by 11 points, which indicated a large effect size greater than 0.8 (Naglieri, LeBuffe, & Shapiro, 2011). Specifically, her SET initially fell within a range that suggested a borderline need for instruction and improved to a score that fell within the average range.

Chung. Results of *Second Step* on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Chung are displayed in Tables 9 through 11, 14, 15, and 23.

With regard to mindfulness, Tau-U suggested that *Second Step* had a moderately negative effect on Chung's mindfulness, with a 56% decline trend (-0.56, $p = 0.28$), based on his performance on the individual focused attention task; however, this trend was not statistically significant. With regard to self-regulation, *Second Step* had a small positive effect on Chung's inhibitory control, with an 11% improvement trend (0.11, $p = 0.83$), based on his *Pencil Tap* performance; however, this trend was not statistically significant. On a separate measure (*HTKS*), his score remained similar (35% and 32%; see Table 9). It had no effect on his delay of gratification (0, p = 1.00), based on his *Snack Delay* performance. In contrast, *Second Step* had a large positive effect on Chung's use of active emotion management strategies, such as substitutive play (0.78, p = 0.13), with a 78% improvement trend, based on his response to *Toy Removal*; however, this trend was not statistically significant. In contrast, it had no effect on his empathy, with a 0% improvement trend (0, p = 1.00), based on his *Sharing* performance. On a separate behavioral task, he demonstrated a decrease in emotion management, displaying 33% negative emotion (e.g., anger, frustration) upon receiving a disappointing gift at *Second Step* pre-test and 44% *Second Step* post-test. When presented with a vignette featuring angry puppets, his selection of appropriate anger management strategies improved 50% to 100% at the same time points.

On survey measures, Chung maintained self-regulation and behavioral concerns within the typical range on the teacher-rated *DECA-P2*. His *T*-score of 46 on the self-regulation subscale remained the same from before to after *Second Step* implementation. Likewise, teacher-rated behavioral concerns on the same measure remained nearly identical during this period, increasing slightly from a *T*-score of 45 to 46. This lack of increase in teacher ratings of self-regulation and behavior on the *DECA-P2* aligned with Chung's marginal improvement in socioemotional competence from the second through the fifth week of *Second Step* instruction (i.e., first two data points), as measured using the *DESSA-mini* (see Figures 3 and 8). Within four weeks of instruction, his *DESSA-mini T*-score (Socioemotional Total; SET) increased by 2 points, which indicated minimal effect of *Second Step* on his socioemotional competence (Naglieri, LeBuffe, & Shapiro, 2011).

Ava. Results of *Second Step* on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Ava are displayed in Tables 9, 10, 15, 16, and 23.

With regard to mindfulness, Tau-U suggested that *Second Step* had a large negative effect on Ava's mindfulness, with a 78% decline trend (-0.78, p = 0.13), based on her performance on the individual focused attention task; however, this trend was not statistically significant. With regard to self-regulation, *Second Step* had a large positive effect on Ava's inhibitory control (0.78, p = 0.13) based on her *Pencil Tap* performance; however, this change was not statistically significant. On a separate measure (*HTKS*), her score remained at 0%. In contrast, it had a moderately negative effect on her delay of gratification (-0.33, p = 0.51), with a 33% decline trend, based on her *Sharing* performance. This trend was not statistically significant. *Second Step* had a large significant negative effect on Ava's empathy (-1.00, p = 0.05), with a 100% decline trend that was statistically significant, based on her *Sharing* performance. In contrast, it had a moderately positive effect on her use of active emotion management strategies, such as support seeking (0.56, p = 0.28), with a 56% improvement trend, based on her response to *Toy Removal*; however, this trend was not statistically significant. On a separate measure of emotion management, Ava's level decreased during this period, as she displayed 22% and 33% negative emotion upon receiving a disappointing gift before and after *Second Step* implementation, respectively. When presented with a vignette that featured angry puppets, she demonstrated a decline from 100% selection of appropriate anger management strategies at *Second Step* pre-test to 50% at *Second Step* post-test.

On survey measures, Ava remained within the typical range with regard to teacher-rated self-regulation and behavioral concern on the *DECA-P2* prior to and following *Second Step* implementation (see Table 16). Although her teacher-rated self-regulation and behavior on the *DECA-P2* did not suggest improvements in these broad areas, Ava demonstrated a medium, positive change in socioemotional competence from week 2 through week 5 of *Second Step* instruction, as measured using the *DESSA-mini* (see Figures 4 and 8). Within four weeks of instruction, her *DESSA-mini T*-score (Socioemotional Total; SET) increased by 5 points, which suggested that *Second Step* was moderately effective in enhancing Ava's socioemotional competence (Naglieri, LeBuffe, & Shapiro, 2011). Specifically, her SET initially fell within the area of need range and later progressed to a score that fell within the typical range.

Brody. Results of *Second Step* on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Brody are displayed in Tables 9, 10, 17, 18, and 23.

With regard to mindfulness, Tau-U suggested that *Second Step* had a moderately negative effect on Brody's mindfulness, with a 56% decline trend (-0.56, $p = 0.28$), based on his performance on the individual focused attention task; however, this trend was not statistically significant. With regard to self-regulation, *Second Step* had a very large, near significant positive effect on Brody's inhibitory control, with an 89% improvement trend that was borderline statistically significant (0.89, $p = 0.08$), based on his *Pencil Tap* performance. Likewise, on a separate measure (*HTKS*), his score improved from 65% to 87%. It also had a moderately positive effect on his delay of gratification, with a 33% improvement trend (0.33, $p = 0.51$); based on his *Sharing* performance; however, this trend was not statistically significant. *Second Step* had a moderately positive effect on Brody's empathy (0.44, $p = .38$), with a 44% improvement trend, based on *Sharing* performance. It also had a small positive effect on his use of active emotion management strategies, such as substitutive play (0.11, $p = 0.83$), with an 11%

improvement trend, based on *Toy Removal* response. Both trends were not statistically significant. In contrast, on another measure, he demonstrated mid-level emotion management that declined during this period, as he exhibited an increase of 44% to 56 % negative emotion from *Second Step* pre-test to post-test. Meanwhile, he maintained 100% appropriate selection of anger management strategies at the same time points.

On survey measures, Brody demonstrated a noticeable decrease in teacher-rated self-regulation and an increase in behavioral concerns on the teacher-rated *DECA-P2*. By *Second Step* post-test, Brody's teacher-rated self-regulation *T*-score fell by 10 points (*T*-score of 61 to 51), while his teacher-rated behavioral concerns *T*-score increased by 9 points (*T*-score of 36 to 45). Despite these large changes, his self-regulation and behavioral concerns fell within the typical range following *Second Step* implementation. In line with his lack of progress on teacher-rated self-regulation and behavior, Brody's level of socioemotional competence remained the same from the second through the fifth week of *Second Step* instruction, as measured using the *DESSA-mini* (see Figures 5 and 8). During both weeks, he received a *DESSA-mini T*-score of 46, which fell within the typical range. This lack of change suggested that *Second Step* was ineffective in enhancing Brody's socioemotional competence during this period.

Ethan. Results of *Second Step* on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Ethan are displayed in Tables 9, 10, 19, 20, and 23.

With regard to mindfulness, Tau-U suggested that *Second Step* had a large, near significant negative effect on Ethan's mindfulness, with a decline trend of 100% that was borderline statistically significant (-1.00, p = 0.05), based on his performance on the individual focused attention task. With regard to self-regulation, *Second Step* had a moderately positive effect on Ethan's inhibitory control, with a 56% improvement trend (0.56, $p = 0.28$), based on his *Pencil Tap* performance; this trend was not statistically significant. On a separate measure of inhibitory control (*HTKS*), his score improved from 0% to 18% during these time points. In contrast, this intervention had a negative effect on his delay of gratification (-0.67, $p = 0.19$), with a 67% decline trend, based on *Snack Delay* performance; however, this trend was not statistically significant. *Second Step* had a moderately positive effect on Ethan's empathy (0.44, $p = 0.38$) and small positive effect on his use of active emotion management strategies, such as substitutive play (0.11, $p = 0.83$), based on *Sharing* performance and on response to *Toy Removal*, respectively. In contrast, he displayed a decline in emotion management, in that his display of mean level of 22% negative emotion in response to receiving an unfavorable gift increased to 56% at Maintenance. Furthermore, his selection of 50% appropriate anger management strategies decreased to 0% at these time points.

On survey measures, Ethan's teacher-rated *DECA-P2* T-scores indicated that self-regulation and behavior remained areas of concern, even after *Second Step* delivery. His self-regulation *T*-score of 34 increased by 6 points (*T*-score = 40), placing him 1 point below the typical range. In contrast, his behavioral concerns *T*-score of 68 remained similar, which increased by 1 point (*T*-score = 69) and indicated that his behaviors remained a high concern to his teacher; these scores both exceeded 1 standard deviation above the mean for typical behavior. In line with his teacher-rated self-regulation and behavior scores, Ethan's socioemotional competence (SET) also remained an area of concern, although he demonstrated a small, positive change in this area within four weeks of *Second Step* instruction, as measured using the *DESSA-mini* (see Figure 6). Ethan received SET scores that fell at least 1 standard deviation below the mean, which suggested that socioemotional competence remained an area of need. This 4-point increase suggested that *Second Step* was minimally effective in increasing Ethan's level of socioemotional competence (Naglieri, LeBuffe, & Shapiro, 2011).

Caden. Results of *Second Step* on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Caden are displayed in Tables 9, 10, and 21 through 23.

With regard to mindfulness, Tau-U suggested that *Second Step* had a moderately positive effect on Caden's mindfulness, with a 33% improvement trend (0.33, p = 0.51), based on his performance on the individual focused attention task; however, this trend was not statistically significant. With regard to self-regulation, *Second Step* had a moderately positive effect on Caden's inhibitory control, with a 30% improvement trend (0.30, p = 0.51,) based on *Pencil Tap* performance; this trend was also not statistically significant. However, on a separate measure of inhibitory control (*HTKS*), his score remained similar (0% and 3%). In contrast, this intervention had a large, near significant effect on his delay of gratification, with an 89% decline trend (-0.89, p = 0.08), based on his *Snack Delay* performance; this trend was borderline statistically significant. *Second Step* had no effect on Caden's empathy, with a 0% improvement trend (0, p = 1.00), based on his *Sharing* performance. However, it had a small negative effect on his use of active emotion management strategies, such as substitutive play, with an 11% decline trend (-0.11, p = 0.83), based on his response to *Toy Removal*. Both trends were not statistically significant. In contrast, on another measure, Caden exhibited a similar level of emotion management, from a demonstration of 33% to 22% demonstration of negative emotions before and after *Second Step* delivery. Although he was not evaluated on his selection of appropriate anger management strategies during *Second Step* pre-test, he received 100% for his choice of suitable emotion management approaches during the post-test.

On survey measures, Caden's self-regulation remained nearly the same, with an increase in behavioral concerns, on the teacher-rated *DECA-P2*. His teacher-rated self-regulation *T*-score of 45 at *Second Step* pre-test increased by 1 point at its post-test. These scores remained within 1 standard deviation below the mean, indicating that self-regulation continued to be at risk for becoming an area of difficulty during this period. In contrast, his teacher-rated behavioral concerns *T*-score of 52 increased by 6 points at the second time point (*T*- score = 58). Although his level of behavioral concerns remained within the typical range at the *Second Step* post-test, it approached 1 standard deviation above the mean and suggested that his behavior would likely develop into an area of need without proper intervention. Despite his lack of improvement in self-regulation before and after *Second Step* implementation, Caden demonstrated a large, positive change in socioemotional competence from the second through the fifth week of *Second Step* instruction, as measured using the *DESSA-mini* (see Figure 7). Within four weeks of instruction, his *DESSA-mini T*-score (Socioemotional Total; SET) increased by 9 points, which indicated a large effect size greater than 0.8 (Naglieri, LeBuffe, & Shapiro, 2011).

Exposure and Dosage. Evaluation of the 6 target participants' behavioral and emotional functioning using observable behavioral tasks revealed multiple areas of similarity and differences between part-time (Ethan and Caden) and full-time students (Chloe, Chung, Ava, and Brody).

Part-Time Attendance. With regard to mindfulness (focused attention), *Second Step* had a moderately negative effect on the part-time students' mindfulness, with a 50% decline trend (-0.50, p = 0.15), but this trend was not statistically significant. With regard to self-regulation, *Second Step* had a moderate, near significant positive effect on the part-time students' inhibitory control, with a 61% improvement trend that was borderline statistically significant (0.61, p =

0.08). In contrast, it had a very large, significant negative effect on their delay of gratification, with a 100% decline trend that was statistically significant (-1.00, $p = 0.004$). *Second Step* had a moderate positive effect on the part-time students' empathy, with a 31% improvement trend (0.31, $p = 0.38$). It also had a small negative effect on their use of active, higher-order emotion management strategies like support seeking, with an 11% decline trend (-0.11, $p = 0.75$). However, these trends were not statistically significant. Ethan's selection of appropriate anger management strategies decreased dramatically, but Caden's selection remained the same (see Table 10). Caden's expression of negative emotion also decreased, whereas Ethan's increased nearly three times in response to a disappointing gift (see Table 10).

Summative assessment of Caden and Ethan's functioning (i.e., pre-test and mid-test) using indirect measures of mindfulness and self-regulation completed by the teacher revealed similar patterns of behavior at school before and after *Second Step* implementation. Both children earned *DECA-P2* teacher ratings that suggested limited progress in the broad areas of self-regulation and behavior at *Second Step* post-test. However, Ethan consistently scored lower in self-regulation and higher in behavioral concerns than Caden. Both children's teacher-rated self-regulation and behavior became at least at-risk for becoming areas of concern (see Tables 20 and 22). Related to self-regulation, socioemotional competence was also measured using the teacher-rated *DESSA-mini* near the start and completion of *Second Step* implementation and found to remain a general area of need for both Caden and Ethan (see Figures 6 and 7).

Full-Time Attendance. With regard to mindfulness (focused attention), all full-time participants' mean level of focused attention decreased, most noticeably by Chloe and Ava. Overall, *Second Step* had a moderately negative effect on the full-time participants' mindfulness, with a 42% decline trend (-0.42, $p = 0.08$), but this trend was not statistically significant. With regard to self-regulation, *Second Step* had a moderate positive effect on the full-time participants' inhibitory control, with a 33% improvement trend (0.33, $p = 0.17$). It also had no effect on their delay of gratification, with a 1% improvement trend (0.01, $p = 0.95$). These trends were not statistically significant. *Second Step* had a small negative effect on the full-time participants' empathy, with a 15% decline trend (-0.15, $p = 0.54$). It had a small positive effect on their use of higher-order emotion management strategies like support seeking, with an 18% improvement trend (0.18, $p = 0.45$). However, these trends in empathy and emotion management were not statistically significant. Chloe's, Chung's, and Brody's selection of appropriate anger management strategies increased to or remained high, although Ava's decreased dramatically (see Table 10). All full-time participants also demonstrated an increase in expression of negative emotion in response to a disappointing gift (see Table 10).

Summative assessment of full-time students' functioning using indirect measures of mindfulness and self-regulation completed by the teacher revealed similar patterns of behavior at school before and after *Second Step* implementation (refer to Tables 12, 14, 16, and 18). Related to self-regulation, socioemotional competence was also measured using the teacher-rated *DESSA-mini* near the start and completion of *Second Step* implementation. By late January 2017, Chloe, Chung, and Ava obtained higher *DESSA-mini* T-scores than in early December 2016, but Brody received the same T-score in this area (see Figures 2 through 5 and 8). Despite the increases in Chloe's, Chung's, and Ava's T-scores, only Chloe's and Ava's socioemotional competence improved to the at-risk or typical ranges during this time period; Chung's socioemotional competence remained an area of need (see Figure 8). Brody's remained within the at-risk range.

Group Analyses. *DECA-P2* Self-Regulation and Behavior Concerns subscale scores were analyzed using two separate paired samples *t*-tests; a one-way repeated measures MANOVA was considered, but not used, because statistical analysis revealed multicollinearity (r = -.95, $p < .01$). Prior to conducting the paired samples *t*-tests, assumption checks were completed to ensure no violations. No outliers were detected that were more than 1.5 box-lengths from the edge of the box in a boxplot. The assumption of normality was not violated, as assessed by Shapiro-Wilk's test ($p > .05$).

The first paired samples *t*-test was conducted to determine whether there was a statistically significant mean difference between the behavioral concerns demonstrated by preschool students (n = 12) following the completion of *Second Step* implementation compared to before its delivery. Participants demonstrated an increased level of behavior concerns after the selected *Second Step* lessons were delivered ($M = 47.08$, $SD = 8.71$) in contrast to before it had been delivered ($M = 45.58$, $SD = 10.91$). However, this increase was not statistically significant, 95% CI [-2.72, 5.72], $t(11) = .78$, $p = .45$.

The second paired samples *t*-test was used to determine whether there was a statistically significant mean difference between the self-regulation demonstrated by preschool students (n = 12) following the completion of *Second Step* implementation compared to before its delivery. Participants demonstrated a higher level of self-regulation after the selected *Second Step* lessons were delivered ($M = 53.17$, $SD = 7.93$) in contrast to before it had been delivered ($M = 51.17$, $SD = 10.58$). However, this increase was not statistically significant, 95% CI [-2.61, 6.61], $t(11) = .95$, $p = .36$.

Research Question 3

The third objective of this study was to examine whether supplemental *MindUp* lessons provided added value beyond the benefits of *Second Step Early Learning Program* in preschool children. Exposure and dosage of *MindUp* lessons were also explored with regard to their benefits beyond *Second Step Early Learning Program*. Analyses are provided at both the individual and group levels.

Individual-Level Analyses. Formative and summative assessments of each participant's mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) were conducted using (a) visual analysis and effect size calculation (Tau-U) of single-case data drawn from individual behavioral tasks and (b) parent- and teacher-rated risk level using *DECA-P2* completed before and after implementation of targeted *MindUp* lessons. Maintenance, or post-test, data were included in the examination of participant's performance. Socioemotional competence was also evaluated by child using the *DESSA-mini* progress monitoring tool at the second through fourth time points during the study.

Chloe. Results of the *MindUp* lessons on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Chloe are presented in Figure 9 and in Tables 9 through 12 and 24.

With regard to mindfulness (focused attention), Chloe's mean level of focused attention noticeably increased from 49% (range, 47% to 53%) at *MindUp* Probe 1 (prior to *MindUp* delivery) to 70% (range, 63% to 74%) at *MindUp* Probe 2 (after targeted *MindUp* instruction). The single data points collected during *MindUp* Probes 3 and 4 and Maintenance (i.e., post-test), which measured Chloe's ability to maintain the prior level of mindfulness achieved following direct instruction, revealed a gradual decline over time. It remained at a similar level (75%) at

MindUp Probe 3, but declined to 68% at *MindUp* Probe 4 and stayed at a similar level at Maintenance (71%). Overall, *MindUp* had a large positive effect on Chloe's mindfulness, with a 100% improvement trend that was statistically significant (1.00, p = 0.05).

With regard to self-regulation, Chloe's mean level of inhibitory control and delay of gratification remained at 100% before (*MindUp* Probes 1 and 2) and after (*MindUp* Probe 3) the second set of targeted *MindUp* lessons. Both areas of self-regulation remained at 100% three weeks following instruction (*MindUp* Probe 4). While delay of gratification remained at 100% at Maintenance, inhibitory control decreased to 94% at the same time point, which measured Chloe's maintenance of inhibitory control and delay of gratification three and six weeks after implementation of the *MindUp* lessons. Overall, *MindUp* neither had an effect on Chloe's inhibitory control, nor on her delay of gratification, with a 0% improvement trend in these areas (0, p = 1.00).

Chloe's mean level of empathy decreased from a mean of 57% (range, 50% to 60%) at *Second Step* post-test / *MindUp* Probe1 to 50% at *MindUp* Probes 2 and 3. The week following the third set of targeted *MindUp* lessons, Chloe's mean level of empathy decreased further to 43% (range, 40% to 50%) at *MindUp* Probe 4 and remained at a similar level at Maintenance (40%). In addition, her level of substitutive play in response to the removal of a favored toy, which fluctuated before the second set of targeted *MindUp* lessons, varied after implementation at *MindUp* Probe 4. From *MindUp* Probes 1 through 3, or prior to the targeted *MindUp* lesson set, Chloe's mean level of substitutive play ranged from 16% to 79%. Her level of substitutive play increased from two weeks prior to targeted *MindUp* instruction, or at *MindUp* Probe 3, to the week afterward. Her level of support seeking substitutive play increased from 16% to a mean of 29% (range, 21% to 48%), but decreased to 25% at Maintenance. Overall, *MindUp* had a

Table 24:

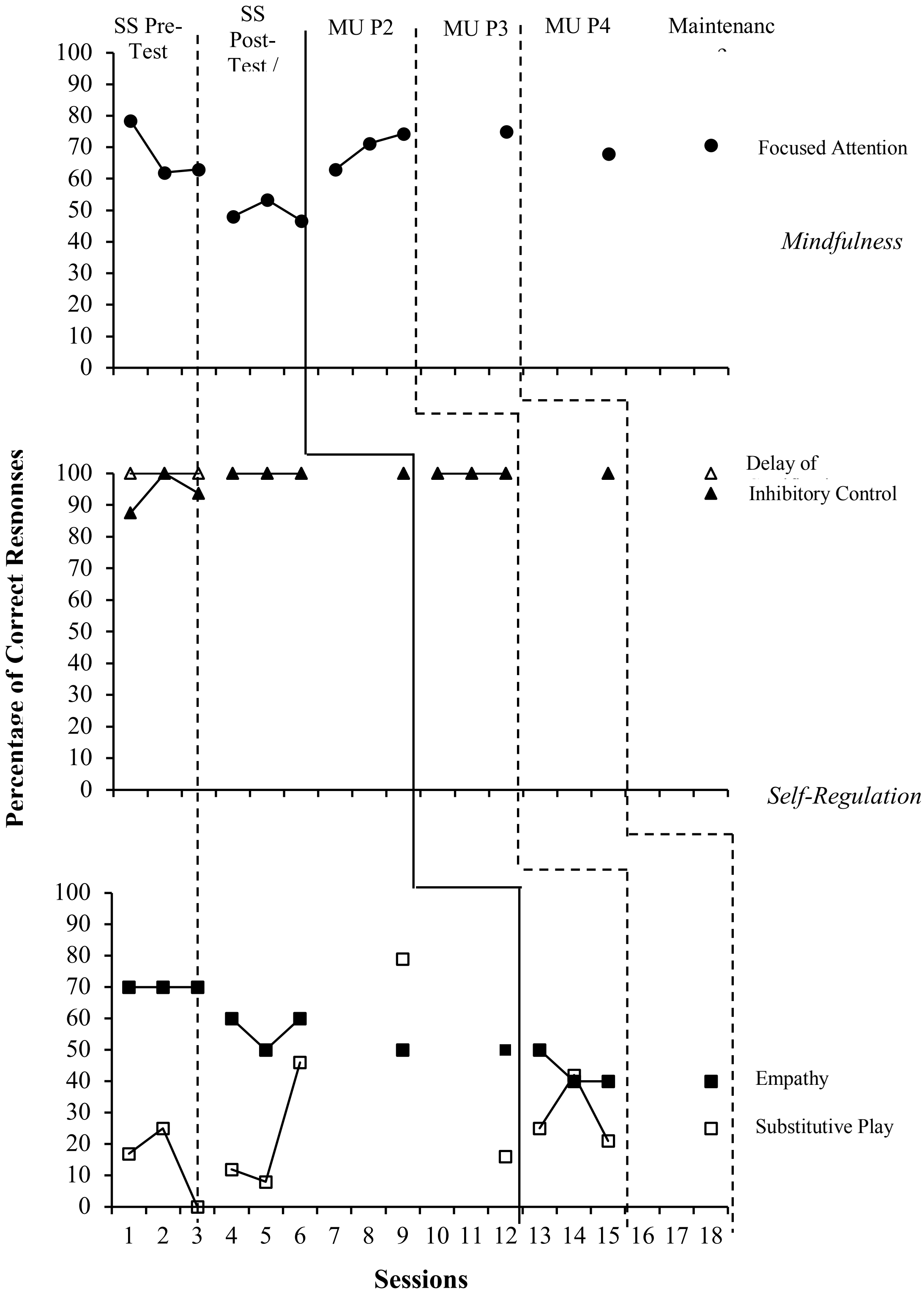
Tau-U Effect Size: Effectiveness of *MindUp* by Target Participant

Participant	Domain		Tau-U	Z	90% CI
Chloe	Mindfulness	Focused Attention	1.00*	1.96	(0.16, 1.00)
	Self-Regulation	Inhibitory Control	0	0	(-0.78, 0.78)
		Delay of Gratification	0	0	(-0.78, 0.78)
		Empathy	-0.80†	-1.79	(-1.00, 0.06)
		Substitutive Play	-0.07	-0.15	(-0.80, 0.67)
Chung	Mindfulness	Focused Attention	0.56	1.09	(-0.28, 1.00)
	Self-Regulation	Inhibitory Control	0.50	1.06	(-0.28, 1.00)
		Delay of Gratification	0	0	(-0.78, 0.78)
		Empathy	0.33	0.75	(-0.40, 1.00)
		Substitutive Play	-0.60	-1.34	(-1.00, 0.14)
Ava	Mindfulness	Focused Attention	0.56	1.09	(-0.28, 1.00)
	Self-Regulation	Inhibitory Control	1.00*	2.12	(0.23, 1.00)
		Delay of Gratification	-0.08	-0.18	(-0.86, 0.69)
		Empathy	-0.53	-1.19	(-1.00, 0.20)
		Substitutive Play	-0.60	-1.34	(-1.00, 0.14)
Brody	Mindfulness	Focused Attention	0.22	0.44	(-0.62, 1.00)
	Self-Regulation	Inhibitory Control	0.50	1.06	(-0.28, 1.00)
		Delay of Gratification	0.08	0.18	(-0.69, 0.86)
		Empathy	-1.27**	-2.83	(-1.00, -0.62)
		Substitutive Play	-0.67	-1.49	(-1.00, 0.07)
Ethan	Mindfulness	Focused Attention	0.56	1.09	(-0.28, 1.00)
	Self-Regulation	Inhibitory Control	0	0	(-0.78, 0.78)
		Delay of Gratification	1.00*	2.12	(0.23, 1.00)
		Empathy	-0.80†	-1.79	(-1.00, -0.06)
		Substitutive Play	0.60	1.34	(-0.14, 1.00)
Caden	Mindfulness	Focused Attention	-0.78	-1.53	(-1.00, 0.06)
	Self-Regulation	Inhibitory Control	0.58	1.24	(-0.19, 1.00)
		Delay of Gratification	-0.25	-0.53	(-1.00, 0.53)
		Empathy	-0.33	-0.75	(-1.00, 0.40)
		Substitutive Play	-0.73	-1.64	(-1.00, 0.002)

Notes: †p < .10, *p < .05, **p < .01

Figure 9:

Percentage of Correct Responses Performed by Chloe



large, near significant negative effect on Chloe's empathy, with an 80% decline trend (-0.80, p = 0.07). It also had a small negative effect on her use of active emotion management strategies, such as substitutive play, with a 7% decline trend (-0.07, p = 0.88). These trends were not statistically significant.

Certain components of Chloe's self-regulation were measured by separate behavior tasks at mid-test and post-test time points, in addition to the data collected for visual analysis. On *HTKS*, her inhibitory control increased from 58% to 98% at mid-test and post-test, respectively. On the *Disappointing Gift* task, Chloe displayed a similar level of negative emotions in response to receiving an undesired present (44% to 33%). On the *Puppet* task, her selection of anger management strategies remained 100% appropriate.

On the *DECA-P2* survey measure, Chloe's teacher reported a decline in self-regulation and an increase in behavioral concerns. Immediately prior to *MindUp* implementation (mid-test), she earned a teacher-rated self-regulation *T*-score of 57 and a behavioral concern *T*-score of 47, indicating typical functioning in both areas. Following completion of *MindUp* instruction (post-test), Chloe's self-regulation *T*-score decreased by 7 points (*T*-score = 50) and her behavioral concerns *T*-score increased by 6 points. Over time, her self-regulation remained within the typical range, yet she became at-risk for demonstrating behavior difficulties. These findings generally indicate that *MindUp* did not add value to Chloe's overall self-regulatory repertoire.

Consistent with the teacher-rated *DECA-P2* scores, Chloe displayed a large decrease in socioemotional competence, as measured using the *DESSA-mini*. Although it had improved from a *T*-score of 41 to 52 during the prior condition, it returned to a *T*-Score of 41 during the second week of *MindUp* implementation. This large decline in her Socioemotional Total (SET) score, while still within the typical range, suggested a lack of responsiveness to two weeks of *MindUp* instruction that placed her at-risk for socioemotional difficulties. Four weeks later, she earned a *T*-score of 44, a 3-point increase that indicated a small effect size of 0.3 and a level of socioemotional competence that placed her closer to the typical range for her age (Naglieri, LeBuffe, & Shapiro, 2011).

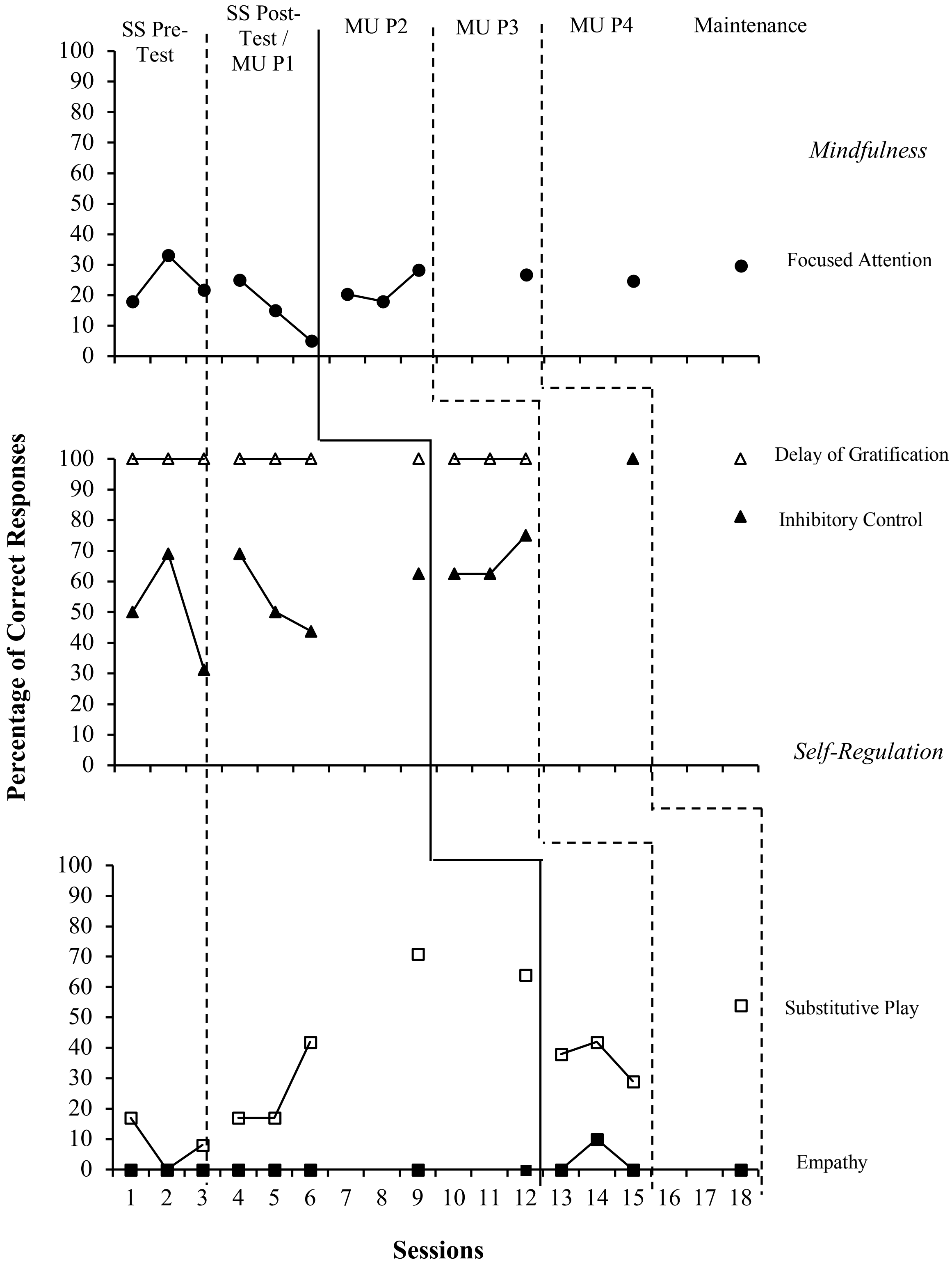
Chung. Results of the supplemental *MindUp* lessons on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Chung are presented in Figure 10 and in Tables 8 through 10, 13, 14, and 24.

With regard to mindfulness, Chung showed an increase in mindfulness (focused attention) from a mean level of 15% (range, 5% to 25%) just prior to *MindUp* instruction (*MindUp* Probe 1) to 22% (range, 18% to 28%) after targeted *MindUp* instruction (*MindUp* Probe 2). The single data points collected during *MindUp* Probes 3 and 4 and Maintenance revealed Chung's ability to maintain, and even increase, his prior level of mindfulness following direct instruction. It remained at a similar level (27%) at *MindUp* Probe 3, at *MindUp* Probe 4 (25%), and at Maintenance (30%). Overall, *MindUp* had a moderately positive effect on Chung's mindfulness, with a 56% improvement trend (0.56, p = 0.28), but this trend was not statistically significant.

With regard to self-regulation, Chung's level of inhibitory control and delay of gratification either improved or consistently remained at a high level. His level of inhibitory control increased slightly, from 63% before direct instruction at *MindUp* Probe 2 to a mean level of 67% (range, 63% to 75%) after direct instruction at *MindUp* Probe 3. His level of delay of gratification remained at 100% before and after targeted *MindUp* lessons at *MindUp* Probes 2 and 3. Both areas of self-regulation increased to or remained at 100% at *MindUp* Probe 4 and at Maintenance, which measured Chung's maintenance of inhibitory control and delay of

Figure 10:

Percentage of Correct Responses Performed by Chung



gratification levels three and six weeks after implementation of the *MindUp* lesson set. Overall, *MindUp* had a moderately positive effect on Chung's inhibitory control, with a 50% improvement trend (0.50, $p = 0.29$), but this trend was not statistically significant. It did not have an effect on his delay of gratification, with a 0% improvement trend (0, $p = 1.00$), which remained at 100%.

Chung displayed little or no empathy before and after targeted *MindUp* instruction. His empathy remained at 0% at *MindUp* Probes 1, 2, and 3. The week following targeted instruction, Chung's mean level of empathy increased slightly to 3% (range, 0% to 10%) at *MindUp* Probe 4, but returned to 0% at Maintenance. In addition, his level of active, higher-order self-regulation skills (e.g., substitutive play) in response to the removal of a favored toy, which fluctuated greatly before targeted *MindUp* lessons, continued to vary after implementation at *MindUp* Probe 4. From *MindUp* Probes 1 to 3, or prior to the targeted *MindUp* lesson set, Chung's mean level of substitutive play ranged from 25% to 71%. His level of substitutive play decreased from 64% to a mean of 36% (range, 29% to 42%) from *MindUp* Probes 3 to 4. At Maintenance, Chung's substitutive play increased to 54%. Overall, *MindUp* had a moderately positive effect on Chung's empathy, with a 33% improvement trend (0.33, $p = 0.46$). In contrast, it had a large negative effect on his use of active emotion management strategies, such as substitutive play, with a 60% decline trend (-0.60, $p = 0.18$). The trend for empathy and emotion management were not statistically significant.

Certain components of Chung's self-regulation were measured by separate behavior tasks at mid-test and post-test time points, in addition to the data collected for visual analysis. On *HTKS*, his inhibitory control increased slightly from 32% to 37% at mid-test and post-test, respectively. On the *Disappointing Gift* task, Chung's degree of displayed negative emotions remained the same in response to receiving an undesired present (44%). On the *Puppet* task, his selection of anger management strategies remained 100% appropriate.

On the teacher-reported *DECA-P2*, Chung demonstrated noticeable increase in self-regulation from before to after *MindUp* implementation (i.e., mid-test to post-test). Following *MindUp* instruction (post-test), Chung demonstrated an 11-point increase in his teacher-reported self-regulation (*T*-score = 57) indicating functioning within the typical range. His teacher-reported behavior concerns T-score remained similar, with a 1-point increase slightly below the mean (*T*-score = 47) that also placed his behavior within the typical range. Overall, the data indicates that *MindUp* provided additional value to Chung's overall self-regulatory skillset.

On the *DESSA-mini*, Chung's level of socioemotional competence remained nearly identical, with a *T*-score of 39 during the fifth week of *Second Step* instruction (prior to *MindUp* implementation) and a *T*-score of 38 during the second week of *MindUp* instruction. These ratings placed his socioemotional competence within the area of need range and indicated a lack of responsiveness to two weeks of *MindUp* instruction. Four weeks later, Chung earned a *T*-score of 36, a 2-point decrease that indicated no effect of *MindUp* instruction on socioemotional competence and a level of socioemotional competence that continued to be an area of need.

Ava. Results of the supplemental *MindUp* lessons on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Ava are presented in Figure 11 and in Tables 9, 10, 15, 16, and 24.

Visual analysis and Tau-U effect sizes of single-case results of Ava's performance on individual behavior tasks indicate that *MindUp* provided additional benefit, beyond *Second Step*'s curriculum, in Ava's level of inhibitory control. Although her level of mindfulness also increased, it was not statistically significant. After targeted *MindUp* lessons, Ava's mean level of focused attention increased from 64% (range, 52% to 82%) at *MindUp* Probe 1 to 79% (range, 75% to 86%) at *MindUp* Probe 2. However, this high level of focused attention was inconsistent at three, six, and nine weeks following targeted instruction. It decreased to 63% at *MindUp* Probe 3, increased to 84% at *MindUp* Probe 4, and decreased to 72% at Maintenance. Overall, *MindUp* had a moderately positive effect on Ava's mindfulness (0.56, p = 0.28), with a 56% improvement trend; however, this trend was not statistically significant.

With regard to self-regulation, Ava's level of inhibitory control and delay of gratification either increased or consistently remained at a high level. Her level of inhibitory control gradually and consistently increased prior to (*MindUp* Probes 1 and 2) and following targeted *MindUp* instruction (*MindUp* Probe 3). It increased from a mean of 63% at *MindUp* Probe 2 (prior to instruction) to a mean of 83% (range, 81% to 88%) at *MindUp* Probe 3 (following instruction). It remained consistently high, with 94% at *MindUp* Probe 4 and 81% at Maintenance, or three and six weeks following targeted instruction. Her mean level of delay of gratification remained near (92%; range, 75% to 100%) or at 100% before and after the targeted *MindUp* lessons just prior to *MindUp* Probe 3. Ava's delay of gratification increased to and remained at 100% at *MindUp* Probe 4 and Maintenance. Overall, *MindUp* had a very large positive significant effect on Ava's inhibitory control, with a 100% improvement trend that was statistically significant (1.00, p = 0.03). It also had a negligible negative effect on her delay of gratification, with an 8% decline trend (-0.08, p = 0.86); this trend was not statistically significant.

In contrast, Ava maintained a low mean level of empathy that ranged from 20% to 30% at *MindUp* Probe 1 (27%; range, 20% to 30%), *MindUp* Probe 2 (30%), and at *MindUp* Probe 3 (20%), just prior to targeted *MindUp* instruction. Following instruction, it decreased further to a mean level of 10% (range, 0% to 30%) at *MindUp* Probe 4. It remained at 10% at Maintenance.

In addition, her level of substitutive play in response to the removal of a favored toy consistently increased from *MindUp* Probes 1 to 3 (from 77% [range, 38% to 88%] to 96%), but decreased following implementation at *MindUp* Probe 4 (from 96% to 64% [range, 50% to 79%]). At Maintenance, Ava's level of substitutive play further increased to 100% and 75%, respectively. Overall, *MindUp* had a moderately negative effect on Ava's empathy, with a 53% decline trend (-0.53, p = 0.23). Additionally, it had a large negative effect on her use of active emotion management strategies, such as substitutive play, with a 60% decline trend (-0.60, p = 0.18). Both trends were not statistically significant.

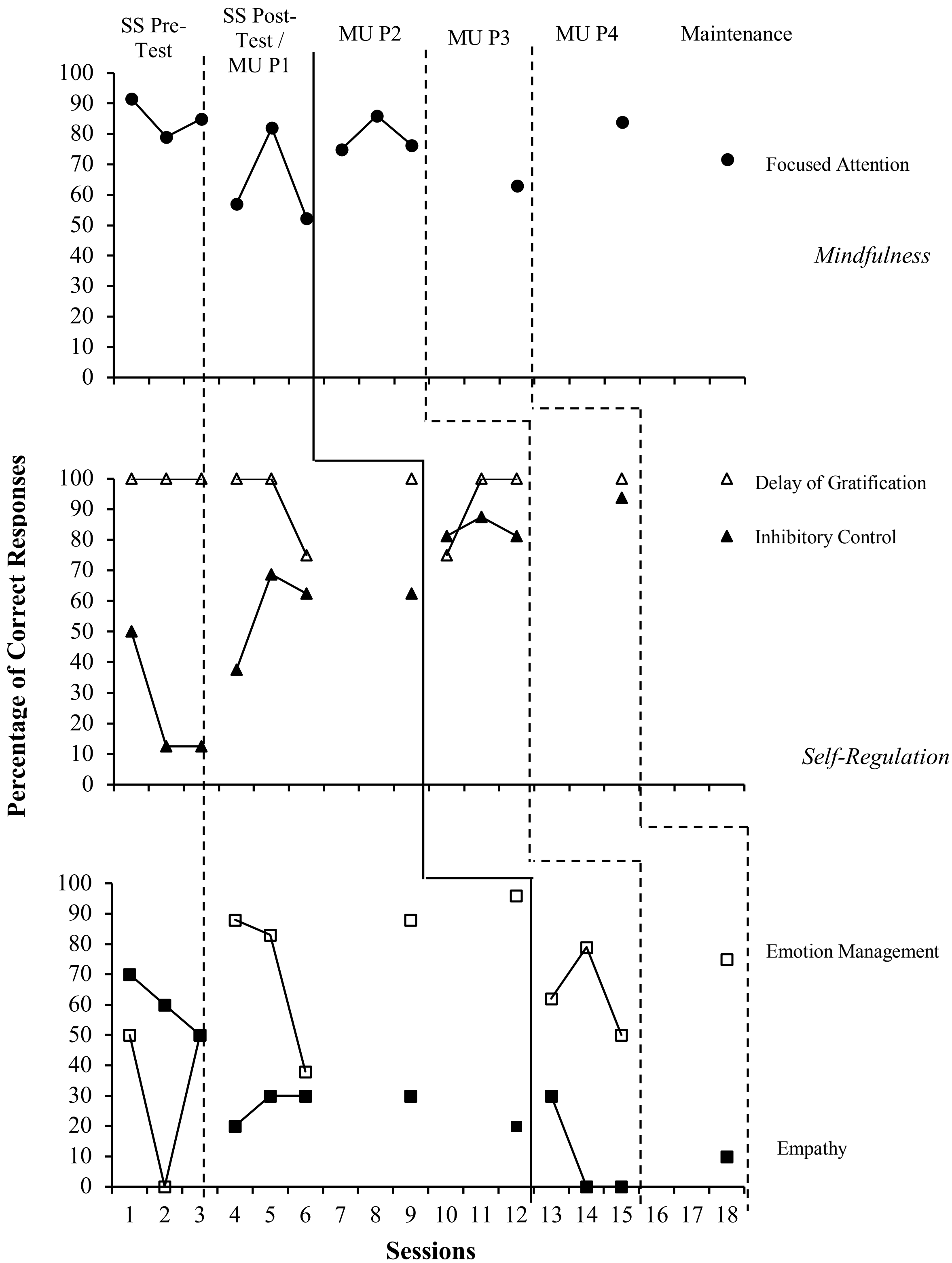
Certain components of Ava's self-regulation were measured by separate behavior tasks at mid-test and post-test time points, in addition to the data collected for visual analysis. On *HTKS*, her inhibitory control remained at 0% at mid-test and post-test. On the *Disappointing Gift* task, Ava's degree of displayed negative emotions decreased from 33% to 11% in response to receiving an undesired present. On the *Puppet* task, her selection of appropriate anger management strategies increased from 50% to 100% appropriate.

On the *DECA-P2*, Ava's teacher-reported self-regulation decreased by 3 points from mid-test to post-test, yet remained within the typical range (T-score = 50). Furthermore, her behavioral concerns T-score on the same measure increased by 2 points (T-score = 52), which indicated that her behavior remained within the typical range, yet shifted toward becoming at-risk for developing behavioral difficulties.

On the teacher-reported *DESSA-mini*, Ava's T-scores, like Chung's, suggested that she responded to neither the second, nor the fifth, week of *MindUp* instruction. Prior to *MindUp* instruction, or during the fifth week of *Second Step* implementation, Ava earned a T-score of 41, which indicated that she was at risk for developing socioemotional difficulties. At the second

Figure 11:

Percentage of Correct Responses Performed by Ava



week of *MindUp* instruction, Ava received an identical *T*-score of 41. However, four weeks later, her *T*-score fell by 9 points. Her final *T*-score of 32 indicated that socioemotional competence became an area of need and suggested that *MindUp* was likely ineffective in enhancing her socioemotional competence. See Figure 4 for Ava's level of socioemotional competence relative to other participants.

Brody. Results of the supplemental *MindUp* lessons on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Brody are presented in Figure 12 and in Tables 9, 10, 17, 18, and 24.

With regard to mindfulness (focused attention), his mean level of focused attention improved from 51% (range, 42% to 67%) before targeted *MindUp* instruction at *MindUp* Probe 1 to 61% (range, 57% to 68%) after instruction at *MindUp* Probe 2. The single data points collected during *MindUp* Probes 3 and 4 and Maintenance revealed further increase in Brody's level of focused attention three and six weeks after instruction at *MindUp* Probes 3 (72%) and 4 (90%), respectively, but not nine weeks later at Maintenance (58%). Overall, *MindUp* had a small positive effect on Brody's mindfulness, with a 22% improvement trend (0.22, $p = 0.66$), but this trend was not statistically significant.

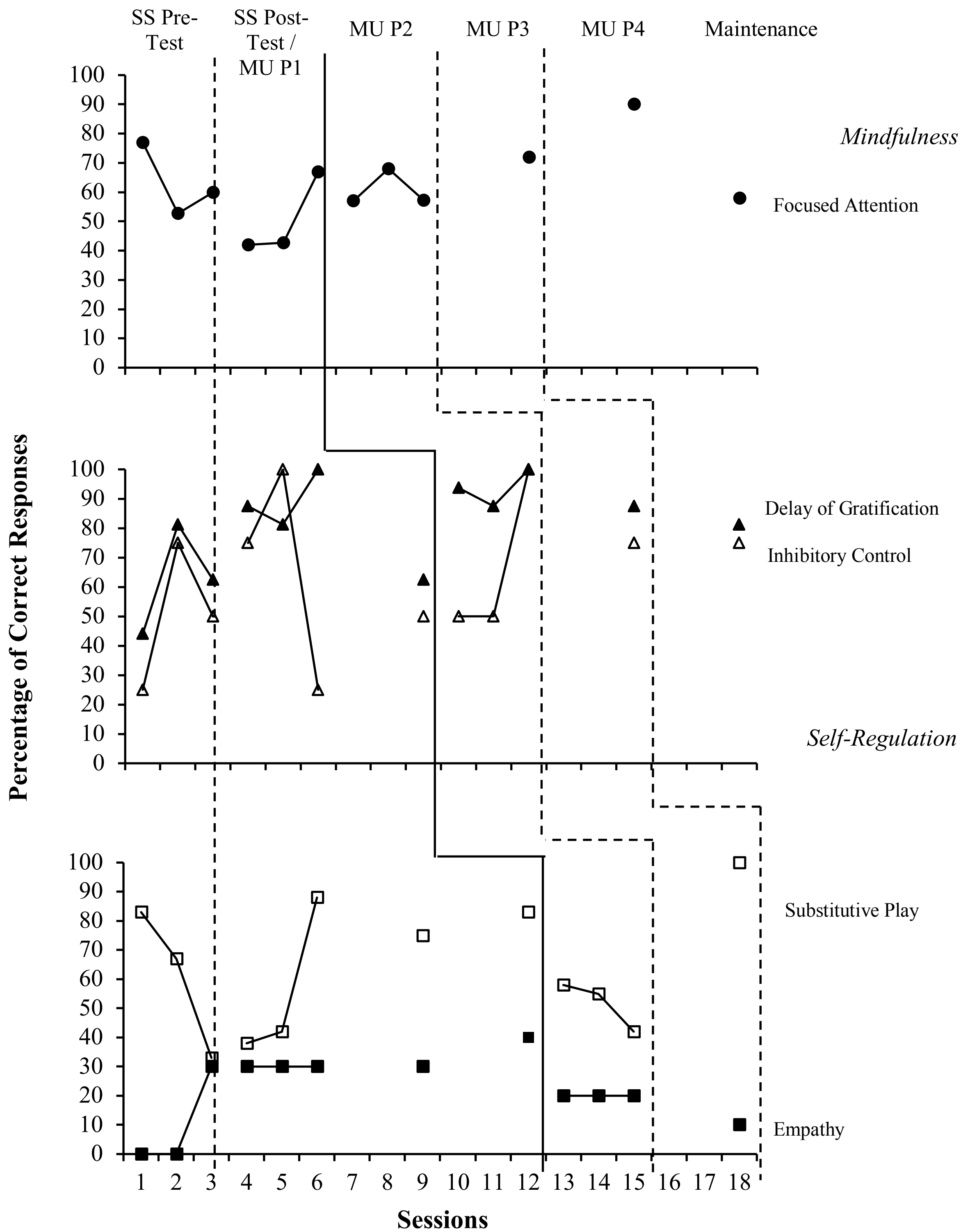
With regard to self-regulation, Brody earned noticeably increased scores in inhibitory control and delay of gratification following intervention. His mean level of inhibitory control, despite decreasing from 90% (range, 81.25% to 100%) at *MindUp* Probe 1 to 63% at *MindUp* Probe 2, increased to a mean level of 94% (range, 88% to 100%) following targeted instruction at *MindUp* Probe 3. This mean level of inhibitory did not last, as it decreased to 88% and 81% three and six weeks following targeted *MindUp* instruction at *MindUp* Probe 4 and Maintenance, respectively. Meanwhile, his level of delay of gratification also increased. Although it initially decreased from a mean level of 67% (range, 25% to 100%) at *MindUp* Probe 1 to 50% just prior to targeted *MindUp* instruction at *MindUp* Probe 2, it returned to a mean level of 67% (range, 50% to 100%) following instruction and further increased to 75% at *MindUp* Probe 4 and at Maintenance. Overall, *MindUp* had a moderately positive effect on Brody's inhibitory control, with a 50% improvement trend (0.50, p = 0.29), and no effect on his delay of gratification (i.e., 0% improvement trend); these trends were not statistically significant.

Brody maintained a level of empathy below 50% before and after targeted *MindUp* instruction. Just prior to targeted *MindUp* instruction (*MindUp* Probe 3), he scored 40%, but it decreased to 20% the week following targeted instruction (*MindUp* Probe 4). It further declined to 10% at Maintenance. In addition, Brody's level of substitutive play in response to the removal of a favored toy decreased after implementation at *MindUp* Probe 4. Prior to targeted *MindUp* instruction, from *MindUp* Probes 1 to 3, Brody's mean level of substitutive play ranged from 56% (range, 38% to 88%) to 83%. His level of substitutive play decreased from 83% to 52% (range, 42% to 58%) from the week prior to *MindUp* instruction (*MindUp* Probe 3) to the week following it (*MindUp* Probe 4). However, his level of substitutive play increased to 100% at Maintenance. Overall, *MindUp* had a very large significant negative effect on Brody's empathy, with a 127% decline trend that was statistically significant (-1.27, p = 0.005). In addition, it had a large negative effect on his use of active emotion management strategies like substitutive play (-0.67, p = 0.14), with a 67% decline trend; however, this decline trend was not statistically significant.

Certain components of Brody's self-regulation were measured by separate behavior tasks at mid-test and post-test time points, in addition to the data collected for visual analysis. On

Figure 12:

Percentage of Correct Responses Performed by Brody



HTKS, his inhibitory control declined from 87% to 78% at mid-test and post-test. On the *Disappointing Gift* task, Brody's degree of displayed negative emotions increased from 56% to 67% in response to receiving an undesired present. On the *Puppet* task, his selection of anger management strategies remained 100% appropriate at these two time points.

On the *DECA-P2*, Brody earned *T*-scores that indicated lack of improvement on his teacher-reported self-regulation following *MindUp* implementation (i.e., mid- to post-test). He maintained the same teacher-rated self-regulation before and after *MindUp* (*T*-score = 51), and a slightly lower behavioral concerns score (*T*-score = 43), which placed his self-regulation and behavior within the typical range.

On the *DESSA-mini*, Brody displayed a small decline from before to the second week of *MindUp* implementation. Whereas his socioemotional competence remained at a *T*-score of 46 during *Second Step* delivery, it slightly decreased to a *T*-score of 43 during the second week of *MindUp* implementation. This 3-point decrease in score, while still within the typical range, suggested a lack of responsiveness to two weeks of *MindUp* instruction and placed him at risk for developing socioemotional difficulties in the future. Four weeks later, he earned a *T*-score of 45, a 2-point increase that indicated a small effect size of 0.2 and a level of socioemotional competence nearer the typical range for his age (Naglieri, LeBuffe, & Shapiro, 2011).

Ethan. Results of the supplemental *MindUp* lessons on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Ethan are presented in Figure 13 and in Tables 9, 10, 19, 20, and 24.

With regard to mindfulness (focused attention), Ethan's mean level of focused attention increased from 38% (range, 35% to 41%) at *MindUp* Probe 1 to 61% (range, 35% to 75%) at *MindUp* Probe 2. The single data points collected during *MindUp* Probes 3 and 4 revealed

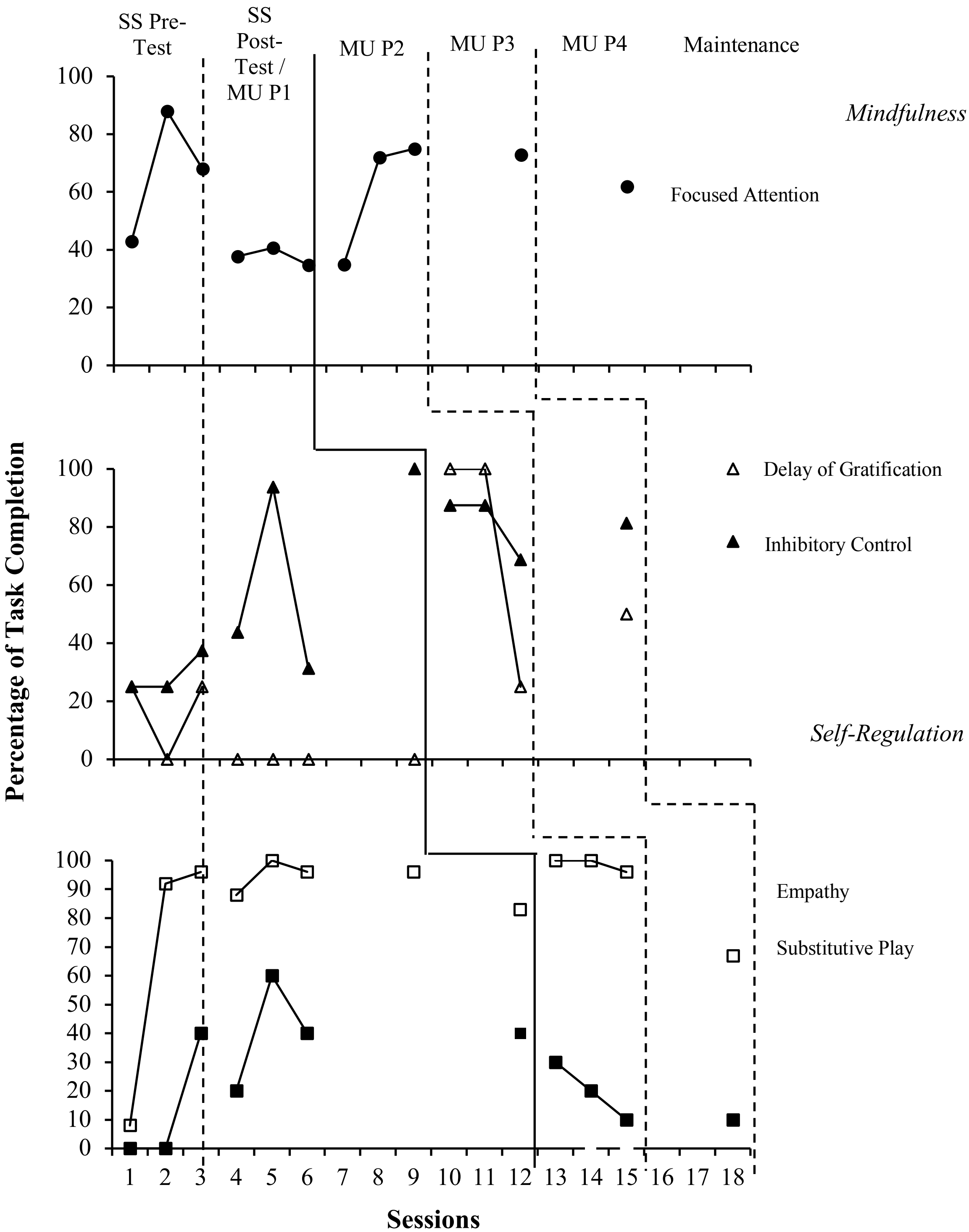
Ethan's ability to maintain or improve his prior level of mindfulness three and six weeks after instruction, respectively. His level of mindfulness further increased to 73% at *MindUp* Probe 3, but decreased to 62% at *MindUp* Probe 4. Overall, *MindUp* had a moderately positive effect on Ethan's mindfulness, with a 56% improvement trend (0.56, p = 0.28), but this trend was not statistically significant.

With regard to self-regulation, Ethan's level of inhibitory control and delay of gratification varied greatly prior to and following targeted *MindUp* instruction. Before delivery of the *MindUp* lesson set, he demonstrated a mean level of 56% (range, 31% to 94%) inhibitory control at *MindUp* Probe 1 and 100% at *MindUp* Probe 2, the week before targeted *MindUp* instruction. His mean level of inhibitory control decreased to and remained at a mean of 81% (range, 69% to 88%) three and six weeks (*MindUp* Probes 3 and 4) following delivery of the specific *MindUp* lesson set. It decreased slightly, to 75% at Maintenance. In contrast, he displayed a noticeable increase in delay of gratification, from 0% before targeted *MindUp* instruction (*MindUp* Probes 1 and 2) to a mean level of 75% (range, 25% to 100%) afterward at *MindUp* Probe 3. This mean level of 75% at *MindUp* Probe 3 was not maintained, as it decreased to 50% three weeks following instruction at *MindUp* Probe 4. However, it increased to 100% at Maintenance. Although his mean level of inhibitory control and delay of gratification varied greatly from week to week, *MindUp* had no effect on Ethan's inhibitory control, with 0% improvement trend (0, p = 1.00), and had a very large significant positive effect on his delay of gratification, with a 100% improvement trend that was statistically significant (1.00, p = 0.03).

Ethan's level of empathy showed a decreasing trend from before to after targeted *MindUp* instruction. Prior to targeted *MindUp* instruction, Ethan's level of empathy was at a mean level of 35% (range, 29% to 40%) at *MindUp* Probes 1, at 30% at *MindUp* Probe 2, and at

Figure 13:

Percentage of Correct Responses Performed by Ethan



32% at *MindUp* Probe 3. Following targeted *MindUp* instruction at *MindUp* Probe 4, Ethan's mean level of empathy increased to 88% (range, 85% to 90%) and remained at a near-identical level (89%) at Maintenance. In addition, he demonstrated an increased level of substitutive play in response to the removal of a favored toy following *MindUp* instruction. However, this level was similar to the level following *Second Step* implementation. Prior to targeted *MindUp* instruction (*MindUp* Probes 1 to 3), Ethan's mean level of substitutive play ranged from 83% to 96%. Following *MindUp* instruction, Ethan's level of substitutive play increased from 83% to a mean of 99% (range, 96% to 100%) at *MindUp* Probe 4. At Maintenance, level of substitutive play decreased to 67%. Overall, *MindUp* had a large, near significant negative effect on Ethan's empathy, with an 80% decline trend that was borderline statistically significant (-0.80, $p = 0.07$). In addition, it had a large positive effect on his use of active emotion management strategies like substitutive play, with a 60% improvement trend (0.60, $p = 0.18$), but this trend was not statistically significant.

Certain components of Ethan's self-regulation were measured by separate behavior tasks at mid-test and post-test time points, in addition to the data collected for visual analysis. On *HTKS*, his inhibitory control remained at 18% from mid-test to post-test. On the *Disappointing Gift* task, Ethan's degree of displayed negative emotions decreased from 56% to 44% in response to receiving an undesired present. On the *Puppet* task, his selection of anger management strategies declined from100% to 50% appropriate at these two time points.

On the *DECA-P2*, Ethan's teacher-rated self-regulation and behavioral concerns *T*-scores indicated that these areas continued to be teacher concerns before and after *MindUp* instruction. Although his self-regulation remained an area of need, his teacher-rated *T*-score decreased by 11 points (*T*-score = 31) following intervention implementation. Consistent with the decline in self-regulation, Ethan's behavior continued to be an area of concern, as indicated by his 3-point increase on the teacher-rated behavioral concerns score (*T*-score = 72).

On the *DESSA-mini*, Ethan displayed an increase in socioemotional competence during *MindUp* implementation. Prior to *MindUp* instruction, he earned a socioemotional competence *T*-score of 40 by the fifth week of *Second Step* instruction; however, it declined by 4 points, to a *T*-score of 36, during the second week of *MindUp* instruction. This small score decrease placed his socioemotional competence within an area of need for his age and suggested a lack of responsiveness to two weeks of *MindUp* instruction. Four weeks later, he earned a *T*-score of 39, a 3-point increase that indicated a small effect size of 0.3. Despite this small improvement, his level of socioemotional competence remained an area of need for his age (Naglieri, LeBuffe, & Shapiro, 2011). See Figure 6 for Ethan's level of socioemotional competence relative to other participants.

Caden. Results of the supplemental *MindUp* lessons on mindfulness (focused attention) and self-regulation (inhibitory control, delay of gratification, empathy, and emotion management) for Caden are presented in Figure 14 and in Tables 9, 10, 21, 22, and 24.

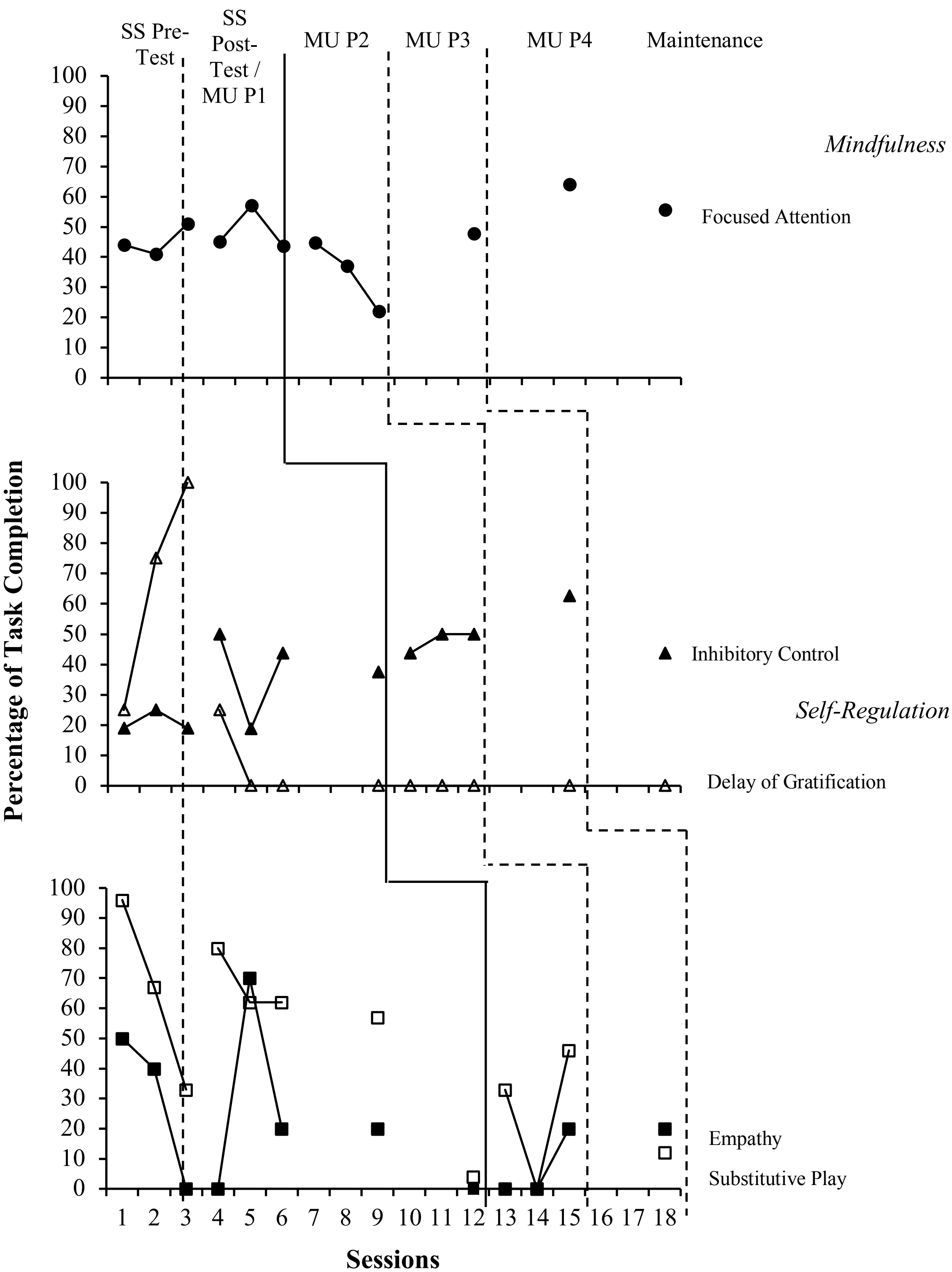
With regard to mindfulness, Caden's mean level of focused attention decreased from 49% (range, 44% to 57%) at *MindUp* Probe 1 to 35% (range, 22% to 45%) with a downward slope at *MindUp* Probe 2, following targeted *MindUp* instruction. The single data points collected during *MindUp* Probes 3 and 4 and Maintenance revealed an increase in Caden's level of focused attention three (48% at *MindUp* Probe 3), six (64% at *MindUp* Probe 4), and nine (56% at Maintenance) weeks after direct instruction, respectively. These increases, which were absent of direct mindfulness instruction, suggest lack of effectiveness of *MindUp* on Caden's mindfulness. Overall, *MindUp* had a large negative effect on Caden's mindfulness, with a 78% decline trend (-0.78, p = 0.13), but this trend was not statistically significant.

With regard to self-regulation, Caden's level of inhibitory control increased gradually from before to after targeted *MindUp* instruction. It remained at a mean level of 38% (range, 19% to 50%) prior to instruction (*MindUp* Probes 1 and 2) and increased to a mean level of 48% (range, 44% to 50%) after instruction at *MindUp* Probe 3. This trend continued three weeks following instruction (*MindUp* Probe 4), in which he displayed it at 63%. However, it declined to a level of 44% six weeks after instruction (Maintenance). In contrast, he demonstrated delay of gratification that ranged from 0% to a mean level of 8% (range, 0% to 25%) prior to targeted instruction at *MindUp* Probes 1 and 2. His mean level of delay of gratification remained at 0% following targeted *MindUp* instruction at *MindUp* Probe 3 and three and six weeks following instruction, or at *MindUp* Probe 4 and Maintenance, respectively. Overall, *MindUp* had a moderate positive effect on Caden's inhibitory control (0.58, p = 0.22), with a 58% improvement trend, and a small negative effect on his delay of gratification (-0.25, p = 0.60), with a 25% decline trend. However, these trends were not statistically significant.

Caden generally increased in level of empathy following targeted *MindUp* instruction at *MindUp* Probe 4. Although his mean level of empathy dropped from 30% (range, 0% to 70%) at *MindUp* Probe 1 to 20% at *MindUp* Probe 2 and 0% at *MindUp* Probe 3, the week before *MindUp* instruction, it increased to a mean level of 7% (range, 0% to 20%) following instruction at *MindUp* Probe 4. At Maintenance, he demonstrated empathy with a level of 20%. In addition, Caden demonstrated a diverse level of substitutive play in response to the removal of a favored toy. His mean level of substitutive play ranged from 4% to 68% (range, 62% to 80%) before targeted *MindUp* instruction (*MindUp* Probes 1 to 3). Following targeted *MindUp* instruction at

Figure 14:

Percentage of Correct Responses Performed by Caden



MindUp Probe 4, Caden's level of substitutive play increased from 4% to a mean of 26% (range, 0% to 46%). From *MindUp* Probe 4 to *Maintenance*, Caden's substitutive play decreased from a mean of 26% (range, 0% to 46%) to 12%. Overall, when data collected at baseline and at all probe sessions are taken together, *MindUp* had a moderate negative effect on Caden's empathy, with a 33% decline trend (-0.33, $p = 0.46$), and a large negative effect on his use of active emotion management strategies like substitutive play, with a 73% decline trend (-0.73, $p = 0.10$); however, these trends were not statistically significant.

Certain components of Caden's self-regulation were measured by separate behavior tasks at mid-test and post-test time points, in addition to the data collected for visual analysis. On *HTKS*, his inhibitory control remained below 10% at mid-test (3%) and at post-test (7%). On the *Disappointing Gift* task, Caden's degree of displayed negative emotions remained at 22% in response to receiving an undesired present. On the *Puppet* task, his selection of appropriate anger management strategies declined from100% to 50% at these two time points.

On the *DECA-P2*, Caden demonstrated a 6-point decrease in teacher-rated self-regulation (*T*-score = 40) and a 6-point increase in teacher-rated behavioral concerns (*T*-score = 64) from immediately before to after completion of *MindUp* implementation. These changes in *T*-score indicated that his self-regulation and behavior became two new areas of need following *MindUp* instruction.

On the teacher-rated *DESSA-mini*, Caden's responsiveness to *MindUp* implementation followed a pattern similar to Chung's, such that Caden's level of socioemotional competence decreased at the second week of *MindUp* implementation and continued to do so four weeks later. The initial 5-point decrease to a *T*-score of 35, followed by an additional 3-point decrease to a *T*-score of 32, indicated that *MindUp* was ineffective in enhancing or maintaining Caden's level of socioemotional competence, which remained an area of need throughout the study. See Figure 7 for Caden's level of socioemotional competence relative to other participants.

Table 25:

Summary of Results from Visual Analyses by Research Question

	RQ #1: ***Second Step* + *MindUp***	**RQ #2:** ***Second Step***	**RQ #3:** ***MindUp***
Mindfulness: Focused Attention	Same, decrease, or increase	**Decrease**	**Increase** (all except Caden)
Self-Regulation: Inhibitory Control	Same or increase	**Increase**	**Same or increase** (all except Ethan)
Self-Regulation: Delay of Gratification	Same, decrease, or increase	**Same or decrease**	**Same or increase**
Self-Regulation: Empathy	Same or decrease	Same, decrease, or increase	**Similar or decrease**
Self-Regulation: Emotion Management (Substitutive Play)	Increase or decrease	Same or increase	Decrease or increase

Note: Results include both significant and non-significant positive and negative effect.

Dosage and Exposure. Evaluation of the 6 target participants' behavioral and emotional functioning using observable behavioral tasks revealed similarities and differences between part-time (Ethan and Caden) and full-time students (Chloe, Chung, Ava, and Brody).

Part-Time Attendance. With regard to mindfulness (focused attention), *MindUp* had a moderately negative effect on the part-time participants' mindfulness (-0.19, p = 0.58), with a 19% decline trend, but this trend was not statistically significant. With regard to self-regulation, *MindUp* had a moderately positive effect on the part-time participants' inhibitory control (0.38, p = 0.25), with a 38% improvement trend. It also had a moderately positive effect on part-time participants' delay of gratification (0.42, p = 0.20), with a 42% improvement trend. However, the trends for inhibitory control and delay of gratification were not statistically significant. *MindUp* had a moderate negative effect on the part-time participants' empathy, with a 47% decline trend (-0.47, $p = 0.13$); this change was not statistically significant. It also had a moderate negative, near significant effect on their use of higher-order emotion management strategies like support seeking, with a 58% decline trend that was borderline statistically significant (-0.58, $p = 0.06$). When a favorite toy was removed, both target participants displayed an increased mean level of substitutive play.

Formative and summative assessment of Caden and Ethan's functioning using indirect measures of mindfulness and self-regulation completed by the teacher revealed similar patterns of behavior in the educational environment before and after *MindUp* implementation. Both children earned noticeably lower *DECA-P2* teacher ratings following *MindUp* delivery, which suggested lack of response to the *MindUp* intervention in the broad areas of self-regulation and behavior (see Tables 19 through 22). Related to self-regulation, socioemotional competence was also measured using the teacher-rated *DESSA-mini* near the start and completion of *MindUp* implementation and found to remain a general area of need for both Caden and Ethan (see Figures 6 through 8).

Full-Time Attendance. With regard to mindfulness (focused attention), all full-time participants' mean level, except for Brody's, increased following targeted *MindUp* instruction. Overall, *MindUp* had a moderately positive effect on the full-time participants' mindfulness, with a 44% improvement trend (0.44, $p = 0.07$), which approached significance. With regard to self-regulation, *MindUp* had a moderate positive effect on the full-time participants' inhibitory control, with a 30% improvement trend (0.30, $p = 0.18$), but this trend was not statistically significant. It had no overall effect on their delay of gratification, with a 0% improvement trend

(0, $p = 1$). *MindUp* had a moderate negative effect on the full-time participants' empathy, with a 26% decline trend (-0.26, $p = 0.23$), but this trend was not statistically significant. In contrast, it had a significant positive effect on their use of active, higher-order emotion management strategies like substitutive play, with a 46% improvement trend that was statistically significant (0.46, $p = 0.005$).

Summative assessment of full-time participants' functioning using indirect measures of mindfulness and self-regulation completed by the teacher at mid-test and post-test revealed distinct patterns of behavior in the educational environment before and after *MindUp* implementation. Chloe, Chung, Ava, and Brody all earned *DECA-P2* teacher ratings that suggested maintenance or improvement in self-regulation following *MindUp* delivery. However, the teacher ratings indicated elevated concerns for Chloe and Ava's behavior; both Chung and Brody demonstrated relatively low behavioral concerns after *MindUp* implementation. Related to self-regulation, socioemotional competence was also measured using the teacher-rated *DESSA-mini* near the start and completion of *MindUp* implementation (see Figures 2 through 5 and 8). Between the end of *Second Step* implementation and during the second week of *MindUp* instruction, the full-time students either demonstrated similar (Ava) or a lower level (Chloe, Chung, and Brody) of socioemotional competence. These score changes generally resulted in SET scores below the mean, suggesting socioemotional competence at risk for becoming, or already, an area of need (see Figure 8).

Group Analyses. *DECA-P2* teacher-rated Self-Regulation and Behavior Concerns subscale scores at mid-test and post-test were analyzed using two separate paired samples *t*-tests. Preliminary analyses were conducted to confirm that the assumptions were met.

The first paired samples *t*-test was conducted to determine whether there was a statistically significant mean difference between the teacher-reported self-regulation demonstrated by preschool students (n = 12) following the completion of *MindUp* implementation compared to before its delivery. Prior to analysis, assumption checks were completed to ensure no violations in conducting a paired samples *t*-test. One outlier was detected that was more than 1.5 box-lengths from the edge of the box in a boxplot. Inspection of its value did not reveal it to be extreme and it was kept in the analysis. The assumption of normality was not violated, as assessed by Shapiro-Wilk's test (p = .185). Participants demonstrated a lower level of teacher-reported self-regulation after the selected *MindUp* lessons were delivered (M = 51.08, SD = 9.42) in contrast to before it had been delivered (M = 53.17, SD = 7.93). However, this decrease of 2.00 points on the teacher-rated self-regulation T-score was not statistically significant, 95% CI [-5.494, 1.327], $t(11)$ = -1.345, p = .206.

The second paired samples *t*-test was used to determine whether there was a statistically significant mean difference between the teacher-reported behavioral concerns demonstrated by preschool students (n = 12) following the completion of *MindUp* implementation compared to before its delivery. No outliers were detected that were more than 1.5 box-lengths from the edge of the box in a boxplot. The assumption of normality was not violated, as assessed by Shapiro-Wilk's test (p = .936). Participants demonstrated a higher level of teacher-reported behavioral concerns after the selected *MindUp* lessons were delivered (M = 49.08, SD = 11.34) in contrast to before it had been delivered (M = 47.08, SD = 8.71). However, this increase of 2.00 points on the teacher-rated behavioral concerns T-score was not statistically significant, 95% CI [-1.065, 5.065], $t(11)$ = 1.436, p = .179.

CHAPTER 5: DISCUSSION

Research Question 1: Cumulative Effectiveness of *Second Step* and *MindUp*

Based on existing evidence that found that each type of intervention predicted improved behavioral, social, and emotional outcomes in children as young as those in preschool (e.g., Razza et al., 2015; Schonert-Reichl et al., 2015; Durlak et al., 2011), implementation of *Second Step Early Learning Program*, in combination with *MindUp*, was expected to lead to an overall increase in mindfulness and self-regulation in preschool students. However, both interventions altogether did not lead to expected improvements across these areas, as significant positive effects were not replicated across at least 3 target participants.

Mindfulness. Contrary to the hypothesis, implementation of both *Second Step* and *MindUp* did not lead to any significant positive effects in mindfulness in at least 3 target participants based on visual analyses of a focused attention task performance and associated Tau-U effect sizes. Although these interventions altogether resulted in a decrease in each child's initial level of mindfulness, these effects were not statistically significant. Parent- and teacher-rated mindfulness (attentional focus) for each child generally remained within the same area of functioning (e.g., weakness, typical, and strength) before and after implementation of both interventions, except for Brody and Ava's improved teacher ratings. At the group level, neither parent, nor teacher ratings of mindfulness on the *CBQ* yielded statistically significant changes.

These findings contradict prior research that found statistically significant improvements in the mindfulness of preschool and school-aged children who received separate and combined mindfulness and SEL programming (e.g., Schonert-Reichl et al., 2015; Durlak et al., 2011; Razza et al., 2015; Flook et al., 2015; Bierman et al., 2008). Because these studies evaluated interventions that were implemented with integrity and without adaptations, it may be that decreases in mindfulness among target participants may reflect the sub-optimal implementation of both *Second Step* and *MindUp* in the preschool context. Specifically, in relation to mindfulness (focused attention), the first unit of *Second Step* targets global self-regulatory skills necessary for learning, including focused attention, and typically requires the implementer to review each skill area over 5 days; however, implementation of each skill was done in half that time. In addition, 2 separate *MindUp* lessons were used to further enhance children's mindfulness; however, like *Second Step*, their implementation was completed in half the recommended number of weeks due to time constraints. In addition, these lessons were implemented at variable times throughout the week, due to scheduling conflicts with higher priority class and school activities and lessons. As such, the timing of each day's lesson may have influenced target participants' level of engagement and interest in skill development. It is likely that, even if the instructional practices of both interventions complemented each other to target mindfulness, students likely required more intense lessons or a lengthier intervention period to allow for additional practice and skill reinforcement.

The departure from intended implementation may also explain the finding that participants who began the current study with initially low mindfulness (focused attention) scores did not demonstrate improvement, which contradicts recent findings that children with particularly low initial scores in executive function (e.g., focused attention) show the greatest improvement (Flook et al., 2015; Diamond & Lee, 2011). Implementation as intended, or a more targeted, intense, and lengthier intervention would have more likely led to significant changes in the mindfulness and self-regulation of participants whose scores at *Second Step* Pre-Test indicated below-average performance in these areas.

Relatedly, it is possible that practical barriers (e.g., alignment with classroom and school priorities) to implementation prevented target participants from reaping more benefits. For example, although teachers and staff anecdotally viewed the focus on mindfulness to be important for their students, they prioritized academic and social skills building activities from school-approved curricula over the current study's interventions in order to meet specific National Association for the Education of Young Children (NAEYC) standards for accreditation purposes. Other practical barriers to implementation as intended, which likely related to lack of alignment to priority, included irregular scheduling to deliver lessons, limited teacher assistance, and space availability for probe sessions.

Another explanation relates to the mismatch between the applied definition and measurement of mindfulness across both interventions. In the current study, focused attention was considered an indicator of mindfulness and was defined as the child's ability to focus on a challenging task in the midst of distractions. The behavioral task required each child to focus attention on a hidden pictures task (i.e., find as many hidden pictures on the given page) for 5 minutes as a favorite movie (e.g., *Frozen*) played audibly in close proximity. The first intervention, *Second Step*, reinforced focused attention along with other skills for learning (e.g., following directions and listening) to allow children to be able to learn and function well within an educational context. In contrast, the chosen *MindUp* lessons introduced the brain-mindful behavior connection and cultivated attention and mindful awareness in everyday situations that stressed novelty and non-judgment (e.g., tasting food and noticing sounds). Furthermore, the *CBQ* subscale of attentional focus asked parents and the teacher to rate each child in terms of his or her concentration and sustained activity on pre-academic tasks. It is possible that this disconnect between the current study's definition and the measures may have contributed to these findings specific to mindfulness. It also may be that fluctuations in performance on the mindfulness task related to the children's attention to certain movie attributes as they completed the hidden pictures activity. For example, one study conducted on 3- to 5-year-old preschool children (n = 60) found that participants' visual attention to a variety of television shows was positively associated with animation, laughter, peculiar voices, sound effects, and inclusion of puppets, women, and children as part of the show (Alwitt, Anderson, Lorch, & Levin, 1980). It was also found that children's comprehension predicted attention to television shows. Other more recent investigations confirmed these findings (e.g., Campbell, Wright, & Huston, 1987). Although no data were collected on movie attributes and children's response to them in the current study, one may speculate that target participants demonstrated variations in the period of time they engaged in the hidden pictures task in the midst of a distracting movie, depending on the movie's features and individual differences in interest and exposure.

Although not measured, one may also speculate that intrinsic motivation, a construct closely related to self-regulation (Berhenke, 2013), was a likely contributor to target participants' performance. Ryan and Deci (2000) suggested that intrinsically motivated individuals across age groups exhibit self-regulation to achieve a particular goal. Of particular relevance are persistence and interest, a major component of intrinsic motivation that can emerge from environmental cues (situational interest) or from individual interest (Renninger, 2000; Ryan & Deci, 2000). Anecdotally, Chung, Caden, and Ethan were more likely to engage in the activity for longer periods of time based on the appearance (e.g., color versus black and white) and content (e.g., pyramids versus dinosaurs) of the hidden pictures (situational interest). In contrast, these hidden picture features did not consistently affect Chloe, Brody, and Ava's level of engagement on the task, as they each observed to persist in the face of a particularly difficult hidden picture. It may be that they had a strong pre-existing interest in challenging puzzles and hidden picture activities (individual interest). Furthermore, target participants with a pre-existing individual interest and high intrinsic motivation may have been more driven to find as many hidden pictures as they could within the time limit, despite distractions from an animated movie; in contrast, other participants may have only initially been drawn to the exercise due to contextual cues, but found few or no hidden pictures due to their attention to the animated movie instead.

Also, it is not surprising that half of the target participants (Chloe, Ava, and Ethan) received much higher scores on teacher-rated initiative, or goal-directed behavior linked to engaged learning, challenge seeking, problem solving skills, and self-awareness (LeBuffe & Naglieri, 2012). This finding aligns with evidence suggesting that motivation relates closely to self-regulation (Berhenke, 2013). Perhaps the combination of *Second Step* and *MindUp* promoted goal-directed behavior and aspects of children's intrinsic motivation, in addition to mindfulness and self-regulation. It is possible that the teacher's ratings reflected these three participants' marked improvement in intrinsic motivation and enthusiasm to engage in class activities, perhaps explained by underlying situational or individual interest in puzzles and hidden pictures.

Inhibitory Control. In line with the hypothesis, the combination of *Second Step* and *MindUp* had a statistically significant or borderline statistically significant positive effect in inhibitory control on 4 of 6 of target participants based on visual analyses of *Pencil Tap* task performance and associated Tau-U effect sizes. While these interventions altogether had a positive effect on the 2 remaining target participants (Chloe and Chung), it was not statistically significant. Generally, target participants who received the lowest initial average scores (e.g., Ava and Ethan) demonstrated the greatest score increases on this task. In contrast, target participant performance on a second behavioral measure of inhibitory control (*HTKS*; Cameron & McClelland, 2011) did not align with performance on the primary behavior task (*Pencil Tap*; Smith-Donald et al., 2007) at the same time points. On *HTKS*, each target participant demonstrated low initial baseline scores and little or no score increases at post-test, except for Chloe and Ethan. Parent- and teacher-rated inhibitory control generally remained within the same area of functioning (e.g., weakness, typical, and strength) for each child before and after implementation of both interventions, except for Brody's and Chung's decline in teacher ratings and Ethan's decline in parent ratings. At the group level, parent and teacher ratings of inhibitory control suggested improvement, but these changes were not statistically significant.

The significant and borderline positive effect of *Second Step* and *MindUp* on most target participants' inhibitory control, coupled with similar pre- and post-test ratings of parent-teacher *CBQ* scores across participants, suggests that the combination of *Second Step* and add-on *MindUp* lessons does not clearly result in improvement in EF skills like inhibitory control. Perhaps the discrepancy in performance reflects differences in children's responses in decontextualized lab and real-life settings. For example, target participants may behave a certain way during class time based on teacher expectations (e.g., raise hand before speaking) and response to behavior (e.g., verbal praise or reprimand); they may behave differently in a lab setting with another set of expectations and response to their behavior.

Despite the mixed findings, the increased, non-significant parent-teacher ratings of inhibitory control on the *CBQ* at the group level suggest that adults noticed a positive change in student behavior across settings as a result of the *Second Step-MindUp* combination intervention. It may be that SEL and mindfulness-based programming together cultivated target participants' self-regulation by teaching and reinforcing this skill in a wide variety of relatable contexts. In particular, *Second Step* lessons incorporated inhibitory control across units to applicable, everyday situations, such as following directions, waiting one's turn, and managing waiting (Jones et al., 2017). The selected *MindUp* lessons taught children about the connection between brain functioning and their behavior and reinforced those skills with games that required children to practice inhibitory control skills (e.g., *Red Light, Purple Light*; *The Freeze Game*; Tominey & McClelland, 2011). Integrating this skill across multiple units and lessons may have allowed participants more practice opportunities across different situations over a longer period of time, which has been shown to improve young children's inhibitory control (Blair, 2002; Diamond & Lee, 2011; Ford, McDougall, & Evans, 2009). The large score increases demonstrated by children with initially low inhibitory control scores support previous findings specific to this skill area (Flook et al., 2015; Raver et al., 2011; Tominey & McClelland, 2011).

Although target participants' performance on *Pencil Tap* and *HTKS* did not align, it is not entirely surprising. It is likely that target participants received higher percentage scores on the *Pencil Tap* than on *HTKS* and that improvement on the *Pencil Tap* was more salient than on *HTKS* due to issues related to content validity. Specifically, *Pencil Tap* measures children's ability to inhibit a motor response (Rhoades et al., 2009). In contrast, *HTKS* assesses a combination of children's inhibitory control, working memory, and attention (Tominey & McClelland, 2011). Therefore, *HTKS* scores may have masked individual contributions of these three EF skills. In the case of a child who consistently performed poorly on *HTKS*, but showed significant progress on the *Pencil Tap* (e.g., Ava), it is possible that this individual's working memory or attention – not inhibitory control – negatively affected *HTKS* performance.

Delay of Gratification. Contrary to the hypothesis, implementation of both *Second Step* and *MindUp* did not lead to any significant positive effects in delay of gratification in at least 3 target participants based on visual analyses of *Snack Delay* task performance and associated Tau-U effect sizes. Instead, these interventions cumulatively had a statistically significant negative effect on Caden's initial level of delay of gratification and no statistically significant positive effects for other target participants. Parent- and teacher-rated impulsivity, a major component of delayed gratification (Luerssen & Ayduck, 2014), generally remained within the same area of functioning (e.g., weakness, typical, and strength) before and after implementation of both interventions, except for Brody's decline in teacher ratings. At the group level, neither parent, nor teacher ratings of impulsivity generated statistically significant changes.

As reported in some studies, participants did not respond to an intervention combination. For example, the Chicago School Readiness Project (CSRP), a multi-component intervention that trained teachers to support at-risk preschool students' self-regulation skills, did not lead to improvements in delay of gratification (Raver et al., 2011). One explanation proposed by the study authors was that this particular skill, a component of effortful control (EC), is composed of essential systems (limbic and neuroendocrine) that develop early and are heavily influenced by home-school experiences. Therefore, it would have been necessary to provide comprehensive strategies that support preschoolers' self-regulation across different settings (Raver et al., 2011). In the current study, parents were not involved in extending skills learned outside of school. Therefore, it is possible that parent involvement and practice at home would have further enhanced target participants' delay of gratification skills.

The aforementioned recommendation by Raver and colleagues (2011) suggested that children should be allowed multiple practice opportunities and provided with reinforcement in many situations to cultivate their ability to delay gratification at a more global level, a strategy found to be effective in cultivating children's self-regulation (Diamond & Lee, 2011; Ford et al., 2009; Razza et al., 2015). However, *Second Step* and *MindUp* implementation, despite having introduced this skill across multiple relevant situations (e.g., managing waiting in line and dealing with accidents), did not provide many opportunities to practice and reinforce delay of gratification skills. Unlike the instruction of inhibitory control, which included multiple games that promoted this skill, the teaching of delay of gratification included no such games to help children further develop it. This could further explain why target participants did not demonstrate improvements in delay of gratification skills.

Anecdotally, Caden and Brody often displayed negative affect during probe sessions. It is also possible that their negative affect worsened their ability to delay gratification on the *Snack Delay* task (Luerrsen & Ayduck, 2014). Specifically, multiple empirical investigations have found that negative emotion is related to poor performance on delay of gratification tasks in children (Moore, Clyburn, & Underwood, 1976; Sethi et al., 2000). This may occur because negative feelings (e.g., sadness, anger, and frustration) are considered stressful. Energy and resources initially directed towards postposing immediate gratification may be redirected and used to manage emotions (Luerrsen & Ayduck, 2014). This diversion of resources for the purposes of managing emotions may make it more difficult to wait and resist initial temptation. Therefore, it is possible that target participants who felt sad, lonely, angry, embarrassed, or frustrated during *Snack Delay* task diverted the majority of their cognitive resources to manage their negative emotions, which made it more likely for them to perform poorly.

Empathy. Contrary to the hypothesis, *Second Step* and *MindUp* cumulatively failed to result in statistically significant positive effect in at least 3 target participants based on visual analyses of the *Sharing* task performance and associated Tau-U effect sizes. Instead, they had a statistically significant negative effect on empathy for 2 target participants (Chloe and Ava).

Though these interventions altogether had a moderately positive or negative effect on the other target participants' empathy, they were not statistically significant. In contrast to empirical findings (e.g., Flook et al., 2015), target participants who received low initial average empathy scores did not make the most gains. Participants, most of whom consistently scored below average (50%) (Brody, Chung, Caden, and Ava), made little or no progress in this area. However, despite some variation, the parent and teacher ratings on one question of the *DECA-P2* (how often the participant shared with other children during the past 4 weeks) revealed that each participant shared frequently with other children (in contrast to never, rarely, occasionally, and very frequently), with few changes in how often this occurred before and after the study.

The lack of positive significant effect of both interventions on target participants' empathy may suggest the limited validity of the *Sharing* task used to measure this particular skill. As defined in the current study, empathy refers to an affective response to another individual's feelings. However, sharing preferred objects or edibles may serve as an indicator for other constructs beyond empathy (e.g., prosocial behavior; Flook et al., 2015), or as a distal outcome that stems from it. Furthermore, this affective response may be contextualized within peer relationships, which can affect performance and measurement of the particular construct.

Perhaps the lack of significant positive findings in this area reflects the low dosage of instruction that targeted this skill in the *Second Step-MindUp* intervention. Although *Second Step* devoted 1 unit (5-6 lessons) to developing empathy in participants near the beginning of the study, both selected *MindUp* lessons did not reintroduce or reinforce these skills until 9 weeks later. Research suggests that children, especially those with an identified area of need, require more intensive, ongoing practice and reinforcement of skills if they are to show improvement in a given area (Payton et al., 2008; Weare & Nind, 2011; Dowsett & Livesey, 2000; Raver et al., 2011). Because the lesson sequence neither consistently developed participants' empathy, nor provided much guided practice, it is not entirely surprising that participants' level of empathy decreased over time, even after targeted *MindUp* lessons.

Together with the intervention's low dosage and few practice opportunities, preschool students' general difficulty to take others' perspectives may have also contributed to their decreased empathy level over time. Sharing, among other prosocial behaviors, is an example of how one may show concern or care for others and requires awareness and comprehension of these individuals' emotional states (Eisenberg, 2000). According to Piaget, children between ages 2 and 7 demonstrate preoperational thinking and tend to view the world through their own lens (Flavell et al., 1968). Although children in this age range generally demonstrate egocentric behavior and thinking, they may develop this prosocial skill through instruction and practice in a variety of settings (Payton et al., 2008; Weare & Nind, 2011; Dowsett & Livesey, 2000; Raver et al., 2011).

Another contribution to these findings may relate to children's practice experiences. Although *Second Step* and *MindUp* lessons altogether provided more than three weeks of necessary instruction and practice opportunities, children may have had experiences associated with negative emotions during practice opportunities in sharing with their peers. Prior investigations have found that dispositional negative emotionality (e.g., anger) is inversely related to empathy (Strayer & Roberts, 2004; Eisenberg, 2006). For example, Ava, one participant who demonstrated a very large significant decline in empathy, reportedly felt upset when she noticed that none of her randomly selected peers chose to share their crackers with her. Chung, one participant who showed no improvement, expressed frustration when his friend, to whom he had shared his red sticker, returned it for Chung's favorite blue sticker.

It may also be that the contrast between the target participants' performance on the behavior task (*Sharing*) and the parent-teacher ratings reflect the difference between the decontextualized behavioral measure and the everyday opportunities for sharing. Specifically, *Sharing* task accounts for children with whom target participants choose to share in a lab setting. Based on anecdotal evidence, performance on this task may depend on children's views of and relationships with identified peers without consideration of context. For example, Ava and Caden often had difficulty identifying a peer from each category (good friend, disliked peer, absent peer, and unfamiliar peer) with whom they would like to share their snack. This translated into poor performance on the behavior task. They generally shared with their classmates without trouble, but this may not have translated in the lab setting due to social variables just prior to the task (e.g., unfamiliarity with certain peers and argument with peers). However, in the classroom setting, there are times (e.g., snack time) when children are required to bring and share a snack with all students in the class, regardless of the degree to which certain peers are liked. In addition, when children are asked to share snacks during lunch time, particularly when it is a birthday or holiday snack, they usually do so with peers who sit at their table. Therefore, parents and teachers who observe these behaviors consider sharing as occurring frequently, but it is contextualized, enforced by adults, and done so on a global level.

Emotion Management. Contrary to the hypothesis, *Second Step* and *MindUp* did not clearly have a statistically significant positive effect in active emotion management strategies (e.g., substitutive play) across at least 3 target participants. Instead, they cumulatively had a statistically significant positive effect on 1 target participant (Chung) based on visual analyses of *Toy Removal* task performance and associated Tau-U effect sizes. An additional 4 participants (Chloe, Ava, Brody, and Ethan) displayed an increase in use of active strategies, whereas 1 participant (Caden) demonstrated a moderate decline. *Second Step* and *MindUp* did not have statistically significant effects on these 5 students. In contrast, data gathered from 2 complementary behavior tasks (*Disappointing Gift* and *Puppet*) indicated that most target participants, except Ethan and Brody, generally demonstrated lower than average and similar levels of negative emotions when placed under duress before and after delivery of both interventions. They also generally demonstrated the same or improved ability to select appropriate anger management strategies when shown a distressing scenario during the same time points. Individually, target participants (except Caden and Brody) displayed no change in teacher-rated anger and frustration; however, most parent ratings indicated improved or worsened functioning in this area. This variation aligned with parent and teacher ratings on a broader measure of children's ability to handle frustration and negative emotion effectively. Similar to other teacher ratings, teacher-rated socioemotional competence (per target participant) remained at a similar level of functioning before and after implementation of both interventions. Group-wise, parent- and teacher-rated anger and frustration decreased, but were not statistically significant. Parent-rated self-regulation showed statistically significant improvement from at-risk to typical level of functioning; however, teacher-rated self-regulation remained within the typical range. In contrast, target participants' parent- and teacher-rated behavior concerns were both found to be typically functioning at both time points, though these were also found to be statistically insignificant.

The behavioral patterns demonstrated by each target participant in response to a stressful situation, along with anger management strategy selection, offer insight into the shift in strategies that select preschool children use to manage negative emotion when under duress. Following *Second Step* and *MindUp*, target participants (except Chloe and Chung) demonstrated a decline in passive emotion management strategies that helped them deal with the toy removal situation but not change it. For example, support seeking and withdrawal comprised the least-used (below 20%) strategies after implementation of both interventions. In contrast, participants (except Brody) exhibited at least twice as much active emotion management strategies, such as substitutive play (Supplee et al., 2009), over this time period. Most participants (except Ethan) also looked away from the toy for nearly half the time it was removed. Although gaze aversion by itself is considered a passive emotion management strategy, it could be used as part of active strategies and was coded along with other regulation approaches. Despite the overall negligible effect of *Second Step* and *MindUp*, the behavioral trends suggest that these interventions together could indirectly benefit the target participants, as active emotion management strategies have been found to correlate with higher levels of social functioning (Grolnick et al., 1996; Raver et al., 1999) and passive emotion management strategies have been found to correlate with negative behaviors and social outcomes (Eisenberg et al., 1994; Eisenberg et al., 1996).

Demonstration of negative facial expressions and maintenance or improvement of selection of appropriate anger management strategies, along with teacher-rated socioemotional competence, following these interventions provide insight on other dimensions of self-regulation. Although target participants generally exhibited more active emotion management strategies and fewer passive methods, they maintained their initial level of socioemotional competence. On the surface, this pattern suggests that the *Second Step-MindUp* intervention combination did not improve children's socioemotional functioning. However, it is possible that participants did make gains in this area, but not enough to change the teacher's global perceptions (Stoolmiller, Eddy, & Reid, 2000).

In light of the positive effects on emotion management based on visual analysis of individual performance, it is promising that parent ratings indicated a significant improvement in their children's ability to express feelings and manage their behavior effectively. Besides the fact that effortful control (EC) and executive functioning (EF) manifest uniquely in different settings, differences in home-school ratings may relate to the frequency of emotion management opportunities in each context (Supplee et al., 2009; Eisenberg et al., 1994). Alternatively, it is possible that expectations at home differed from those at school (Renk & Phares, 2004) and that parents generally noticed an improvement based on parent-child interactions, relationship quality, child acceptance, attitudes towards their children, and family context (Bates, Maslin, & Frankel, 1985; Kolko & Kazdin, 1993).

A relevant extension of home-school expectation relates to the cultural influences of key stakeholders, given the racial diversity of teachers and target participants. For example, at least half of the target participants were non-White. Although data was not specifically collected on cultural heritage in the current study, one may speculate that differences between parent and teacher ratings at least partly stem from cultural views and norms of emotional expressivity (Markus & Kitayama, 1991). In particular, Western, individualistic cultures support open expression of both positive and negative emotions, due to a focus on autonomy, individuality, and authenticity. In contrast, Eastern, collective cultures encourage controlled emotional expression (e.g., calmness and serenity), as they tend to value group harmony and attention to others. This difference has implications in perceptions of children's EC and EF, as children who display more positive and negative emotion are viewed by non-Western parent-teacher raters as dysregulated. Studies that examined self-regulation between U.S. and Chinese (Zhou et al., 2009) and European American and African American children (Supplee et al., 2009) support this. Therefore, target participants with a collective cultural orientation may score lower on displays of high-arousal positive (happiness and excitement) and negative (anger and frustration) emotionality at school, yet simultaneously score higher on these displays of emotionality at home because parents may be more intolerant of or sensitive to these emotional and behavioral displays (Chen et al., 2011).

Relatedly, emotion socialization practices have also been shown to affect children's socioemotional competence. It is thought that children are socialized by significant others (e.g., parents and teachers) to modulate their emotions and behavior through significant others' (a) reactions to children's emotions, (b) discussion of children's emotion, and (c) emotional expression, which reflect socializers' beliefs, values, and goals related to children's experience, expression, and management of their feelings (Eisenberg, Cumberland, & Spinrad, 1998; Eisenberg, Spinrad, & Cumberland, 1998). With regard to family, despite cultural differences in parental emotional expression (Camras et al., 2006), it has been shown that parents universally shape their children's ability to manage their emotions and interact appropriately with others (Chen et al., 2011; Valiente et al., 2006). For example, parental displays of anger, contempt, and blame have been shown to predict externalizing problems in samples of European American (Valiente et al., 2006), Chinese (Chen et al., 2011, 2015), and Indonesian children (Eisenberg et al., 2001).

Theoretical Implications. Self-regulation has been conceptualized in at least two ways in the literature. One body of research conceptualizes self-regulation as an integrated, hierarchical network comprised of bottom-up (effortful control; EC) and top-down (executive function; EF) processes that engage in a give-and-take relationship (e.g., Blair & Dennis, 2011; McClelland et al., 2015; Garon, Bryson, & Smith, 2008) and allow for engagement in productive, goal-directed behavior. In contrast, another literature base views self-regulation as part of a network of five important socioemotional (SEL) skill areas needed to learn and get along with others (Durlak et al., 2011; Izard et al., 2001; CASEL, 2007).

In relation to theory, results of the current study suggest that self-regulation and socioemotional competence are be more distally connected than expected. With regard to the cumulative effects of SEL and mindfulness on preschool participants' ability to manage their behavior and emotions effectively, teacher ratings of each child at pre-test and post-test revealed qualitative differences in EF-EC skills and socioemotional competence by child. Given that self-regulation was conceptualized as an integrated system of EF-EC or as a key aspect of socioemotional competence, it was expected that teacher ratings of general self-regulation, domains of self-regulation (e.g., focused attention and inhibitory control), and socioemotional competence remain consistent, both in degree of change and level of functioning. However, inconsistencies in these ratings existed, which may suggest fundamental differences in their definitions of self-regulation.

While differences in these ratings of self-regulation and socioemotional competence may reflect the influence of teacher-level factors (e.g., increased expectations over the school year) or measurement issues (e.g., content validity), they may also indicate that the integrated system of EF-EC is linked more distantly, instead of more intricately, to socioemotional competence. Specifically, ratings and in vivo observations of behavior change occurred in one direction following SEL skill instruction, yet occurred in the opposite direction following mindfulness lessons, which suggests that processes involved in supporting socioemotional competence and in EF-EC may not necessarily be related. For example, teacher ratings suggested improvement in Chloe and Chung's overall self-regulation (At-Risk to Typical), but they indicated lack of growth in socioemotional competence; Chloe's socioemotional competence remained within the At-Risk range and Chung's remained within the Area of Need range. Likewise, teacher ratings of participants' executive function (e.g., inhibitory control) and effortful control (e.g., anger/frustration) were inconsistent with their ratings of socioemotional competence. For example, Ava's rating of anger/frustration remained an area of strength and her inhibitory control remained a weakness throughout the study, yet her rating of socioemotional competence remained an area of need during this period. Results of the single-case visual analyses further highlight the discrepancy between EF-EC and socioemotional competence. They revealed that all or most participants' mindfulness (focused attention) declined, their inhibitory control improved, and their emotion management skills (substitutive play) improved from before *Second Step* implementation to after *MindUp* delivery. Meanwhile, teacher ratings indicated that each participant displayed the same level of socioemotional competence (e.g., Strength, Typical, At-Risk, or Area of Need).

Taken together, these results suggest at least three possible explanations for the cumulative effect of *Second Step* and *MindUp* on the mindfulness (focused attention) and self-regulation of preschool participants. First, findings indicate that socioemotional learning (SEL) skills and the cognitive-temperamental system of self-regulation may involve processes that target different, rather than similar, areas of functioning that involve self-regulation. Results from the current study are consistent with findings from an investigation that identified SEL skills and self-regulation (e.g., focused attention and inhibition) as independent contributors to social competence in children ages 4 through 14; it suggested no relationship between these areas (McKown, Gumbiner, Russo, & Lipton, 2009). These findings may partially explain why an add-on mindfulness intervention did not consistently improve participants' self-regulation skills by the end of the current study.

Second, the variability of specific self-regulatory outcomes in response to the cumulative effects of SEL and mindfulness interventions may reflect developmental timing (McKown et al., 2009; Razza et al., 2015). Perhaps there is less connection or overlap between particular subdomains of self-regulation during the preschool years, a period of dramatic neurodevelopment, than during the middle childhood and adolescent years, specifically as they relate to SEL skills and the EC-EF relationship. For example, this idea likely explains the decrease in participants' focused attention following both SEL and mindfulness interventions. Specifically, it is possible that the maturing attentional system and its lack of integration of anterior attentional processes prevent or limit cumulative effectiveness of interventions that target global SEL and specific focused attention skills, a combination thought to be particularly potent (Diamond & Lee, 2011).

Third, it is possible that the main focus of *MindUp*'s lessons on self-regulation diminished the exposure to the socioemotional skills instruction taught explicitly during *Second Step* implementation. It is thought that strategic combination of instruction that incorporates targeted socioemotional and mindfulness-based instruction, which enables children to cultivate these skills from both the "inside out" (mindfulness approach) and from the "outside in" (socioemotional learning), can sufficiently target all aspects of self-regulation that underlie EC-EF and socioemotional competence (Gueldner & Feuerborn, 2016; Felver et al., 2013). Although the last two weeks of *MindUp* instruction focused on building empathy through practicing gratitude and performing acts of kindness, the prior four lessons taught students about brain function and to regulate their behavior with the practice of mindfulness strategies that did not review or build on socioemotional competence. Despite being paired together, it may be that *Second Step* and *MindUp* lessons require a greater level of coordination and integration than implemented in the current study.

Overall, findings from the current study suggest a need to clarify how the integrated model of EC-EF relates to socioemotional competence in a larger sample of preschool students. While a recent study found a significant relationship between self-regulation and socioemotional competence, it was specific to an international sample of fifth-grade students and did not examine these connections with subdomains of self-regulation (Akbulut-Kilicoglu & Dincer, 2015). Additional questions that have emerged from the current study should be answered in order to better understand the relationship between EC-EF and socioemotional competence, particularly during early childhood. These questions include: (a) Which SEL skills (self-awareness, self-management/regulation, social awareness, relationship skills, and responsible decision-making) work with EC and EF to elicit emotion and behavior management in young children? (b) How does this web of SEL skills relate to EC and EF to allow a young child to engage in goal-directed behavior?

Research Question 2: Effectiveness of *Second Step*

Multiple studies and meta-analyses have shown that school-based SEL interventions predict improvements in students' behaviors and feelings (e.g., less aggression and improved emotion identification) across grade levels starting in kindergarten (Durlak et al., 2011; Frey et al., 2005; Low et al., 2015). Based on this empirical evidence, it was expected that preschool students' mindfulness and self-regulation skills would improve upon receiving SEL instruction from *Second Step Early Learning Program*. However, *Second Step* did not lead to expected improvements across these areas, as significant positive effects were not replicated across at least 3 target participants.

Mindfulness. Contrary to the hypothesis, implementation of *Second Step* did not result in any significant positive effects in mindfulness in at least 3 target participants based on visual analyses of focused attention task performance and associated Tau-U effect sizes. Rather, it led to a significant decline in the initial levels of mindfulness in Chloe and Ethan, along with moderate to large decreases not considered statistically significant in the other children.

While the majority of SEL investigations have focused on behavioral and emotion-based outcomes, few have investigated preschoolers' focused attention. Those that have examined it have also not found significant effects. For example, one experimental study that investigated the effect of the *PATHS* curriculum on preschoolers' sustained attention found no significant differences between intervention and control groups (Domotrovich et al., 2007). Domotrovich and colleagues (2007) noted their unrealistic expectation regarding their selected SEL's effectiveness, given its low intensity nature. Similarly, the negative effect of *Second Step* on target participants' level of focused attention in the current study may reflect incongruence between *Second Step*'s Tier 1 quality and the higher dosage that participants may have needed to demonstrate improvement. In the current study, only 2 days of instruction, as opposed to the curriculum's intended daily lessons, were used to teach students to focus attention as part of the class-wide *Second Step* curriculum.

Relatedly, it is also likely that implementation of *Second Step* played a role in the participants' decreases in their initial levels of mindfulness, as high-quality SEL implementation usually predicts positive outcomes and low-quality implementation is associated with poor outcomes (Durlak et al., 2011; SACD Research Consortium, 2010). With regard to mindfulness, *Second Step* devotes one unit to target students' skills for learning, which includes lessons that target sustained attention as part of its curriculum. In its implementation, the primary researcher only delivered 2 mini-lessons over 2 days that targeted focusing attention with skill reinforcement across 4 weeks of daily *Second Step* instruction, but with no daily teacher-reinforced extension activities (Brain Builders). Within a supportive learning environment, in which teachers express their high expectations and provide reinforcement opportunities, students may feel more engaged and put forth more effort in their practice of mindfulness during this portion of the intervention (Zins et al., 2007).

Another explanation for *Second Step*'s lack of significant positive effect on target participants' mindfulness may relate to the mismatch between the lesson on focusing attention and the definition of mindfulness. In the current study, mindfulness is defined as a skill that entails one's ability to focus on fleeting thoughts and feelings without judgment, in addition to one's ability to use executive function (EF) and effortful control (EC) to manage behaviors and emotions (Kabat-Zinn, 2003; Langer & Moldoveanu, 2000). Although *Second Step*'s focusing attention lesson incorporates the use of cognitive control strategies (i.e., Listening Rules) to attend to the teacher or to an object during instruction, it does not apply those skills to other learning situations, such as completing tasks or putting away toys in their original locations during clean-up time. It also fails to teach students the relevance and importance of non-judgment in relation to mindfulness.

This mismatch likely reflects problems that stem from the measurement of the mindfulness construct in the present study. Currently, no measures reliably and validly assess mindfulness in children below the fourth grade (e.g., *Mindful Attention Awareness Scale Adapted for Children* [*MAAS-C*]), which may relate to a paucity of empirical research on this construct in young children (Lawlor et al., 2014). As observational methods of measuring mindfulness are non-existent in young children, the primary researcher developed a behavior task designed to assess this construct through observation. This task required participants to complete hidden picture worksheets as a popular cartoon movie played on a laptop placed in front of them. Although this task measured children's focused attention, a skill that was taught using *Second Step* via time on the activity, it also likely assessed intrinsic motivation (e.g., level of engagement and persistence to complete difficult tasks). Therefore, the mixture of constructs measured on this task likely concealed the true effect of *Second Step* on each child's focused attention because the observed negative effects could have been attributed to low engagement or persistence, instead of focused attention, during probe sessions.

Inhibitory Control. Contrary to the hypothesis, implementation of *Second Step* did not lead to any significant positive effects in inhibitory control across at least 3 target participants based on visual analyses of the *Pencil Tap* task performance and associated Tau-U effect sizes. Nevertheless, participants (except Chung) generally demonstrated a moderate to large increase in their level of inhibitory control. Brody made particularly large gains on *Pencil Tap*, which approached statistical significance. However, participants' performances on *Pencil Tap* were inconsistent with their performance on *HTKS*. Except for Brody, all other participants displayed lower initial scores, in addition to limited or no improvement on *HTKS*.

The lack of a significant positive effect on target participants' inhibitory control may reflect the small focus that *Second Step* places on developing this skill, coupled with departures from implementation in the current study. With regard to content, 40% of *Second Step*'s curricular activities support young children's cognitive regulation, yet only 18% of these activities (i.e., 7% across the entire curriculum) target inhibitory control (Jones et al., 2017).

Many of the activities intended to teach or reinforce inhibitory control were Brain Builder activities that the teachers did not implement in the current study, thereby limiting students' practice opportunities in this area. Additionally, 20% to 40% of selected units (or, 1 to 2 out of 5 weekly lessons) were not implemented, which further limited participants' exposure to the content and additional practice. It is likely that delivery of teacher-led Brain Builder exercises would have further supported participants' inhibitory control, as repeated exposure to games and tasks that require use of executive skills have been shown to facilitate improvement in inhibitory control in children as young as age 3 (Dowsett & Livesey, 1999).

Despite the lack of a significant effect, it is promising that most target participants demonstrated growth in inhibitory control as a result of *Second Step*. As discussed above, these improvements may be attributed to instruction that integrates inhibitory control with everyday skills, such as taking turns and managing anger. In addition, it is possible that students demonstrated gains in this area because SEL programs like *Second Step* tend to promote central executive cognitive functions (e.g., inhibitory control) by developing more cognitive-affect regulation in the prefrontal cortex (Greenberg, 2006). This is accomplished by providing children with multiple opportunities to consciously practice cognitive and behavioral strategies, such as belly breathing to calm down and avoid an impulsive outburst.

Delay of Gratification. Contrary to the hypothesis, implementation of *Second Step* did not lead to any significant positive effects in delayed gratification in at least 3 target participants based on visual analyses of the *Snack Delay* task performance and associated Tau-U effect sizes. Instead, it resulted in no effect in 2 participants (Chloe and Chung) and moderate to large negative effects in 3 other participants (Ava, Ethan, and Caden). Only a moderate positive effect on Brody's delay of gratification was observed, although it was not statistically significant.

One possible explanation for no significant effect and reductions in delay of gratification may relate to the lack of content in *Second Step* that focuses on cultivating this specific skill. As noted by Jones and colleagues (2017), *Second Step* devotes 40% of its instruction and activities toward building cognitive regulation. However, there are no activities that cultivate delay of gratification skills within this area. Therefore, it may be that *Second Step*'s lack of focus on this area prevented growth among participants. It is possible that Brody's improvement reflected his exposure to instruction at home or through extracurricular enrichment.

Relatedly, decreases in delay of gratification for Ava, Ethan, and Caden may highlight the function of individual child characteristics and the normative development of this particular skill in preschool-aged children in the absence of instruction and reinforcement. Li-Grining (2007) found that child characteristics explained 19% of variance in preschool students' delayed gratification. In particular, 3-year-old children tended to score lower than 4-year-old children on the *Snack Delay* task. Other individual factors that may have affected performance include temperamental tendency to display negative reactivity (e.g., anger, frustration, and distress), which has also been found to relate to lower levels of delayed gratification (Luerrsen & Ayduck, 2014; Kochanska & Knaack, 2003). Coupled with the Piagetian view that young children display competence in emerging skills in a non-linear fashion (Miller, 2002), Ava, Ethan, and Caden's performance may reflect the fact that delay of gratification is an emerging skill area in young children under age 5 (Jones, Rothbart, & Posner, 2003), in addition to other individual child characteristics like temperament and negative emotionality.

In contrast, the lack of *Second Step*'s effect on Chung and Chloe likely reflects their consistently high level of delay of gratification across the study. Both students initially scored 100% on the *Snack Delay* task before and after *Second Step*, suggesting a ceiling effect. Any additional improvement in this area would not have been captured by *Snack Delay*, as this measure was likely not sufficiently difficult to assess Chung and Chloe's true ability and potential growth in this area.

Empathy. Contrary to the hypothesis, *Second Step* had a statistically significant negative effect on Chloe and Ava's empathy based on visual analyses of the *Sharing* task performance and associated Tau-U effect sizes. In contrast, it either had no effect on some target participants (Chung and Caden) or a moderate, non-significant positive effect on other target participants (Brody and Ethan). On one item of the teacher-rated *DECA-P2*, which asked whether and how often each participant shared with other children, Chung and Ethan received higher scores. All other children were observed to share just as often as their initial level (e.g., occasionally or frequently).

The single-case findings specific to Chloe, Ava, Chung, and Caden may reflect the lack of instruction focused specifically on sharing, a prosocial indicator of empathy, during *Second Step* implementation. Although 52% of *Second Ste*p activities target emotional processes, including 33% empathy within this area (Jones et al., 2017), the selected lessons taught children to identify and understand feelings and to view things from others' perspectives (e.g., other people may have similar or different feelings about the same thing; sometimes things happen by accident) (Committee for Children, 2011). However, participants were not taught to use empathy in their practice of sharing. Furthermore, they did not receive practice opportunities to share during implementation. As such, the *Sharing* task may not have validly measured empathy skills as defined in the current study. It is likely that targeting specific prosocial indicators of empathy (e.g., sharing) would have resulted in improvements by more target participants, as preschoolers who were explicitly taught such skills using an SEL program were shown to make significant gains (Schultz, Richardson, Barber, & Wilcox, 2011). On the other hand, it is possible that Brody and Ethan's positive changes resulted from pre-existing general practices that the teachers used in their classroom, or practice opportunities at home.

Alternatively, these findings may reflect participants' positive peer interactions, peer acceptance, and friendships (e.g., the number of friends each participant identifies and friendship quality). Preschoolers' friendships with each other may be momentary, though emerging socioemotional competence (e.g., cooperation, taking turns, social problem solving, and conflict resolution), including empathy, over time can maintain and stabilize friendships and affect young children's likelihood to engage in prosocial behavior (e.g., sharing) with peers (Barbarin & Wasik, 2009).

Although teacher ratings on the *DECA-P2* aligned with *Sharing* task performance for 4 target participants (Chloe, Ava, Caden, and Ethan), it was inconsistent for Brody and Chung. It is possible that discrepancies between teacher ratings and observations for both students relate to contextual factors, such as sharing an undesired food item with a peer during lunch versus sharing a desired snack or sticker with a good friend.

Emotion Management. Contrary to the hypothesis, *Second Step* did not lead to a statistically significant positive effect on the use of active emotion management strategies (e.g., substitutive play) across at least 3 target participants based on visual analyses of *Toy Removal* task performance and associated Tau-U effect sizes. Nevertheless, scores earned by most participants increased; only Caden earned a lower score in this area. Data gathered from *Disappointing Gift* and *Puppet* tasks, which measured 2 other dimensions of emotion management, indicated that all participants except Caden, displayed an increased level of negative emotions when placed under duress after *Second Step* implementation. However, they demonstrated negative emotions at average levels or lower. During this time point, 2 participants (Ava and Ethan) selected fewer appropriate anger management strategies when shown a distressing scenario, whereas the other 4 children demonstrated improvement or similar performance (i.e., selection of all appropriate strategies). Individually, teacher ratings indicated that most children maintained at least typical functioning or improved to this level in their ability to handle frustration and negative emotion effectively. Caden and Ethan continued to display difficulty in these areas. Group-wise, teacher ratings suggested that students showed more self-regulation and behavioral concerns, maintaining typical functioning within each realm. However, these changes were not statistically significant. Consistent with improvements on teacher ratings of global self-regulation and behavioral concerns, teacher ratings of socioemotional competence indicated small to moderate growth in participants' functioning before and after *Second Step*. Ethan, Caden, and Ava made particularly large gains, which qualitatively signified functioning at a higher level (e.g., from area of need to at-risk, or from at-risk to typical).

Despite no significant changes, it is promising that most students demonstrated an increase in their use of active emotion management strategies (e.g., substitutive play), which aligned with teacher ratings of socioemotional competence. These improvements likely reflect *Second Step*'s focus on teaching students how to manage strong feelings in everyday situations (Jones et al., 2015). *Second Step* implementation, which targeted the use of active emotion management strategies (e.g., labeling emotions and belly breathing) to manage strong feelings and as a waiting strategy, involved daily instruction, role playing, and practice over nearly 3 weeks. The current study's findings align with previous research, which suggests that intervention and prevention, such as SEL instruction, can predict or lead to improvements in emotion management across age groups, including young children (e.g., Durlak et al., 2011; Schultz et al., 2011; Domotrovich et al., 2007).

Although many child characteristics were not collected in the current study, one may speculate that variations in *Second Step*'s effects on individual students may reflect the contributions of child factors to self-regulation. Empirical evidence suggests that age and cognitive development (e.g., non-verbal intelligence) relate to the use of active and complex forms of emotion management, such as cognitive reappraisal (Sala, Pons, & Molina, 2014; Cole et al., 2008). Verbal ability and emotion comprehension have also been shown to affect young children's ability to manage their emotions. For example, it is thought that receptive language skills predict strategy comprehension specific to anger, presumably because they allow children to generate articulate strategies to manage their emotions (Cole et al., 2008). In addition, research has reported that young children's recognition of diverse methods of emotion management is associated with the types of self-regulation strategies young boys and girls use when under duress (Cole et al., 2008; Sala, Pons, & Molina, 2014).

Another major variable that has been implicated in young children's ability to modulate and control feelings is temperament, which involves individual variations in biologically-shaped emotional and behavioral processes (Rothbart, 2012). Among its main features, negative emotionality and effortful control (EC) have often been discussed in relation to socioemotional competence. Pre-existing literature points out that each child displays unique differences in how he or she copes with stressful circumstances and in the manner in which it is expressed. For example, negative emotional intensity and individual coping styles (e.g., avoidance, distracting mental processes and behaviors, and support seeking) have been implicated in young children's naturally occurring reactions to anger and problem behaviors (Eisenberg et al., 1994; Eisenberg et al., 1996). Researchers have also found that preschoolers' individual differences in effortful control moderate the relationship between adult ratings of child negative emotionality and social functioning (e.g., Liew, Eisenberg, & Reiser, 2004; Eisenberg et al., 1996; Denham et al., 2003). It is believed that children with high ratings of EC are less likely to display negative emotionality than those with low ratings because they are likely more proficient at regulating their attention, feelings, and behavior, skills that reflect biologically-based differences and bi-directional interactions with the environment (Eisenberg, Hofer, Sulik, & Spinrad, 2014; Eisenberg & Spinrad, 2004; Shiner, 2012).

As such, any one or a combination of these individual differences may account for the trends in emotion management found after participants' exposure to *Second Step* instruction. At least one of these variables (e.g., age/maturity, cognitive development, and temperament) may explain why Caden displayed a decline in use of active emotion management strategies instead of an increase on the *Toy Removal* task, why most participants exhibited negative emotionality on the *Disappointing Gift* task, or why Ava and Ethan selected fewer appropriate anger management strategies than at baseline. For example, perhaps Caden's young age, or lack of maturity, contributed to these outcomes. The patterns of participants' active emotion strategy use, display of negative emotionality, appropriate selection of emotion management strategies, and teacher ratings of self-regulation and socioemotional competence suggest the suitability of conducting a thorough profile analysis as part of participant selection and the use of higher-dose targeted prevention rather than low-dose universal prevention in future research.

Theoretical Implications. With regard to the effect of *Second Step*, an SEL program, on the mindfulness and self-regulation of preschool students, most or all participants demonstrated a statistically non-significant decrease in mindfulness (focused attention) and in empathy, whereas they also exhibited a statistically non-significant increase in inhibitory control and in emotion management (substitutive play) on the individual behavioral tasks. Teacher ratings generally indicated that participants' overall self-regulation either remained within the same level of functioning or improved slightly. These results were somewhat consistent with teacher ratings of each participant's socioemotional competence, which improved across *Second Step* implementation.

These results may indicate that improvement in socioemotional competence and some areas of EF-EC come at a cost, particularly with regard to mindfulness (focused attention) and empathy (sharing). Specifically, while SEL skill instruction may target areas of the brain that support the development of certain subareas of self-regulation, it may do so less directly or with less intensity in other areas (Diamond & Lee, 2011).

An important area to consider with respect to mindfulness and self-regulation is development. Although mindfulness, EC, and EF share common processes, it is likely that many of these processes are emerging and have not yet integrated to enable full or optimal self-regulatory functioning by the end of preschool. In other words, skills like mindfulness (focused attention), inhibitory control, delay of gratification, empathy, and emotion management generally remain emerging skills by age five. For example, with regard to attention, young children during the preschool years exhibit greater ability to sustain and shift attention over time, which likely reflect the increased maturation of the anterior attention system and its control over the orienting attention system within the core parietal-frontal network (Garon et al., 2008). However, focused and shifting attention tend to be antagonistic processes in certain contexts during this time, likely because these two attentional processes have not yet fully organized within a common attentional system within the anterior attention system (Jones, Rothbart, & Posner, 2003).

Results of the current study may also suggest that SEL skill instruction can improve certain areas of hot and cold self-regulation (i.e., integrated EF-EC processes) that work together to enhance functioning in social settings, such as inhibiting pre-potent responses (inhibitory control) and playing with another toy when the original toy is suddenly removed and placed out of reach (substitutive play / emotion management). These findings may also provide evidence of the coordination between EF and EC processes to elicit self-regulation. One may also speculate that SEL skills are somehow connected to socioemotional competence, as well as to the integrated EC-EF processes, based on the finding that socioemotional competence also improved during *Second Step* implementation in the current study. These connections should be elucidated in a separate study with a larger sample size. These results are consistent with findings from a previous study that found that SEL skills and self-regulation independently predict socioemotional competence across early childhood and adolescence (McKown et al., 2009).

Research Question 3: Added Benefit of *MindUp*

The current study also examined whether selected *MindUp* lessons would provide additional benefits beyond what *Second Step Early Learning Program* offered to preschool students. Although no studies have yet investigated the added value of mindfulness-based intervention above the benefits provided by SEL curricula, it was expected that *MindUp* would provide added value beyond the benefits of *Second Step*. However, *MindUp* did not lead to expected improvements across these areas, as significant positive effects were not replicated across at least 3 target participants.

Mindfulness. Contrary to the hypothesis, implementation of *MindUp* did not result in a significant positive effect across at least 3 target participants' mindfulness. Instead, it led to a significant positive effect in mindfulness in only 1 target participant (Chloe) based on visual analyses of focused attention task performance and associated Tau-U effect sizes. Data showed that *MindUp* implementation led to non-significant moderate to large positive effects on the mindfulness of 4 target participants (Chung, Ava, Brody, and Ethan) and to a large negative effect on the mindfulness of the remaining target participant (Caden).

These findings confirmed the expectation that *MindUp* provides added benefit with respect to improved mindfulness for Chloe, although this effect was not replicated in 3 or more students to validate it (Kratochwill et al., 2013). Social validity may explain why *MindUp* had a significant positive effect on only Chloe. Defined as the significance, appropriateness, and importance of an intervention, social validity allows for participants to communicate with the researchers regarding whether (a) the behavioral goals of the intervention is actually desired, (b) the intervention or treatment procedures are acceptable to them, and (c) satisfaction with all results – including unexpected ones – is an outcome (Schwarz & Baer, 1991; Wolf, 1978). Chloe indicated her preference for *MindUp* over *Second Step* on the social validity task, particularly for the brain and its relationship to focused attention. In contrast, other participants did not demonstrate significant improvements in mindfulness. This could be attributed to a general lack of acceptability of the *MindUp* lessons. Chung, Ava, Brody, and Caden indicated preference for *Second Step* or a free choice activity, instead of *MindUp*, when provided with a menu of options on the social validity task following *MindUp*. Their indifference for *MindUp* was also communicated through inattention or disengagement from mini-lessons and through disinterest displayed in the analogue task during several probe sessions. These behaviors are relevant in the context of the current study because behavior change usually occurs when direct consumers communicate their enthusiasm, or tolerability, for the intervention and associated tasks (Hanley, 2010).

Lack of clear, significant positive effect on Caden and Ethan's mindfulness may reflect their limited dosage to the selected lessons. Dosage, which refers to the number of intervention sessions attended by participants and the duration of session attendance, has been shown to affect participant outcomes linearly. The more often participants attend sessions and the longer duration their attendance, the more likely they are to demonstrate improvement in targeted outcomes (e.g., Reynolds et al., 2014; Lee et al., 2006; Roth et al., 2010). As part-time students, Ethan and Caden attended up to 20% (2 of 10) of the lessons that targeted mindfulness, thereby decreasing the likelihood of benefitting from mindfulness instruction.

As discussed earlier, the lack of a clear significant positive effect on target participants' mindfulness may reflect the mismatch between instructional content and performance expectations on the behavior tasks. In addition to the nonexistence of instruments that measure mindfulness in children below fourth grade, it is possible that the selected task possessed limited validity and reliability in its measurement of mindfulness as discussed earlier. Although the task focused on target participants' ability to exercise their ability to focus attention and act with intention, the current study's definition of mindfulness included the ability for a child to remain friendly and nonjudgmental, in addition to the ability to focus attention and exercise control impulses. As such, it is likely that the *Focused Attention* task was an incomplete measure of mindfulness.

Inhibitory Control. Contrary to the hypothesis, implementation of *MindUp* did not result in a significant positive effect across at least 3 target participants' inhibitory control. Rather, it led to a significant positive effect on only 1 target participant's (Ava) inhibitory control based on visual analyses of *Pencil Tap* task performance and the associated Tau-U effect size. Although data showed an increased level of inhibitory control for Chung, Brody, and Caden, these gains were not statistically significant. In contrast, *MindUp* had no effect on Chloe and Ethan's inhibitory control. Results from *HTKS* did not align with *Pencil Tap* performance, as Chloe made a large improvement in her *HTKS* performance (while maintaining 100% *Pencil Tap* scores), whereas Ava maintained a 0% score (despite showing improvements in her *Pencil Tap* scores). The other participants displayed similar or worse inhibitory control based on their *HTKS* scores.

The non-significant positive effect of *MindUp* on 5 of 6 target participants' inhibitory control may reflect the lack of formal measurement of criterion-level performance for this particular skill area. Given the high ratio of classroom students to the primary examiner, along with a lack of availability of research assistants to assist in this measurement during most school days, it was impossible for the examiner to quantitatively measure each student's inhibitory control performance during practice opportunities associated with instruction to determine when to introduce the probe sessions. As such, it may be that the primary examiner prematurely assessed this emerging skill before the target participants reached a certain level of competence.

Although *MindUp* only had a statistically significant positive effect on Ava's inhibitory control, it is promising that 4 participants altogether earned higher scores in inhibitory control following *MindUp* delivery. Perhaps student engagement in mindfulness, particularly as it applied to their senses (e.g., sight and movement), fostered self-regulation by encouraging them to control their impulses upon non-judgmentally recognizing novel features and bodily sensations. It is also possible that their daily participation in a variety of games that required use of executive skills (e.g., *Simon Says*; *Red Light, Purple Light*; *The Freeze Game*; Tominey & McClelland, 2011), in addition to continued review on brain function, resulted in observed improvements in inhibitory control (Dowsett & Livesey, 1999).

In contrast to the observed gains made by their peers on *Pencil Tap*, Chloe and Ethan made no such noticeable improvements. The lack of progress in Chloe's performance indicates a ceiling effect, such that the *Pencil Tap* was not sufficiently difficult to measure Chloe's true inhibitory control ability and assess improvement in this area as a result of *MindUp*. *MindUp*'s lack of effect on Ethan's inhibitory control likely suggests wide variability in task performance prior to implementation (range, 31% to 100%), even though it stabilized to an average of 81% following intervention. Anecdotally, this diverse performance may have reflected Ethan's variable emotionality and emotional regulation skills during probe sessions (Carlson & Wang, 2005; Eisenberg et al., 1994).

Additionally, the discrepancy in performance on *Pencil Tap* and *HTKS* likely relates to the constructs for which each measure assessed. While *Pencil Tap* is a true measure of inhibitory control (Rhoades et al., 2009), *HTKS* assesses more EF subtypes (inhibitory control, working memory, and attention; Tominey & McClelland, 2011). Perhaps Ava's performance on *Pencil Tap* reflected her true ability to inhibit control. It is possible that her performance on *HTKS* reflected continued difficulty in working memory and attention, which masked her improvements in inhibitory control. In contrast, it is likely that the discrepancy between Chloe's *Pencil Tap* and *HTKS* performance reflected improving working memory and attention skills, while maintaining her strong ability to inhibit impulses.

Delay of Gratification. Contrary to the hypothesis, implementation of *MindUp* did not result in a significant positive effect across target participants' delay of gratification. Instead, it resulted in a lack of significant effect, either negligible or negative, on 5 target participants' delay of gratification. Data showed that *MindUp* had a significant positive effect on only 1 target participant's (Ethan) delay of gratification based on visual analyses of *Snack Delay* task performance and associated Tau-U effect sizes.

The negative effect or lack of effect of *MindUp* on 5 of 6 participants may reflect the mismatch between the selected lessons and expectations for children's delay of gratification performance. Specifically, the participants were not explicitly taught strategies to generate their own distractions to wait long enough for the Oreo cookie or sticker, especially in light of the fact that the reward was exposed under a clear plastic cup as part of *Snack Delay*. It has been shown that 4-year-old preschool children are able to wait an average of 11 minutes with an exposed reward, but this waiting time decreased by nearly half when the reward was revealed (Mischel, Shoda, & Rodriguez, 1989). Nevertheless, research suggests that explicit instruction, such as teaching students specific strategies to delay their gratification, and providing practice opportunities can help young children acquire and gain proficiency in new skills (Dowsett & Livesey, 2000; Payton et al., 2008; Weare & Nind, 2011). As such, it is possible that the *Snack Delay* task had limited content validity in the measurement of delay of gratification in the current study, as the method used to assess target participants' skills did not closely parallel instruction or expectations.

Half of the participants earned the same or similar delay of gratification scores following *MindUp* instruction. Chloe and Chung's lack of observable improvement reflected a ceiling effect, such that both consistently performed at 100% on the *Snack Delay* across probe sessions. As previously discussed, this situation suggests that the *Snack Delay* was too easy for both participants, preventing appropriate measurement of their true ability to delay gratification and to assess for meaningful progress following *MindUp* implementation. Brody displayed a very small improvement in this area. Like Ethan's *Pencil Tap* performance, Brody exhibited diverse *Snack*

Delay performance before and after *MindUp* delivery, which were in opposite directions with the same average score (67%). As Brody usually asked to complete the *Snack Delay* task, his performance trend may indicate that delay of gratification was an emerging skill during this period. As previously noted, the Piagetian view of cognitive develop suggests that children who are learning new skills tend to display non-linear progress (Miller, 2002).

Ava and Caden's observable decrease in delay of gratification may be attributed to negative affect. Though usually willing to participate in *Snack Delay* across *MindUp* probe sessions, Caden displayed a mix of playful and oppositional behavior, along with behavior and facial expression that indicated disappointment or sadness. It was clear that Caden understood the task directions, yet he increasingly broke the rules purposely over time, which made him appear progressively less able to delay gratification than he could in reality. While Ava did not purposely break *Snack Delay* rules, she appeared sad or disinterested when presented with the task at least during two probe sessions. Nevertheless, she continued to exhibit high levels of delay of gratification (above 90% on average), with multiple instances of 100% performance on *Snack Delay*. Research suggests that negative emotions correlate with poor performance on both lab and real-world delay of gratification situations (Luerrsen & Ayduck, 2014). For example, empirical research found that 3- to 5-year-old children were more likely to select an immediate, mediocre reward over a delayed, desired one in negative affect conditions than were children who were in the neutral or positive affect conditions (Moore, Clyburn, & Underwood, 1976).

Ethan's statistically significant improvement in delay of gratification may, in part, be due to his anecdotal change in affect, from negative to positive emotionality during *MindUp* probe sessions. During the beginning of behavioral task administration, Ethan often exhibited anger, irritability, or boredom, and would later demonstrate playfulness and excitement toward the middle of the sessions. Affect can influence performance on delay of gratification scenarios (Luerrsen & Ayduck, 2014).Whereas evidence suggests that negative affect is linked to poorer performance on delay of gratification tasks, positive affect has been shown to improve, or prevent decline in, performance and overall self-regulation (Luerssen & Ayduck, 2014). Furthermore, Luerssen and Ayduck (2014) suggest that positive affect likely facilitates improved delay of gratification because individuals in this particular state have increased attentional focus, which may help them to wait for desired, delayed rewards. In addition, evidence points to the possibility that positive affect may alleviate the detrimental effect that negative affect has on delay of gratification. It is also thought to provide individuals with affirmation that they are safe and relaxed, which may result in more willingness to transcend immediate gratification in favor of a delayed, desired reward.

Although data were not collected on motivational variables, one may speculate that another factor that may explain Ethan's improved delay of gratification involved his motivation to engage in tasks during *MindUp* probe sessions. Perhaps his need for a sense of autonomy and competence (Ryan & Deci, 2000) was satisfied prior to probe sessions and his display of enthusiasm (positive attitude toward school and high task engagement) (Galejs, Klink, & Hegland, 1987) and pride (Berhenke, 2013) may have played roles in more self-regulated control and goal-directed behavior.

Empathy. Contrary to the hypothesis, *MindUp* did not result in statistically significant positive effect on at least 3 target participants. Rather, it led to a statistically significant or near-significant negative effect on the empathy of 3 target participants (Chloe, Brody, and Ethan) based on visual analyses of the *Sharing* task performance and associated Tau-U effect sizes. Ava and Caden also displayed lower empathy, but these changes were not statistically significant.

Although Chung demonstrated moderate improvement, it was also not statistically significant. Teacher ratings on how regularly each child shared with peers following *MindUp* (i.e., post-test) indicated that all participants shared frequently, which suggested improvement in Ethan and Caden's sharing frequency from occasional occurrences to those that happened more often.

The single-case findings in the area of empathy may reflect implementation issues in the current study. As opposed to research that found significant positive effects of mindfulness-based curricula on empathy and prosocial behavior (e.g., sharing) among preschool and school-aged children (Schonert-Reichl et al., 2015; Flook et al., 2015), the current study failed to find such effects in this area. Schonert-Reichl and colleagues (2015), who found statistically significant improvements on fourth- and fifth-graders' empathy as a result of *MindUp* implementation, noted that cumulative implementation and regular rehearsal of specific practices over several units (e.g., three-times daily mindfulness practices, practicing optimism, and performing acts of kindness) likely contributed to the positive outcomes. Their hypotheses suggest that the current study's modular approach specific to *MindUp* (i.e., delivery of select *MindUp* lessons instead of all lessons; Chorpita, Becker, & Daleidon, 2007) to target participants' empathy may have been inappropriate. This may be because pre-existing literature has only shown positive effects in clinical group samples, rather than in individual, typically-developing children with no formal diagnoses and diverse needs (Chorpita et al., 2007).

Furthermore, delivery of only select *MindUp* lessons prevented students from cumulatively building skills over time, which limited their exposure to instruction and practice opportunities for skills that promote nonjudgement, compassion, and optimism, three key focus areas in *MindUp* (The Hawn Foundation, 2011). For example, students were not taught the daily mindfulness practices recommended by *MindUp*, which prevented them from experiencing potential benefits of doing so as part of their routine. Instruction and practice of daily mindfulness may have been necessary prior to teaching students to become focused because doing so can engage students in the lessons through their experiences of mindfulness. Also, although participants were taught to express gratitude and perform acts of kindness, these lessons were done so without having first taught preliminary skills (e.g.., choosing optimism and appreciating happy experiences); doing so would have provided participants with a better understanding of why gratitude and acts of kindness matter in everyday life. It would have also facilitated deeper learning of these areas through practice opportunities.

Despite *MindUp*'s negative effects on most participants' empathy, Chung, Ethan, and Caden demonstrated improvements. It is important to remember that individual children's responses to interventions are unique, even if most participants responded negatively. Perhaps the exposure to empathy instruction and practice feedback that Chung received was enough to increase his level of empathy. While the behavioral measure indicated their decline in empathy scores, Ethan and Caden's empathy improved based on teacher ratings. This discrepancy suggests differences between different settings, as the teacher may have noticed changes in behavior classroom environmental factors that were missed in a decontextualized lab setting.

Emotion Management. Contrary to the hypothesis, *MindUp* resulted in negative effects in active emotion management strategies (e.g., substitutive play) for nearly all participants (except Ethan) based on visual analyses of *Toy Removal* task performance and associated Tau-U effect sizes. The changes noted in all children were not statistically significant. Participants' performances on *Disappointing Gift* and *Puppet* tasks generally revealed at least slight decreases in their displays of negative feelings and maintenance or improvement in appropriate selection of anger management strategies. Individually, teacher ratings indicated that most children maintained at least typical functioning or improved to this level in their ability to handle frustration and negative emotion effectively. While Chloe and Ava demonstrated at-risk functioning, these remained areas of need for both Caden and Ethan following *MindUp* implementation. Group-wise, teacher ratings indicated that students showed less self-regulation and more behavioral concerns, though they continued to function within the typical range within each area. These changes were considered statistically insignificant. However, these ratings do not align with teacher-rated socioemotional competence. At the beginning of *MindUp* implementation, all target participants displayed much less socioemotional competence; most became at-risk or were already showing difficulty in their functioning. After *MindUp* implementation, Brody, Chloe, and Ethan improved, nearing functioning at a higher level (at-risk or typical range); Chung and Caden's socioemotional competence worsened, such that it became even more of an area of need.

Similar to a prior investigation of *MindUp* (Schonert-Reichl et al., 2015), findings from the current study revealed mixed findings based on multiple assessment methods of emotion management and socioemotional competence. The observed changes based on the *Toy Removal* task measured how each child would respond in a decontextualized setting. After having completed multiple rounds of this particular task, it is possible that the decrease in substitutive play reflected participants' knowledge that they would receive the opportunity to play with the toy after it was taken away. This observation aligns with participants' lower instances of support seeking, another active emotion management strategy.

Alternatively, mixed findings may suggest the need to intensify the intervention, as universal prevention in a class-wide setting provides limited support for students who may require targeted intervention. Although Flook and colleagues (2015) concluded that a universal preventive approach in mindfulness-based programming showed promise in improving preschoolers' self-regulation, their investigation was based on children who had no noted areas of difficulty. On the other hand, the current study recruited students whose teacher or parent indicated specific areas of concern, such as emotion management.

Despite observations based on *Toy Removal*, it is promising that participants generally exhibited fewer negative emotions and chose appropriate anger management strategies on two additional tasks. Although no statistical or visual analyses were conducted on the latter observations, one may speculate the existence of a possible relationship between *MindUp* and participants' greater ability to regulate displays of negative emotionality and to understand socially appropriate ways to manage it (Cole et al., 2008; Sala, Pons, & Molina, 2014). These observations are consistent with findings from previous group-based examinations of mindfulness-based programming (Flook et al., 2015; Schonert-Reichl et al., 2015).

With regard to teacher ratings of socioemotional competence, it is likely that the content of the first two selected *MindUp* lessons did not benefit students near the beginning of *MindUp* implementation. Although *MindUp* supports the development of socioemotional competence by targeting nonjudgmental attention, compassion, and optimism (The Hawn Foundation, 2011), the first two lessons focused instruction and practice opportunities on parts of the brain and how they contribute to focused attention. Children were not provided chances to exercise socioemotional skills they had learned in *Second Step*, as the primary focus of the current study was to examine the added value of *MindUp* on different self-regulation components in individual students.

However, near the end of *MindUp* delivery, during the period in which the primary researcher taught students emotion management skills as part of the lesson on gratitude expression (e.g., cognitive reappraisal, deep breaths), Chloe, Brody, and Ethan received better teacher ratings of socioemotional competence, while Chung, Ava, and Caden received lower ratings. In the other *MindUp* investigation (Schonert-Reichl et al., 2015), elementary school students who received *MindUp* instruction also reported more gains in emotion management skills than those in the control group. Schonert-Reichl and colleagues (2015) suggest that the content helped students develop such skills. While this is a reasonable explanation, 50% of the target participants in the current study also earned decreased emotion management scores over time. An alternative explanation and one that is speculative, as it was not feasible to conduct statistical analyses between *HTKS* and socioemotional competence scores with a small sample size, is that EF skills required to do well on *HTKS* (inhibitory control, working memory, and attentional focus) relate to teacher ratings of socioemotional competence. Except for Ethan, this explanation seems plausible, as it aligns with performances by all target participants. Chloe and Brody scored above 75% on *HTKS*, while Chung, Ava, and Caden scored below 40% on *HTKS* following *MindUp* instruction. Research suggests that EF skills, such as inhibitory control, working memory, and attention, play direct and indirect roles in socioemotional functioning (Riggs et al., 2006; Rhoades, Greenberg, & Domotrovich, 2009; Carlson & Wang, 2005). Ethan's improvement is likely due to factors unrelated to *MindUp* instruction, as he only attended up to 10% of the lessons. No data related to environmental variables were collected, yet speculation includes parenting socialization as a possible contributor (Eisenberg, Cumberland, & Spinrad, 2009).

Theoretical Implications. Data from the current study showed that *MindUp* generally did not have a significant positive effect across mindfulness and self-regulation in the preschool participants. Nevertheless, most target participants scored higher in mindfulness (focused attention) and in inhibitory control, but lower in empathy (sharing) and emotion management (substitutive play) on the individual behavior tasks; performances on the delay of gratification task varied. Teacher ratings generally indicated that participants' self-regulation improved, but that their socioemotional competence deteriorated over the period of mindfulness instruction.

Taken together, these results suggest that mindfulness instruction may target cognitive processes involved with attention, in addition to various aspects of effortful control (EC) and executive function (EF), as these processes work together to elicit self-regulation. However, this type of instruction did not lead to improvements in teacher-rated socioemotional competence, which suggests that the network of identified skills (e.g., self-management/regulation, self-awareness, and relationship skills) may not be integrated enough to elicit qualitative changes in response to mindfulness lessons. Perhaps mindfulness instruction targets one or two processes independently within the SEL skill network, but not altogether. It is also possible that these results highlight a more distant or nonexistent relationship between self-regulation and socioemotional competence, as mindfulness, an intervention used to enhance self-regulation, led to a decline in socioemotional competence. Perhaps the targeting of mindfulness and self-regulation only addressed one or two processes that comprise the SEL skill network at the expense of the rest of the other interconnected processes. Given these findings, future research should examine the relationship between EC, EF, SEL, and socioemotional competence in a larger sample of young children, as a dearth of evidence currently exists to elucidate how these processes work together.

As discussed above, findings from the current study generally illustrate the bidirectional, integrative relationship between EF and EC in preschool children who are in the midst of major cognitive developmental changes (Carlson & Wang, 2005; Garon et al., 2008; Blair & Dennis, 2011). From a developmental perspective, Piaget suggested that, despite no apparent improvement in behavior or functioning within a specific time frame, young children who are acquiring new skills continue to make progress in a non-linear manner (Miller, 2002). The 4-month period, during which target participants learned to enhance self-regulation through socioemotional competence and mindfulness, contained data points indicating both their decline and growth, which is consistent with Piaget's research.

From a cognitive perspective, it is likely that a U-shaped, quadratic relationship exists between certain EF and EC processes, which may clarify the differences in results between EF (e.g., inhibitory control) and EC (e.g., empathy and emotion management) processes from the current study. For example, this type of relationship exists between inhibitory control and emotion management, such that intermediate scores of inhibitory control (rather than low or high scores) correlate with the highest levels of emotion management (Carlson & Wang, 2005; Eisenberg & Fabes, 1992). Carlson and Wang (2005) proposed that preschool students who demonstrated the highest levels of inhibitory control were possibly over-controlled, a trait that may benefit cognitively-oriented problem solving performance, but possibly impairs performance in motivationally important circumstances because of increased anxiety or dampened emotions. In contrast, children with the lowest levels of inhibitory control were the most under-controlled. This interpretation aligns with the finding that inhibitory control significantly predicts socioemotional competence, particularly social skills and internalizing problems, in 4- and 5-year-old children (Rhoades et al., 2009).

Exposure and Dosage

The current study investigated whether exposure to and dosage of *Second Step Learning Program* and supplemental *MindUp* lessons would relate to the degree to which preschool students demonstrated mindfulness and self-regulation. It was expected that SEL and mindfulness instruction delivered briefly every day would influence the extent to which mindfulness and self-regulation skills develop in preschool students and that full-time students would be more likely to show a greater level of improvement in these skills than their part-time peers.

Contrary to the hypothesis, no differences in the level of significant improvement on mindfulness and self-regulation by attendance emerged from receiving *MindUp*, in combination with and separately from *Second Step*, based on visual analysis and Tau-U effect sizes. Full-time participants were not found to demonstrate more progress in mindfulness and self-regulation than part-time participants.

This finding is somewhat surprising, given that greater dosage and exposure (e.g., number of delivered intervention sessions, duration of each session, the length of the entire intervention, number of sessions attended, and duration of participant engagement in sessions) to diverse interventions have been found to relate to a variety of improved outcomes in the pre-existing literature (e.g., Dane & Schneider, 1998; Durlak & Dupre, 2008; Zenner et al., 2014; Luczynski & Hanley, 2013; Gottfredson et al., 1993). These findings have been drawn from studies that have evaluated different types of interventions, such as school-based mindfulness and social and behavioral programs.

It is possible that the low intensity nature of the delivered lessons, in addition to lack of implementation as intended, prevented individuals who attended most or all sessions (i.e., full-time students) from reaping the full benefits. Because *MindUp* and *Second Step* are designed primarily to promote self-regulation and mindfulness at a Tier 1 level, rather than at a Tier 2 or Tier 3 level, and that the nature of each program is cumulative, it is unsurprising that part-time students who only attended one session at most per week did not exhibit improvements.

However, it also may be likely that full-time students required more intense intervention that occurred for the full recommended amount of time to demonstrate beneficial effects.

Limitations

The current study is one of the few investigations that specifically examined the added value of mindfulness-based programming beyond SEL curricula. Other contributions of this investigation to the evidence base included its exploration of combining select lessons from different interventions to target mindfulness and self-regulation skills; its use of a combination of single-case experimental and pre-post group designs to investigate intervention effects on individual and groups of children; its use of behavior tasks and parent-teacher rating scales to monitor student progress; and its evaluation of treatment acceptability by the teachers and single-case participants.

Despite these contributions, the current study contained multiple limitations that may affect interpretation of the results. First, flaws existed in relation to the delivery of the combination group and single-case research design, primarily due to time constraints and lack of parent consent to video or audio record child behaviors. With regard to the group design, only students (n = 12) from one preschool classroom were used in the class-wide investigation of *Second Step* and *MindUp* effectiveness. A lack of random assignment to a control group prevented the primary researcher from making causal inferences regarding intervention effectiveness at the class-wide level. In addition, only half of the students in the preschool classroom, including the target participants, took part in the group study.

With regard to the multiple-probe across behavior design, 3 data points – the minimum number to meet design standards (Kratochwill et al., 2013) – were collected during pre-intervention, probe, and maintenance phases to assess the effectiveness of *Second Step* and

MindUp. This number of data points was determined a priori, based on the assumption that all measured behaviors would likely improve after training and that they would produce stable behavioral patterns across phases (Horner & Baer, 1978). However, the collection of 3 data points, particularly to evaluate pre-intervention level of functioning for delay of gratification and inhibitory control, was not enough to establish baseline stability in level or trend prior to the introduction of either intervention across the participants. Although the study included more than 3 attempts to demonstrate *MindUp* effectiveness at different time points, there was also high variability within at least one probe phase across all target participants. The inconsistent behavioral patterns in these phases made it difficult to draw causal conclusions about intervention effectiveness for each child (Kratochwill et al., 2013). In relation to data collection, it is possible that the intermittent nature of multiple-probe across behavior design may have led to undetected changes in responding within or across particular behaviors being measured (Gast & Ledford, 2014). Another area of weakness in relation to the delivery of multiple-probe across behavior design in this study was the lack of formal measurement of criterion-level performance to introduce specific *MindUp* lesson sets to target behaviors (Gast & Ledford, 2014). Although each target participant received opportunities to practice skills in a class-wide setting for two weeks prior to each *MindUp* probe phase, score recording their performance by paper was not feasible with a 1:19 researcher to student ratio per practice session. The inability to record each participant's performance during these practice sessions led the primary researcher to base introduction of *MindUp* lesson sets and probe phases on qualitative estimates of meeting the criterion level by behavior. As such, it is possible that the intervention and probe phases were introduced prematurely, leading to inaccuracies related to behavioral patterns before and after intervention implementation and, ultimately, to erroneous conclusions drawn regarding intervention effectiveness.

Second, related to the use of single cases, in combination with a small group sample, the issue of external validity limited generalizability of the current study's findings across individuals and across different contexts. As reported in Chapter 4 (Results), each target participant in the single-case portion responded uniquely to *Second Step* and *MindUp* with regards to mindfulness and self-regulation skills. Furthermore, a small sample (n = 12) in the selected preschool classroom (just under the recommended G*Power n = 14 to maintain 95 % power with a 1.2 effect size) participated in the group portion. It is also possible that selection bias, in which characteristics of parents who provided consent for their children to participate in the single-case and group portions of the study were different from those who chose not to participate. For example, parents with a greater level community mindedness, who have a higher level of trust for strangers, perceive the intervention to be low-risk and resulting in greater benefit to their children, and possess more open attitudes to privacy may have been more likely to provide consent for their children to participate in the study (Baghal, 2016; Sala, Burton, & Knies, 2012; Hoberman et al., 2013). Likewise, the majority of children who chose to participate attended preschool full time and had received at least 1 year of childcare by the intervention start date. Furthermore, the classroom of students was generally high functioning (i.e., within the typical range for mindfulness and self-regulation) relative to students who typically require intensive treatment (i.e., Tier 3 support).

Third, the behavioral analogue tasks intended to capture each target participant's level of mindfulness and self-regulation may have elicited inconsistent responses across probe sessions. Specifically, it is possible that the reliability of certain measures may have been compromised by a number of factors, including lack of task novelty over time, familiarity with the primary researcher, individual-level variables (e.g., negative or positive affect, temperament, and level of maturity), and environmental variables (e.g., no breakfast, frequency of school attendance, and siblings' Spring Break) at the time of these assessments (Gast & Ledford, 2014). In addition, two of three emotion management tasks (*Disappointing Gift* and *Toy Removal*) had consistently sub-80% inter-observer agreement (IOA), or below the minimum acceptable values (Kratochwill et al., 2013), across the primary researcher and research assistants. Despite multiple training sessions, the low IOA was likely due to the necessity to code behavior in vivo due to lack of parental consent to video record participants. Multiple observed behaviors were considered to be ambiguous across observers during live coding and required a review of the recorded behavior to confirm the coding.

Fourth, the behavioral tasks and parent-teacher rating scales may not have assessed the same skills, which could have led to alternative conclusions. Toplak, West, and Stanovich (2013) suggested that behavioral tasks and rating scales of self-regulation "tap different cognitive levels" (p. 137), such that the former measures efficiency of cognitive processing, whereas the latter provides information on rational goal pursuit. As such, it is possible that one or both interventions cultivated mindfulness and self-regulation, but children demonstrated these skills more so in one setting than in another (e.g., home versus school). Alternatively, perhaps participants were able to demonstrate several areas of self-regulation more effectively with behavioral tasks administered under artificial conditions, but not in their daily living situations (Blair et al., 2015).

Fifth, it is possible that response bias on survey measures was present. A number of factors could account for this possibility. Although surveys asked the teacher and parents to complete the forms based on behaviors demonstrated over a set period of time (e.g., past 4 weeks for *DECA-P2*), perhaps each child was rated based on the most recent or most salient behavior displayed. In addition, it is known that raters generally hold different standards and ideas about typical and extraordinary behavior across settings and over time (Renk & Phares, 2004), in part, due to the fact that each individual observes and uniquely processes events and behaviors (Dobbs & Arnold, 2009). This idea extends to parent and teacher raters. For example, within the school setting, it is likely that the teacher held higher expectations of her students' behavior as the school year progressed, even if the child's behavior remained the same over time. This increased expectation could have led to similar or lower teacher ratings at post-test. Furthermore, ratings could have been influenced by the mood and mental health of the parent or teacher rater (Pas & Bradshaw, 2014; Webster-Stratton & Hammond, 1988).

Sixth, and related to the fifth point, ratings were subject to flaws, such that ratings were provided by two different caregivers before and after the study. For example, Chung's father provided his ratings at pre-test, but Chung's mother provided her ratings at post-test. Ratings completed by Chung's father at pre-test and by Chung's mother at post-test likely provide differences in the rating's reference. Ratings by a different caregiver at each time point make it difficult to draw conclusions about the child's improvement in self-regulation, as answered items are likely influenced by the quality of the parent-child relationship and the parent's perception of the child.

Seventh, neither intervention was implemented as intended by the developers. In other words, not all *Second Step* and *MindUp* lessons were delivered, nor were selected lessons implemented with the recommended daily dose. While 3 of 4 units of *Second Step* were implemented with at least 90% procedural fidelity, the primary researcher combined and delivered only the main lessons, such that two lessons were implemented per day for up to 10 minutes daily. The suggested extension activities were also not delivered in the classroom. Furthermore, only 6 of 15 *MindUp* lessons were implemented. Although taught in approximate order with at least 90% procedural fidelity, only 2 lessons in each of 3 units were selected to address mindfulness and self-regulation; the modular approach was used to address the targeted skills. As such, the delivered *MindUp* content did not provide students the opportunity to build on their skills as they did during *Second Step* implementation. In addition, each *MindUp* lesson was taught in half the recommended time. Instead of 2-week implementation per lesson, each lesson was implemented in 1 week. For children whose skills are still developing, it is ideal to allow them time daily over the school year to practice, review, and apply them in a classroom environment that integrates these competencies with their typical routines and schedule (Zins et al., 2007).

Eighth, and related to the seventh point, practical barriers in a community setting (e.g., preschool) impeded delivery as intended by the intervention developers and behavior data collection, which may have affected intervention outcomes. Implementation barriers included time constraints and scheduling difficulties, which prevented lessons from being consistently delivered at the same time daily; sometimes, intervention delivery was relegated at the end of the day, just prior to the afterschool time slot and child pick-up. Scheduling conflicts also resulted in inconsistent assistance throughout implementation and probe sessions, due to limited resources (e.g., limited teacher time, lack of substitute aide, and space availability for behavior tasks). The teacher's social validity data suggested that they viewed the interventions as enrichment, rather than as central to building primary or core skill areas. These practical barriers altogether suggested that the intervention did not seem to be a high priority for the classroom teachers.

Ninth, parents were not engaged in reinforcing SEL and mindfulness practices at home in this investigation. A strong research base suggests that home-school collaboration relates to positive educational student outcomes, such that it has become widely encouraged (e.g., National Association of School Psychologists, 2012). School-family partnerships have also been found to benefit children's socioemotional competence (Durlak et al., 2010). Although it has yet to be studied in the area of mindfulness, it is likely that home-school collaboration would also enhance children's self-regulation and executive functioning.

Future Research

In relation to the findings and limitations, researchers may wish to address a number of issues in future evaluations of interventions that target self-regulation in young children. First, future research should use single-case experimental designs to study intervention effectiveness in Tier 2 and Tier 3 students in the school context. Although class-wide delivery generally did not result in meaningful improvement, perhaps more targeted, intensive instruction in small groups of students with similar characteristics and behavioral concerns may reap significant benefit. In line with this, student profile analysis should be conducted as part of participant recruitment to match need with intervention dosage.

Second, researchers should investigate the effect of SEL and mindfulness-based curricula on young children's sustained attention and mindfulness in the future, given that a paucity of such examinations exists. More evidence is currently needed to determine whether mindfulness interventions improve preschoolers' mindfulness, particularly because few measures are able to validly and reliably assess it. Relatedly, a fundamental direction that would allow for this type of evaluation is to develop a valid and reliable measure of mindfulness for preschool-aged children.

Third, future research should examine the relationship between the integrated hot and cold self-regulatory processes and socioemotional competence during early childhood in a large sample of preschool students. Results from this study indicate that EC-EF and socioemotional competence are only distantly linked, perhaps during early childhood. Development is likely an important variable to investigate in relation to these processes, as those that are common to EC and EF are emerging and have not fully integrated during early childhood (Garon et al., 2008; Jones et al., 2003).

Fourth, future research should also measure young children's motivation (e.g., persistence) as it relates to improved self-regulation and mindfulness because these areas are strongly connected (Chang & Burns, 2005; Berhenke, 2013; Ryan & Deci, 2000). Hence, an understanding of whether a child with a certain level of intrinsic motivation would develop self-regulation skills more quickly or slowly could inform selection of intervention to match certain student characteristics.

Fifth, future studies should assess changes in the management of both positive and negative affect because emotion management does not only involve the modulation of negative emotions (e.g., anger and frustration). Including an evaluation of positive emotion management (e.g., excitement) would provide a more comprehensive understanding of this area of self-regulation.

Sixth, researchers should consider examining intervention effectiveness by dosage and exposure to the intervention. Although pre-existing literature has suggested that frequency of attendance and time period over which the intervention was implemented directly relate to improvement in a variety of skills across diverse populations, these findings conflict with those in the current study. Therefore, an examination of this particular topic in interventions that target self-regulation and mindfulness skills may be beneficial.

Seventh, future studies should formally involve parents in the intervention, such that home-school collaboration is established in promoting self-regulation and mindfulness. Overwhelming evidence suggests that parent involvement can improve children's socioemotional competence (e.g., NASP, 2012; Durlak et al., 2011). Based on this literature, it is likely that home-school partnership would also enhance children's self-regulation and mindfulness because instruction and reinforcement would occur in two different settings. Doing so may help children generalize their self-regulation skills across contexts and situations.

Implications for School Psychological Practice

The current study's findings are relevant for the delivery of school psychological services for children across grade levels, particularly for those in early childhood educational settings. Research on the short- and long-term implications of self-regulation suggests that this set of skills improves young children's school readiness (e.g., Blair, 2002) and predicts their educational, financial, and mental and physical health through adulthood (Moffitt et al., 2011). In light of the evidence, school psychologists are ethically obligated to promote children's skills in their effective management of thoughts, feelings, and behaviors through "[advocacy] for school policies and practices that are in the best interest of children" (Standard IV.1.2; NASP, 2010).

As indicated in the results of this study, selected *MindUp* lessons implemented class-wide generally did not benefit most single-case participants in their mindfulness and self-regulation skills. Though not initially examined, goal-directed behavior significantly improved across half of these children. Therefore, in selecting an intervention that would likely be effective in addressing these identified skill areas, school psychologists are advised to consider ecological factors (e.g., instruction; teacher-, classroom-, and family-level variables), child characteristics (e.g., age; interests; strengths and weaknesses related to modulation of thoughts, feelings, and behaviors), the mechanism to deliver the services (e.g., intensive, targeted, or universal), and the evidence base (Ysseldyke et al., 2006). It is also advisable that school psychologists work with teachers, families, and children to identify an intervention that they would find acceptable and feasible and sustainable, as these factors can affect the support for the intervention and its effectiveness with regard to instruction and assessment of skills (Wolf, 1978). Other variables to consider include alignment of the intervention with school philosophy, goals, programs, and policies, along with delivery of high-quality training and consultation strategies to allow for high implementation fidelity (Forman, Olin, Hoagwood, Crowe, & Saka, 2009). Furthermore, in their work with stakeholders, school psychologists should consider the match between the intervention's theoretical underpinnings and its instructional approach, along with implementation quality and progress monitoring tools. The results of this study specifically point to the need to deliver *MindUp* as intended, due to its theoretical focus on the mind-body connection, daily meditation practice, and the cumulative, comprehensive nature of the curriculum. Although *MindUp* was not found to provide significant benefit for most students beyond *Second Step*, it may be effective, provided that it is delivered with high integrity. To evaluate effectiveness, careful consideration should be made to select the type of measure that would allow for valid and reliable formative and summative assessment, as different types or methods of evaluation may likely measure dissimilar skills (Toplak et al., 2013).

Conclusion

The current study is the only examination, to date, to have investigated the effectiveness of the added value of a mindfulness-based program beyond SEL instruction using single-case experimental design. Although the findings demonstrate that individual children can reap the benefits from mindfulness practices beyond an SEL curriculum in certain subareas of self-regulation, these benefits did not generalize across participants in the current study. Results suggest that social validity and implementation matter. Overall, the current study shows that the combination of SEL and mindfulness-based programming did not lead to clear benefits in self-regulation and mindfulness across preschool students. Future research that considers the nuances and complexities of school-based implementation and single-case research should replicate and expand on the current study.

APPENDICES

APPENDIX A:
Research Participation Information and Parental Consent Form

The Effects of Socioemotional Learning and Mindfulness Strategies on the Self-Regulation of Preschool Students

Dear Parent/Guardian,

My name is Angela Chen and I am a doctoral candidate at Michigan State University in the School Psychology Program. I am collaborating with your child's school, Eastminster Child Development Center, to assist in studying the ***Second Step*** Early Learning Program and ***MindUp*** Curriculum. These programs will teach children strategies to manage behavior and feelings in classroom problem-solving. Students will receive daily whole-class instruction and practice activities designed to foster these skills. The school will be collecting data as part of their evaluation of the programs and I will be collecting additional data for my study. I am asking your permission for your child to participate in this study.

Your participation would involve: 1) completing a background questionnaire, 2) granting permission to obtain your child's self-management and socioemotional skills data collected by the school, 3) granting permission for your child to participate in individual ongoing study if your child is selected, and 4) granting permission to obtain your child's progress monitoring data collected by the teacher and me, should he or she be chosen for ongoing individual study.

First, you would be asked to complete a 1 page demographic survey at the beginning of the study. It takes about 5 minutes.

Second, I am asking for your permission to allow the school to share with me your child's data that it will be collecting to evaluate its use of the programs. The school will be asking parents and teachers to complete rating scales of socioemotional competence and behavior during the academic year. These surveys are: 1) the *DECA-P2* (*Deveroux Early Childhood Assessment for Preschool, Second Edition*) and 2) *CBQ* (*Children's Behavior Questionnaire*). The *DECA-P2* takes about 15 minutes and is a survey that asks parents and teachers to separately rate a child's social, emotional, and behavioral characteristics, such as initiative, self-control, attachment, and behavioral concerns. The *CBQ* takes 10 minutes and is a survey that asks parents and teachers to separately rate a child's ability to manage anger and frustration, as well as his or her level of attention, impulsivity, and self-control.

Third, we are asking permission for your child to participate in ongoing individual study if he or she is chosen. The purpose of ongoing individual study is to promote school readiness through progress monitoring. Four preschool students will be chosen to take part in it. You may choose to nominate your child for consideration to participate in this ongoing portion; he or she will be randomly chosen if more than 4 children are nominated.

Fourth, we are asking permission to access your child's progress monitoring data should he or she be chosen for ongoing individual study. If selected, your child will be observed, but not be video- or audiotaped, as he or she completes activities over the school year. Examples of activities that your child will be asked to complete include finding hidden pictures and working with puppets. In addition, your child's teacher will complete the *DESSA-mini* (*Deveroux Student Strengths Assessment Mini*). The *DESSA-mini* is a brief progress monitoring tool that the teacher uses to rate a child's socioemotional and behavioral skills 4 times during the school year.

This study has several potential benefits. This research can help young children develop socioemotional skills shown to support early success in school. The programs under investigation may help students transition into elementary school by providing them with skills to recognize and manage their behaviors and feelings, as well as to get along with others. In addition, this research allows for us to regularly progress monitor skill development among four students and to keep track of class-wide growth three times during the year.

There is minimal risk to you and your child from participating in the study. It primarily involves your time to complete the demographic survey. I would be happy to talk with you further should you have questions about your child's potential participation in the individual ongoing study.

Participants' identities will be kept confidential. All identifying information will be removed and no names will be used. Each student will be assigned an ID code. Students who are also chosen to participate in ongoing individual study will also receive pseudonyms. Data will be stored on password protected computers inside locked files. Your confidentiality will be protected to the maximum extent allowable by law. The results of the study will be shared with the school and will be available to you upon request. The final results will not contain any identifying information.

Your participation in this study is entirely voluntary. This means that you are free to choose whether or not you want to participate in the study, and you are free to withdraw your participation at any time without consequence. You may also refuse to answer certain questions without consequence. If you choose not to participate, this will not affect your child's school experience in any way.

PLEASE SIGN AND RETURN IN THE ENVELOPE PROVIDED.

If you are willing to participate, please sign and return this consent form to the envelope in the Zebra classroom labelled *SEL and Mindfulness Study* that will be placed by the parent sign-in table near the classroom entrance. Please keep a copy for your records.

If you have any questions or concerns about participating in this study, or if questions arise later, please feel free to contact me: Angela Chen (Michigan State University; CEPSE, chenang2@msu.edu), or my advisor: Dr. Evelyn Oka (Michigan State University; CEPSE, 439 Erickson Hall; East Lansing, MI, 48824; 517-432-9615; evoka@msu.edu).

If you have any questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this research study, you may contact, anonymously if you wish, Michigan State University Human Research

Protection Program at 517-355-2180, FAX 517-432-4503, or email irb@msu.edu, or regular mail at: 202 Olds Hall, MSU, East Lansing, MI 48824.

If I may be of further assistance, please do not hesitate to contact Dr. Oka or me.

Sincerely,

Angela Chen, M.P.H, M.A.
Doctoral Candidate, School Psychology
Department of Counseling, Educational Psychology, and Special Education
Michigan State University

Informed Consent

The Effects of Socioemotional Learning and Mindfulness Strategies on the Self-Regulation of Preschool Students

You indicate your voluntary agreement to participate in this study by signing below.

_______________________________________ _____________________________

Parent/Guardian **Signature** Date

PLEASE PRINT:

_______________________________________ **Circle One**: Mother Father Other

Parent/Guardian **Name**

_______________________________________ _____________________________

Child's Name Child's Birth Date

Would you like for your child to be considered for enrollment in ongoing individual study?
Please circle one:

Yes No

PLEASE SIGN AND RETURN THIS COPY IN THE ***SEL AND MINDFULNESS STUDY*** **ENVELOPE** AT THE SIGN-IN TABLE BY THE ZEBRA ROOM ENTRANCE. THE PROJECT STAFF OR I WILL PICK UP THE FORMS.

APPENDIX B:
Research Participation Information and Lead Teacher Consent Form

The Effects of Socioemotional Learning and Mindfulness Strategies on the Self-Regulation of Preschool Students

Dear [Name of Lead Teacher],

This year, your preschool classroom at Eastminster Child Development Center is using a combination of the ***Second Step*** Early Learning Program and ***MindUp*** curriculum to teach children self-management and social skills and give them practice in responding to challenging tasks and interpersonal situations. I will be delivering the lessons and evaluating the program in collaboration with you. Students will receive daily whole-class instruction and practice activities designed to teach strategies to manage behavior and feelings and to engage in mindful practice. I am inviting you to participate in research that studies whether these lessons help to promote school readiness.

Your participation would involve: 1) completing two 5-minute social validity rating forms (*BIRS* and *Social Validity Rating Scale*), 2) providing access to data from teacher- and parent-completed rating scales of students from whom parent consent have been obtained (*DECA-P2*, *CBQ*, and *DESSA-mini*), 3) teaching daily *Second Step* extension activities when appropriate or as time allows, and 4) teaching daily *Second Step* lessons while I am on leave in January 2017. In appreciation of your time and effort, you will be provided with 2 gift cards to a local bookstore: a $100 gift card at the end of *Second Step* and a $50 gift card at the end of *MindUp*.

This study has several potential benefits. This research can help young children develop socioemotional skills shown to support early success in school. It can also help to increase the use of research-based programs by understanding the challenges and benefits involved in implementation. You may benefit from this study by the findings that would be available to you should you choose to deliver *Second Step Early Learning Program* or *MindUp* in the future. These findings can also be used to identify students in need of additional support and keep track of skills development over the school year. There is minimal risk in participating in the study and primarily involves spending time completing the rating forms to evaluate the effectiveness and acceptability of these programs.

Participants' identities will be kept confidential. All identifying information will be removed. Each student will be assigned an ID code. Students who are also chosen to participate in ongoing individual study will receive pseudonyms in addition to an ID code. Data will be stored on password protected computers inside locked files. Your confidentiality will be protected to the maximum extent allowable by law. The results of the study will not contain any identifying information. They will be shared with the school and will be available to you upon request.

Your participation in this study is entirely voluntary. This means that you are free to choose whether or not you want to participate in the study, and you are free to withdraw your participation at any time without consequence. You may also refuse to answer certain questions without consequence. If you choose not to participate, this will not affect *Second Step* Early Learning Program or the *MindUp* Curriculum in any way.

PLEASE SIGN AND RETURN IN THE ENVELOPE PROVIDED.

If you are willing to participate, please sign and we will pick it up from you. Please keep a copy for your records.

If you have any questions or concerns about participating in this study, or if questions arise later, please feel free to contact me: Angela Chen (Michigan State University; CEPSE, chenang2@msu.edu), or my advisor: Dr. Evelyn Oka (Michigan State University; CEPSE, 439 Erickson Hall; East Lansing, MI, 48824; 517-432-9615; evoka@msu.edu).

If you have any questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this research study, you may contact, anonymously if you wish, Michigan State University Human Research Protection Program at 517-355-2180, FAX 517-432-4503, or email irb@msu.edu, or regular mail at: 202 Olds Hall, MSU, East Lansing, MI 48824.

If I may be of further assistance, please do not hesitate to contact Dr. Oka or me.

Sincerely,

Angela Chen, M.P.H, M.A.
Doctoral Candidate, School Psychology
Department of Counseling, Educational Psychology, and Special Education
Michigan State University

Informed Consent Form

The Effects of Socioemotional Learning and Mindfulness Strategies on the Self-Regulation of Preschool Students

You indicate your voluntary agreement to participate in this study by signing below.

______________________________	______________________________
Teacher Signature	Date

PLEASE PRINT

______________________________	______________________________
Teacher Name	Title

PLEASE SIGN AND RETURN THIS COPY IN THE ***SEL AND MINDFULNESS STUDY ENVELOPE*** AT THE PARENT SIGN-IN TABLE BY THE CLASSROOM ENTRANCE. THE PROJECT STAFF OR I WILL PICK UP THE FORMS.

Angela Chen, M.P.H., M.A. ~ Michigan State University ~ email.: chenang2@msu.edu

APPENDIX C:
Research Participation Information and Assistant Teacher Consent Form

The Effects of Socioemotional Learning and Mindfulness Strategies on the Self-Regulation of Preschool Students

Dear [Name of Assistant Teacher],

This year, your preschool classroom at Eastminster Child Development Center is using a combination of the ***Second Step*** Early Learning Program and ***MindUp*** curriculum to teach children self-management and social skills and give them practice in responding to challenging tasks and interpersonal situations. I will be delivering the lessons and evaluating the program in collaboration with you. Students will receive daily whole-class instruction and practice activities designed to teach strategies to manage behavior and feelings and to engage in mindful practice. I am inviting you to participate in research that studies whether these lessons help to promote school readiness.

Your participation would involve: 1) completing the 1-minute *DESSA-mini (Devereux Student Strengths Assessment-Mini)* for 4 selected students four times throughout the study and 2) providing access to data from these rating scales of students from whom parent consent have been obtained (*DESSA-mini*). In appreciation of your time and effort, you will be provided with a $25 gift card to a local bookstore at the end of the study.

This study has several potential benefits. This research can help young children develop socioemotional skills shown to support early success in school. It can also help to increase the use of research-based programs by understanding the challenges and benefits involved in implementation. You may benefit from this study by the findings that would be available to you should you choose to deliver *Second Step Early Learning Program* or *MindUp* in the future. These findings can also be used to identify students in need of additional support and keep track of skills development over the school year. There is minimal risk in participating in the study and primarily involves spending time completing the progress monitoring and social validity rating forms and participating in brief interviews on acceptability of these programs.

Participants' identities will be kept confidential. All identifying information will be removed. Each student will be assigned an ID code. Students who are also chosen to participate in ongoing individual study will receive pseudonyms in addition to an ID code. Data will be stored on password protected computers inside locked files. Your confidentiality will be protected to the maximum extent allowable by law. The results of the study will not contain any identifying information. They will be shared with the school and will be available to you upon request.

Your participation in this study is entirely voluntary. This means that you are free to choose whether or not you want to participate in the study, and you are free to withdraw your participation at any time without consequence. You may also refuse to answer certain questions without consequence. If you choose not to participate, this will not affect *Second Step* Early Learning Program or the *MindUp* Curriculum in any way.

PLEASE SIGN AND RETURN IN THE ENVELOPE PROVIDED.

If you are willing to participate, please sign and we will pick it up from you. Please keep a copy for your records.

If you have any questions or concerns about participating in this study, or if questions arise later, please feel free to contact me: Angela Chen (Michigan State University; CEPSE, chenang2@msu.edu), or my advisor: Dr. Evelyn Oka (Michigan State University; CEPSE, 439 Erickson Hall; East Lansing, MI, 48824; 517-432-9615; evoka@msu.edu).

If you have any questions or concerns about your role and rights as a research participant, would like to obtain information or offer input, or would like to register a complaint about this research study, you may contact, anonymously if you wish, Michigan State University Human Research Protection Program at 517-355-2180, FAX 517-432-4503, or email irb@msu.edu, or regular mail at: 202 Olds Hall, MSU, East Lansing, MI 48824.

If I may be of further assistance, please do not hesitate to contact Dr. Oka or me.

Sincerely,

Angela Chen, M.P.H, M.A.
Doctoral Candidate, School Psychology
Department of Counseling, Educational Psychology, and Special Education
Michigan State University

Informed Consent Form

The Effects of Socioemotional Learning and Mindfulness Strategies on the Self-Regulation of Preschool Students

You indicate your voluntary agreement to participate in this study by signing below.

______________________________________ ____________________________

Teacher Signature Date

PLEASE PRINT

______________________________________ ____________________________

Teacher Name Title

PLEASE SIGN AND RETURN THIS COPY IN THE ***SEL AND MINDFULNESS STUDY*** **ENVELOPE** AT THE PARENT SIGN-IN TABLE BY CLASSROOM ENTRANCE. THE PROJECT STAFF OR I WILL PICK UP THE FORMS.

Angela Chen, M.P.H., M.A. ~ Michigan State University ~ email.: chenang2@msu.edu

APPENDIX D:
Parent Background Survey

This form is to be completed by the parent or primary caregiver of the child. We want to learn more about you and your child. Please answer the following questions as honestly as possible.

Child's Name:________________________ School or Childcare Setting:_______________

Child's Gender: ☐ Female ☐ Male Child's Birth Date: __/__/__

Years in childcare:_____ Grade in school:_________

Person completing the survey:__________________________

Relationship to child:______________________

Person in the home that spends the most time taking care of your child:_____________________

Does your child have difficulty communicating or understanding speech? ☐ Yes ☐ No

Does your child currently receive special education services? ☐ Yes ☐ No

The research materials will be presented in English. Will you or your child have difficulty completing these tasks in English? ☐ Yes ☐ No

What activities does your child like to do? (e.g., drawing, sports, reading)

Is there anything that we should be aware of when working with your child?

Please answer the following questions if you feel comfortable doing so:

What is your race and/or ethnic origin? (check the descriptor(s) that best applies)

☐ American Indian or Alaskan Native
☐ Asian or Pacific Islander
☐ Black, not of Hispanic origin
☐ Hispanic
☐ White, not of Hispanic origin
☐ Multiracial (please specify above)
☐ Other (please specify:__________)

What is your highest level of education? (please check one)

☐ Some high school
☐ High school graduate
☐ Some college
☐ College graduate (e.g., B.A., B.S.)
☐ Graduate degree (e.g., M.A.)
☐ Professional degree (e.g., M.D., Ph.D., J.D.)

APPENDIX E:
Child Assent Verbal Script
(Adapted from Stevens, 2014)

Hi. My name is _____. I go to school. I'm trying to learn about how kids learn and play with their friends.

We are going to do many things together. You will help me find hidden pictures and play games with a pencil. We will also move our bodies and share stickers and snacks. We will even play with puppets. You will hear a story with puppets acting in it Then, I will ask you questions. You get to choose how to answer the questions. I won't tell other people how you answer the questions. By playing with me, you will help me learn about how you learn and play with your friends. You will even get a high-five, a sticker, or a snack from me after we are done playing together. Your mom/dad says it's okay for you to do this, but you can stop at any time. If you have any questions while we are playing with the puppets, you can ask me. If you have a question later that you don't think of now, you can ask *[your parents/teacher]*. Do you have any questions for me now? Would you like to start playing with me?

NOTES TO RESEARCHER: The child should answer "Yes" or "No." Only a definite "Yes" may be taken as assent to participate.

Name of Child: ___________________________ **Parental Permission on File:** ☐ Yes ☐ No
(If "No," do not proceed with assent or research procedures.)

Child's Voluntary Response to Participation: ☐ Yes ☐ No

Signature of Researcher: _____________________________ **Date:** __________________

APPENDIX F:
Children's Behavior Questionnaire – Short Form (*CBQ-SF*)

Participant No. __________

Today's Date ____________

Sex of Child ____________

Date of Child's Birth:

______ ______ ______
Month Day Year

Age of Child ______ ______
Years months

Instructions: Please read carefully before starting:

On the next pages you will see a set of statements that describe children's reactions to a number of situations. We would like you to tell us what the above named child's reaction is likely to be in those situations. There are of course no "correct" ways of reacting; children differ widely in their reactions, and it is these differences we are trying to learn about. Please read each statement and decide whether it is a "true" or "untrue" description of the child's reaction within the past six months. Use the following scale to indicate how well a statement describes the child:

Circle #	If the statement is:
1	extremely untrue of this child
2	quite untrue of this child
3	slightly untrue of this child
4	neither true nor false of this child
5	slightly true of this child
6	quite true of this child
7	extremely true of this child

If you cannot answer one of the items because you have never seen the child in that situation, for example, if the statement is about the child's reaction to your singing and you have never sung to the child, then circle NA (not applicable).

Please be sure to circle a number or NA for every item.

	Extremely **Un**true			Neither True Nor False			Extremely True
1. Gets angry when told s/he has to go to bed.	1	2	3	4	5	6	7
2. Usually rushes into an activity without thinking about it.	1	2	3	4	5	6	7
3. Has temper tantrums when s/he doesn't get what s/he wants.	1	2	3	4	5	6	7
4. When practicing an activity, has a hard time keeping her/his mind on it.	1	2	3	4	5	6	7
5. Will move from one task to another without completing any of them.	1	2	3	4	5	6	7
6. Often rushes into new situations.	1	2	3	4	5	6	7
7. Gets quite frustrated when prevented from doing something s/he wants to do.	1	2	3	4	5	6	7
8. Takes a long time in approaching new situations.	1	2	3	4	5	6	7
9. Can wait before entering into new activities if s/he is asked to.	1	2	3	4	5	6	7

	Extremely **Un**true			Neither True Nor False			Extremely True
10. Gets angry when s/he can't find something s/he wants to play with.	1	2	3	4	5	6	7
11. Is slow and unhurried in deciding what to do next.	1	2	3	4	5	6	7
12. Prepares for trips and outings by planning things s/he will need.	1	2	3	4	5	6	7
13. Tends to say the first thing that comes to mind, without stopping to think about it.	1	2	3	4	5	6	7
14. Has trouble sitting still when s/he is told to (at movies, church, etc.).	1	2	3	4	5	6	7
15. Rarely gets upset when told s/he has to go to bed.	1	2	3	4	5	6	7
16. When drawing or coloring in a book, shows strong concentration.	1	2	3	4	5	6	7
17. Is good at following instructions.	1	2	3	4	5	6	7
18. When building or putting something together, becomes very involved in what s/he is doing,	1	2	3	4	5	6	7

	Extremely **Un**true			Neither True Nor False			Extremely True
and works for long periods.							
19. Approaches places s/he has been told are dangerous slowly and cautiously.	1	2	3	4	5	6	7
20. Can easily stop an activity when s/he is told "no."	1	2	3	4	5	6	7
21. Is among the last children to try out a new activity.	1	2	3	4	5	6	7
22. Is easily distracted when listening to a story.	1	2	3	4	5	6	7
23. Gets angry when called in from play before s/he is ready to quit.	1	2	3	4	5	6	7
24. Sometimes becomes absorbed in a picture book and looks at it for a long time.	1	2	3	4	5	6	7

APPENDIX G:
Children's Behavior Questionnaire – Teacher Short Form (*CBQ-TSF*)

Participant No. __________

Today's Date ____________

Sex of Child ____________

Date of Child's Birth:

______ ______ ______
Month Day Year

Age of Child ______ ______
Years months

Instructions: Please read carefully before starting:

On the next pages you will see a set of statements that describe children's reactions to a number of situations. We would like you to tell us what the above named child's reaction is likely to be in those situations. There are of course no "correct" ways of reacting; children differ widely in their reactions, and it is these differences we are trying to learn about. Please read each statement and decide whether it is a "true" or "untrue" description of the child's reaction within the past six months. Use the following scale to indicate how well a statement describes the child:

Circle #	If the statement is:
1	extremely untrue of this child
2	quite untrue of this child
3	slightly untrue of this child
4	neither true nor false of this child
5	slightly true of this child
6	quite true of this child
7	extremely true of this child

If you cannot answer one of the items because you have never seen the child in that situation, for example, if the statement is about the child's reaction to your singing and you have never sung to the child, then circle NA (not applicable).

Please be sure to circle a number or NA for every item.

	Extremely **Un**true			Neither True Nor False			Extremely True
1. Gets angry when told s/he has to remain still during rest time.	1	2	3	4	5	6	7
2. Usually rushes into an activity without thinking about it.	1	2	3	4	5	6	7
3. Has temper tantrums when s/he doesn't get what s/he wants.	1	2	3	4	5	6	7
4. When practicing an activity, has a hard time keeping her/his mind on it.	1	2	3	4	5	6	7
5. Will move from one task to another without completing any of them.	1	2	3	4	5	6	7
6. Often rushes into new situations.	1	2	3	4	5	6	7
7. Gets quite frustrated when prevented from doing something s/he wants to do.	1	2	3	4	5	6	7
8. Takes a long time in approaching new situations.	1	2	3	4	5	6	7
9. Can wait before entering into new	1	2	3	4	5	6	7

	Extremely **Un**true			Neither True Nor False			Extremely True
activities if s/he is asked to.							
10. Gets angry when s/he can't find something s/he wants to play with.	1	2	3	4	5	6	7
11. Is slow and unhurried in deciding what to do next.	1	2	3	4	5	6	7
12. Plans for new activities or changes in routine to make sure s/he has what will be needed.	1	2	3	4	5	6	7
13. Tends to say the first thing that comes to mind, without stopping to think about it.	1	2	3	4	5	6	7
14. Has trouble sitting still when s/he is told to (story time, etc.).	1	2	3	4	5	6	7
15. Rarely gets upset when told s/he has to remain quiet during rest times.	1	2	3	4	5	6	7
16. When drawing or coloring in a book, shows	1	2	3	4	5	6	7

	Extremely **Un**true			Neither True Nor False			Extremely True
strong concentration.							
17. Is good at following instructions.	1	2	3	4	5	6	7
18. When building or putting something together, becomes very involved in what s/he is doing, and works for long periods.	1	2	3	4	5	6	7
19. Approaches places s/he thinks might be "risky" slowly and cautiously.	1	2	3	4	5	6	7
20. Can easily stop an activity when s/he is told "no."	1	2	3	4	5	6	7
21. Is among the last children to try out a new activity.	1	2	3	4	5	6	7
22. Is easily distracted when listening to a story.	1	2	3	4	5	6	7
23. Gets angry when called in from an activity or game before s/he is ready to quit.	1	2	3	4	5	6	7

	Extremely **Un**true			Neither True Nor False			Extremely True
24. Sometimes becomes absorbed in a picture book and looks at it for a long time.	1	2	3	4	5	6	7

APPENDIX H:
Social Validity Teacher Questionnaire

Please take a moment to complete the rating scale below and provide comments, which will help us to know a little bit about your thoughts about socioemotional learning (SEL) programs and mindfulness and their use with your students. Thank you!

	Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Comments**
1. Teaching (1) SEL skills or (2) SEL skills and mindful practices – and how to use them – will help my students **focus** better.	1	2	3	4	5	
2. Teaching (1) SEL skills or (2) SEL skills and mindful practices – and how to use them – will help my students **manage their behavior** better.	1	2	3	4	5	
3. Teaching (1) SEL skills or (2) SEL skills and mindful practices – and how to use them – will help my students **identify their feelings** better.	1	2	3	4	5	

4. Teaching (1) SEL skills or (2) SEL skills and mindful practices – and how to use them – will help my students **<u>manage</u> their emotions** better.	1	2	3	4	5	
5. Having students who demonstrate (1) socioemotional competence or (2) socioemotional competence and mindfulness will help me be a more efficient and effective teacher.	1	2	3	4	5	
6. Teaching and having my students learn from SEL programs like *Second Step Early Learning Program* and *MindUp* is something I would use in the future.	1	2	3	4	5	

Other questions:

1. What are your concerns about teaching your students SEL skills using a curriculum like *Second Step Early Learning Program*?

2. What are your concerns about teaching students a combination of SEL skills and mindful practices using a combination of the *Second Step Early Learning Program* and *MindUp* curricula?

3. What benefits do you see in teaching your students socioemotional skills and/or mindfulness?

APPENDIX I:
Behavior Intervention Rating Scale (*BIRS*)

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree
1. This would be an acceptable intervention for the child's problem behavior.	1	2	3	4	5
2. Most teachers would find this intervention appropriate for behavior problems in addition to the one described.	1	2	3	4	5
3. The intervention should prove effective in changing the child's problem behavior.	1	2	3	4	5
4. I would suggest the use of this intervention to other teachers.	1	2	3	4	5
5. The child's behavior problem is severe enough to warrant use of this intervention.	1	2	3	4	5
6. Most teachers would find this intervention suitable for the behavior problem described.	1	2	3	4	5
7. I would be willing to use this in the classroom setting.	1	2	3	4	5
8. The intervention would *not* result in negative side-effects for the child.	1	2	3	4	5
9. The intervention would be appropriate intervention for a variety of children.	1	2	3	4	5
10. The intervention is consistent with those I have used in classroom settings.	1	2	3	4	5
11. The intervention was a fair way to handle the child's problem behavior.	1	2	3	4	5
12. The intervention is reasonable for the behavior problem described.	1	2	3	4	5
13. I like the procedures used in the intervention.	1	2	3	4	5
14. This intervention was a good way to handle this child's behavior problem.	1	2	3	4	5
15. Overall, the intervention would be beneficial for the child.	1	2	3	4	5
16. The intervention would quickly improve the child's behavior.	1	2	3	4	5
17. The intervention would produce a lasting improvement in the child's behavior.	1	2	3	4	5
18. The intervention would improve the child's behavior to the point that it would not noticeably deviate from other classmates' behavior.	1	2	3	4	5
19. Soon after using the intervention, the teacher would notice a positive change in the problem behavior.	1	2	3	4	5
20. The child's behavior will remain at an improved level even after the intervention is discontinued.	1	2	3	4	5
21. Using the intervention should not only improve the child's behavior in the classroom, but also in other settings (e.g., other classrooms, home).	1	2	3	4	5
22. When comparing this child with a well-behaved peer before and after use of the intervention, the child's and the peer's behavior would be more alike after using the intervention.	1	2	3	4	5
23. The intervention should produce enough improvement in the child's behavior so the behavior no longer is a problem in the classroom.	1	2	3	4	5
24. Other behaviors related to the problem behavior also are likely to be improved by the intervention.	1	2	3	4	5

APPENDIX J:
Pencil Tap

PEG TAPPING SCRIPT

MATERIALS: 1 wooden dowel (*6* inches long, ¾ inch in diameter).

INTRODUCE THE ACTIVITY AS FOLLOWS:

Hold the peg in one hand and tell child **We are going to play a new game.** Tap the peg one time on the table. Hand the peg to the child and tell him/her, **Now you tap one time on the table.** Continue practicing until the child only taps one time

Once the child has successfully tapped one time, take back the peg and tap two times on the table. Hand the peg back to the child and tell him/her, **Now you tap two times on the table.** Continue practicing until the child only taps two times.

PRACTICE:

RULE 1: **Great, now we are ready to play the game. When I tap one time** (tap one time and hand the child the peg) **I want you to tap two times.** Practice until the child is successful on two consecutive trials. Take the peg back and say,

RULE 2: **When I tap two times** (tap the peg two times on the table and hand it to the child) **I want you to tap one time.** Continue practicing until the child is successful on two consecutive trials. **Ready to play my game?**

PRETEST:

TRIAL 1: Tap one time and hand the peg over to the child to respond.

- If the child responds correctly, praise the child and proceed to Trial 2.
- If the child responds incorrectly or not at all, follow rules for Extended Practice.

TRIAL 2: Tap two times and hand the peg to the child to respond.

- If the child responds correctly again, praise the child and count these first two practice trials as trials 1 and 2 of testing. GO TO TRIAL 3.
- If child responds incorrectly or does not respond at all, follow rules below for Extended Practice.

Extended Practice: If the child responded incorrectly or not at all on either of the above trials, these trials are counted as practice. Remind the child of both rules, beginning with the first rule the child identified incorrectly. Then begin the pretest again. If the child is wrong on either of these two pretest trials, the instruction and pretest procedure can be repeated once more.

NOTE: THE PRETEST TRIALS ARE TRIALS 1 AND 2 ON THE SCORE SHEET. Record the child's answers for the pretest trials 1 and 2 on the score sheet. If the child gets both trials 1 and 2 correct, proceed to testing and BEGIN WITH TRIAL 3. If the child does not get both trials 1 and 2 correct after the third attempt of the pretest, proceed to Trial 3, but do NOT remind child of rules again.

TESTING: Administer the tapping in the order listed on the score sheet and record responses in the table. If the child taps other than 1 or 2 times, record the number of taps on the "other" line.

Do NOT give feedback to the child during or between trials.

PEG TAPPING CODE SHEETS

Trial	# Taps	Correct Response	Child Response (RECORD # OF TAPS)		Score (0-1)
1 (pretest)	1	2			
2 (pretest)	2	1			
3	2	1			
4	1	2			
5	2	1			
6	2	1			
7	1	2			
8	1	2			
9	1	2			
10	2	1			
11	1	2			
12	2	1			
13	2	1			
14	1	2			
15	1	2			
16	2	1			

PEG TAPPING SCORING

Each item is coded as follows:

0 = Incorrect number of taps
1 = Correct number of taps

Final Score:

Sum of all 16 items, children for whom the task was aborted received a score of -1.

APPENDIX K:
Inter-Observer Agreement Data Collection Forms

Focused Attention (Mindfulness)
Duration of focused attention [# seconds]
% of time displaying focused attention out of 5 minutes: $\left(\frac{\#\ seconds\ focused}{300\ seconds}\right)$ x 100

	# Seconds	**Percentage**	**IOA**
Rater 1			
Rater 2			

Inhibitory Control
Pencil Tap (Smith-Donald et al., 2007; Diamond & Taylor, 1996)

Trial	Rater #1	Rater #2	Agreement (√)
1 (pre-test)			
2 (pre-test)			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
IOA % = (# agreement / total) x 100			

Head-Toes-Knees-Shoulders (*HTKS*; Cameron & McClelland, 2011)

Item	Rater #1	Rater #2	Agreement (√)
Part 1: Testing			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Part 2: Testing			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Part 3: Testing			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
IOA % = (# agreement / total) x 100			

Delay of Gratification
Snack Delay Task per session (Kochanska et al., 1996; Murray & Kochanska, 2002; Smith-Donald et al., 2007)

0 = eats snack before the bell is lifted
1 = eats snack after bell is lifted
2 = touches the bell or cup before the bell is lifted
3 = touches the bell or cup after the bell is lifted
4 = waits for the bell to ring before touching cup or bell

(Circle 0, 1, 2, 3, or 4.)

Snack Delay Trial	10 sec	20 sec	30 sec	15 sec	Mean Score	Percentage Full Wait
Rater 1	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4		
Rater 2	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4		
IOA						

Empathy
Sharing Task (Flook et al., 2015)

(Record # items participant **kept** in “Me” bag in each trial.)

Sharing Trial	Most-Liked Peer	Least-Liked Peer	Unfamiliar Peer	Absent / Sick Peer	Mean Score	Percentage Shared Item
Rater 1						
Rater 2						
IOA						

Emotion Management

Toy Removal (Hirschler-Guttenberg et al., 2015)

Emotion Management Behavior	Rater #1 MTS Percentage	Rater #2 MTS Percentage	**IOA**
Support-Seeking			
Withdrawal			
Gaze Aversion			
Substitutive Play			
Total % of Behaviors Displayed			

Disappointing Gift (Carlson & Wang, 2005)

Pre-Assessment and Post-Intervention

0 point = not observed; 1 point = observed (Circle 0 or 1.)

Behavior / Expression	Rater #1		Rater #2	
Nose wrinkles	0	1	0	1
Lowered brows as in a frown or as in an annoyance, disappointment	0	1	0	1
Omitted “thank you”	0	1	0	1
Puckered or pursed mouth	0	1	0	1
Tight, straight-line mouth	0	1	0	1
Avoids eye contact with researcher	0	1	0	1
Negative noise emitted (e.g., snort, ugh)	0	1	0	1
Makes a negative comment (e.g., “This is just a woodchip” or “I don’t want this”)	0	1	0	1
Shoulder shrug	0	1	0	1
Summed score				

*The same table and scoring will be used during pre-assessment and post-intervention.

Puppet Task (Cole et al., 2008)
Script for Emotion Regulation (Cole et al., 2008)
3-Part Pre- Assessment and Post-Intervention

Part 1: Introduction to Angry Vignette

Angry Vignette

Introduction (Props: Small Toys)

Red & Brownie are happy & content, playing with some toys. Each is playing by him/herself but sitting next to the other. They both reach for the same toy.
Red (looks over at Brownie, speaks with emphatic irritation): ***I** need that toy, Brownie.*
(Brownie pulls the toy.)
Brownie (angrily protesting): *HEY, no-oo! **I** need that toy!*
Red (very angry, yells): *I NEED IT!* (To child subject): *[Child's name], Brownie won't give it to me!*
Brownie (also very angry, loud, jumping up): *NOOO!! I NEED IT!* (They struggle with the toy, then Brownie says to child subject in a sullen voice): *[Child's name], Red won't give it to me!!!!!*
Red & Brownie (both very angry, loud, jumping up, approaches as if to hit Red): *It's mine!!!!!!!*
Brownie (To child): *I'm telling Mom. MOOOOM!!*
Mom (enters, very angry): *You two STOP being so angry! If you do not STOP being angry, I'm taking all the toys away!* (Mom marches off.)
Red & Brownie (so angry, both turning to child subject): *We are SO angry. Please [child's name], what can we do to STOP feeling so angry?*

[Child's name], what can we [Red and Brownie] do to STOP feeling so angry?

Child's response:

Part 2: Open-Ended Angry Vignette Queries

Angry Vignette Queries

OPEN-ENDED QUERY:
RA-2: Let's see, Red & Brownie need your help, [child's name]. They must STOP feeling so angry or Mom will take away the toys. [Child's name] what's the best way to STOP feeling so angry?
Pause to give child time to reply. If the child gives a reply, then say:
RA-2: Oh, they could [repeat child's idea regardless of whether it is good or not], then say to the child, Do you have any other ideas?
Repeat this until the child is finished with ideas. If the child has no ideas, or when the child is finished with ideas, continue.

[Child's name], what's the best way to STOP feeling angry?
Child's response:

Part 3: Forced-Choice Angry Vignette Queries

FORCED CHOICE QUERY:
RA-2: Well, Brownie and Red do you have any ideas?
(RA-2: Remember for all the pairs, have the puppet place a bubble card showing that mental component to the child.)
Red: *I should think about what a bad boy/girl Brownie is.*
Brownie: *I should think about something else, like playing with my friend.*
RA-2: Now [child's name], which is the best way for Red & Brownie to STOP feeling so angry, (point to bubble cards and repeat choices and say), remember they want to STOP feeling so angry.

Angry Vignette Queries Continued

RA-2 Repeats child's answer, writes down the child's response and then says: OK, that's good. Red & Brownie, do you have any other ideas?
Brownie (threatening to hit Red): *I should hit Red.*
Red (looking for another toy): *I should find another toy.*
RA-2: Now [child's name], which is the best way for Red & Brownie to STOP feeling so angry, (point to bubble cards and repeat choices and say), remember they want to STOP feeling so angry.
RA-2 Repeats child's answer, writes down the child's response and then says: OK, that's good. Red & Brownie, do you have any other ideas?
Red (moving the toy away and turning back on toy): *I should grab Brownie's toy.*
Brownie (staring at the toy): *I should share the toy with Red.*
RA-2: Now [child's name], which is the best way for Red & Brownie to STOP feeling so angry, (point to bubble cards and repeat choices and say), remember they want to STOP feeling so angry.
RA-2 repeats child's answer, writes down the child's response and then says: OK, [child's name], that was great. Red & Brownie, can you tell us another story?

Circle 0 or 1.

Behavior Choice	Rater #1		Rater #2	
Question 1: **Well, Brownie or Red, do you have any ideas?** ***[Child's name], which is the best way for Red and Brownie to STOP feeling so angry?**	0 I should think about what a bad boy / girl Brownie is.	1 I should think about something else, like playing with my friend.	0 I should think about what a bad boy / girl Brownie is.	1 I should think about something else, like playing with my friend.
Question 2: **Red and Brownie, do you have any other ideas?** ***[Child's name], which is the best way for Red and Brownie to STOP feeling so angry?**	0 I should hit Red.	1 I should find another toy.	0 I should hit Red.	1 I should find another toy.

APPENDIX L:
Procedural Fidelity Checklist: *Second Step* Implementation

Implementer: ___________________________ Observer: ____________________________

Date: __________________________________ Time start & end: ______________________

Check one:
- ☐ Day 1: Puppet Script
- ☐ Day 1/2: Story and Discussion
- ☐ Day 3: Skill – Practice Activity

Total items:	_____________
Total items marked:	_____________
Ratio:	_____________

Key: + happened

- did not happen

N/A if not applicable

Getting Ready

#	Procedure	Check
1	RA has data collection materials ready	
2	Data sheet has implementer and observer names, date, and time	
3	Implementer has scripted lesson card ready (by calendar)	
4	Lesson materials are set up (e.g., puppets / cue cards out of the box, posters hung on wall, CD in CD player and on the specific track)	
5	Lesson materials are out of reach of students during mini-lesson	
6	Objects and materials that compete for students' attention on the rug removed	

Second Step Implementation: Before Lesson

#	Procedure	Check
7	Scripted lesson card is placed by the implementer on the rug (corner)	
8	All lesson materials are set up and placed within 12 inches of implementer	
9	Students are asked to sit in a circle on the rug	
10	Lesson will begin once students sit quietly with crossed legs and eyes on implementer	

Second Step Implementation: During Lesson

#	Procedure	Check
11a	Puppet Script:	

#	Procedure	Check
	☐ Bring out boy and/or girl puppet	
	Puppet Script (cont'd): ☐ (If specified) Bring out additional materials as specified o Surprise box and attent-o-scope, or binoculars made of rolled construction paper o Paintbrush o How to Calm Down poster	
11b	Story & Discussion: ☐ Show students photo	
11c	Skill – Practice Activity: ☐ Bring out boy and/or girl puppet, cards (e.g., Listening Game, Feelings), toys, or stuffed animals	
12	Read scripted text accurately (puppet/s are worn at this time)	
13a	Puppet Script: ☐ Students are prompted to respond to at least 1 directive or question o Examples: "Think about something you really like to do at school." "Let's all say, 'Hello, [*girl puppet's name*]"	
	Puppet Script (cont'd): ☐ Students are called on to respond to the question asked	
	Puppet Script (cont'd): ☐ Review rules and rephrase students' responses (if specified / included in lesson)	
	Puppet Script (cont'd): ☐ Repeat rules and model actions (if specified / included in lesson)	
13b	Story & Discussion: ☐ (If specified / included in lesson) Students are prompted to respond to at least 1 directive or question (read scripted text accurately) o Example: Students prompted to play a game to practice Listening Rules, to make an attent-o-scope, etc.	
	Story & Discussion (cont'd): ☐ Students are asked: (read scripted text accurately) *[excludes Unit 2: Week 7 (Identifying Feelings)]* o "What do you see? AND o "What is happening?" AND	

#	Procedure	Check
	o “How does the [*name of child in photo*] feel in the picture?”	
	Story & Discussion (cont’d): □ Story elements are pointed out (read scripted text accurately) *[excludes Unit 2: Week 7 (Identifying Feelings)]*	
	Story & Discussion (cont’d): □ Students are prompted to respond to at least 1 directive or question (read scripted text accurately)	
	Story & Discussion (cont’d): □ Students are called on to respond to the question asked	
	Story & Discussion (cont’d): □ Provide reminders for students to use listening rules as needed	
	Story & Discussion (cont’d): □ Repeat asking question and calling on students to respond	
13c (i)	Skill – Practice Activity: If this is the first time the game is played: □ Introduce game (read scripted text accurately)	
	If this is the first time the game is played (cont’d): □ Say each rule (if specified / included in lesson)	
	If this is the first time the game is played (cont’d): □ Model what to say and/or do	
	If this is the first time the game is played (cont’d): □ Students are prompted to copy what to say and/or do: o For games that involve cards and require accurate matching of the card / action and its label: ▪ Point to each photo on the cards and read the rule ▪ Prompt students to do the action that is pictured	
	If this is the first time the game is played (cont’d): □ Notice and reinforce skill and/or behavior: o State what the student did (read scripted text accurately if script is included) o Say the rule and ask students to do the action o Do the action and ask students to say the rule	

#	Procedure	Check
	If this is the first time the game is played (cont'd): ☐ Repeat the prompt, notice, and reinforce at least 3 times with different cards, objects, scenarios, or actions	
13c (ii)	Skill – Practice Activity (cont'd): If this game has already been introduced in a prior lesson: ☐ Remind students to follow the rules required to play game (i.e., listening rules)	
	If this game has already been introduced in a prior lesson (cont'd): ☐ If specified in lesson) Have students make hand gesture (e.g., "Make an attent-o-scope with your hands" as it is modeled)	
	If this game has already been introduced in a prior lesson (cont'd): ☐ Students are prompted to engage in game o Example: "Find and focus on an object." "What [*one characteristic*] is the [*object*]?"	
	If this game has already been introduced in a prior lesson (cont'd): ☐ Notice and reinforce skill and/or behavior o State what the student did (read scripted text accurately if script is included)	
	If this game has already been introduced in a prior lesson (cont'd): ☐ Repeat the prompt, notice, and reinforce at least 3 times with different cards, objects, scenarios, or actions	
13c (iii)	Skill – Practice Activity (cont'd): During game playing: ☐ If student performs task correctly on attempt #1, give him/her a high five with verbal acknowledgement that the behavior was performed ("You did it! You were able to [briefly describe task].")	
	During game playing (cont'd): ☐ If student performs the task incorrectly on additional attempts: o Provide corrective feedback	
	During game playing (cont'd): ☐ If student performs the task incorrectly on additional attempts (cont'd): o Ask a peer who has performed it correctly to demonstrate the behavior correctly (done 3 times at most)	

#	Procedure	Check
	During game playing (cont'd): ☐ If student performs the task <u>incorrectly</u> on additional attempts (cont'd): o Invite the student to perform the behavior / complete the task 1 more time ▪ If performed <u>correctly</u>, give the student a high five with verbal acknowledgement that the behavior was performed ("You did it! You [briefly describe task].") ▪ If performed <u>incorrectly</u>, give the student a high five with verbal encouragement ("Nice try, [name of student]! You [describe briefly what was done correctly]. Practicing more tomorrow can help you get better."]	

Notes or Comments:

APPENDIX M:
Procedural Fidelity: *Second Step* Implementation
Brain Builder & Song Instruction
Integrity Checklist for Teacher

Teacher: ____________________________ Date: ____________________________

Time Start & End: ________________________

Directions: Please check off the box for each step that you complete. Remember to teach these steps in order the best that you can.

How to Teach and Review Songs[i]

☐ 1. Preparation:

- Listen to the *Join In and Sing* CD as you read the song lyrics.
- Sing the song through to yourself until you feel comfortable singing it.
- Watch 1 or more of the song videos online at SecondStep.org. Notice how the teachers model the movements for their students.
- Load the *Join In and Sing* CD in the class stereo and select the correct track number.

☐ 2. If the song is 1 verse:

- A. Play the song through 2 times during group time and have the students listen to it.
- B. Over the next three days, replay it and invite the students to sing along.
    - Recommended: Sing songs during any kind of transition, particularly when waiting is involved (e.g., waiting to go outside, waiting for snack time / lunch, etc.).

- [ ] 3. If the song is more than 1 verse (i.e., main song for each of the 3 units)

  Unit 1: The How to Learn Song

  Unit 2: If You're Happy and You Know It

  Unit 3: When My Feeling's Very Strong

  - Teach 1 or 2 verses of the songs every 3 days.
    - Use Step 2 as a guide to teach each verse.
    - *Tip: The verse or verses that are taught every 3 days have separate track numbers.

- [ ] 4. For some songs, add suggested movements specified in the verses.

[i] The Second Step Early Learning Program Teaching Materials (Committee for Children, 2011) was used to create the song and Brain Builder game instruction checklist.

APPENDIX N:
Procedural Fidelity Checklist : *MindUp* Implementation

Implementer: ________________________ Observer: ____________________________

Date: _______________________________ Time start & end: ______________________

Check one:
- ☐ Day 1: Linking Brain Research & Clarify for the Class
- ☐ Day 2: Getting Reading, MindUp Warm-Up, & Discuss
- ☐ Day 3: Leading the Lesson: Engage & Explore
- ☐ Day 4: Leading the Lesson: Reflect & MindUp in the Real World
- ☐ Day 5: Extend: Connecting to Curriculum –OR- Literature Link

Total items:	_____________
Total items marked:	_____________
Ratio:	_____________

Key: + happened
- \- did not happen
- N/A if not applicable

Getting Ready

#	Procedure	Check
1	RA has data collection materials ready	
2	Data sheet has implementer and observer names, date, and time	
3	Implementer has lesson plan / script ready (by seat on the side of the rug)	
4	Lesson materials are set up (e.g., chart paper, posters hung on wall, CD in CD player and on the specific track)	
5	Lesson materials are out of reach of students during mini-lesson	
6	Objects and materials that compete for students' attention on the rug removed	

MindUp Implementation: Before Lesson

#	Procedure	Check
7	Scripted lesson (in book) is placed by the implementer on the rug (corner)	
8	All lesson materials are set up and placed within close proximity to implementer	
9	Students are asked to sit in a circle on the rug or sit in their spots on the rug facing the implementer at a 90-degree angle	
10	Lesson will begin once students sit quietly with crossed legs and look directly on implementer	

MindUp Implementation: During Lesson

#	Procedure	Check
11	Which part of step 11 (11a through 11e) is the implementer delivering? Check a box: ☐ 11a ☐ 11b ☐ 11c ☐ 11d ☐ 11e	
11a (i)	Linking to the Brain: ☐ Shows students “Getting To Know and Love Your Brain” poster (Scholastic)	
	Linking to the Brain (cont’d): ☐ (If specified) Bring out additional materials (e.g., poster / illustration of brain function; model of brain)	
	Linking to the Brain (cont’d): ☐ Explain function of the area of the brain (e.g., amygdala) or related physiological phenomenon (e.g., stress hormone) that is the focus of the lesson	
	Linking to the Brain (cont’d): ☐ Provide a connection of functioning to mindfulness, feelings, and/or behavior / learning	
11a (ii)	Clarify For the Class: ☐ Explain the process and/or function of the brain and its relationship to mindfulness o Make connections using an analogy, illustration, model, interactive / hands-on activity	
	Clarify For the Class (cont’d): ☐ Discussion: o Ask the students both class-wide discussion questions	
11b (i)	Getting Ready: ☐ Bring out chart paper and other specified materials: o Marker o “Getting To Know and Love Your Brain” poster o Photo of doctor or nurse with stethoscope o Construction paper (brown, green, yellow, red, and orange)	

#	Procedure	Check
	Getting Ready (cont'd): □ Play game / do activity if specified: o Brain Power! o Mindful or Unmindful? o Sensory Web	
11b (ii)	MindUp Warm-Up: □ Explain directions to students to complete the activity	
	MindUp Warm-Up (cont'd): □ Engage in activity as specified in the lesson: o Teach and sing the lyrics to "My Brain Is So Very Important to Me" song	
	MindUp Warm-Up (cont'd): □ Engage in activity as specified in the lesson (cont'd): o Sit in a circle and listen very carefully for all sounds heard with eyes closed for 15-20 seconds for at least 3 times	
	MindUp Warm-Up (cont'd): □ Engage in activity as specified in the lesson (cont'd): o Ask children to identify objects in the classroom by the type of characteristics specified	
	MindUp Warm-Up (cont'd): □ Engage in activity as specified in the lesson (cont'd): o Explain what the heart is and what it does	
	MindUp Warm-Up (cont'd): □ Engage in activity as specified in the lesson (cont'd): o Ask children to name a happy memory, a recent time when they thanked someone, and specify who they thanked and what they were thankful for	
	MindUp Warm-Up (cont'd): □ Engage in activity as specified in the lesson (cont'd): o Ask children to share what kindness means in their own lives and write their responses in the "Kindness Counts!" web	
11b (iii)	Discuss: □ Ask students class-wide questions	

#	Procedure	Check
11c (i)	Leading the Lesson: Engage: □ Review the warm-up activity	
	Leading the Lesson: Engage (cont'd): □ Connect the warm-up activity to the brain and/or concept of or relating to mindfulness as specified in the lesson	
	Leading the Lesson: Engage (cont'd): □ Read the scripted questions accurately	
11c (ii)	Leading the Lesson: Explore: □ If specified, bring out materials for this part of the lesson (e.g., clear container with warm water, eye dropper, blue food dye; construction paper, scissors,)	
	Leading the Lesson: Explore (cont'd): □ Read scripted text	
	Leading the Lesson: Explore (cont'd): □ If specified, review the concepts with the students and ask them to explain their reasoning.	
11d (i)	Leading the Lesson: Reflect □ Review concept taught in lesson o If specified, ask students to share examples in whole-group setting	
	Leading the Lesson: Reflect (cont'd) □ Read scripted text / questions	
11d (ii)	MindUp in the Real World □ Read scripted text and questions accurately.	
11e	One of the following is delivered (check a box) □ Extend: Connecting to Curriculum □ Extend: Literature Link	
11e (i)	Extend: Connecting to Curriculum □ Read scripted text	
11e (ii)	Extend: Literature Link □ Books that will be read, depending on library availability (1 per week) – which book is read? (check a box):	

#	Procedure	Check
	- *When Sophie Gets Angry – Really, Really Angry* by Molly Bang - *How Do Dinosaurs Eat Their Food?* By Jane Yolen - *I Spy School Days* by Walter Wick and Jean Marzollo - *Jazz on a Saturday Night* by Leo and Diane Dillon - *Feeling Thankful* by Shelley Rotner and Sheila Kelly - *Crazy Hair Day* by Barney Saltzberg	
	Extend: Literature Link (cont'd): - Read scripted text	

	Extend: Literature Link (cont'd):
	- Ask students questions that will help them to connect the events of the story to the concepts taught during the week. Example question templates include:
	  o How did [character in story] show [concept taught]? What are 3 examples?
	  o If [plot change] occurred, what do you think would have happened? How would that change the way [the character] [felt, said, did]?	

MindUp Implementation: After Lesson

#	Procedure	Check

12	*NOTE: Students are asked to complete at least one activity, which will be similar to or the same as the behavioral tasks.
	
	The type of task will depend on the pair of lessons presented (check a box):
	- MindUp Lessons 1 & 2 – Focused Attention task
	  o All students are asked to sit in a circle and asked to complete an "I Spy" game.
	  o Meanwhile, play a cartoon on low volume from a laptop in the background
	- MindUp Lessons 5 & 8 – Behavioral Regulation tasks
	  o All students are asked to "walk the line" (walk along the edge of the rug or on the strips of white tape on the floor that will indicate where students are expected to walk
	  o All students will play "Simon Says," "Freeze Game," or "Red Light, Purple Light" (Tominey & McClelland, 2011).
	  o Stickers/stationery or edibles (if held during snack time) will be placed in the middle of the rug. Students will be asked to wait their turn (name called) to choose a sticker or an edible.
	- MindUp Lessons 13 & 14 – Emotion Regulation tasks	

#	Procedure	Check
	o All students are handed stickers or edibles to 3 assigned peers and given the option to either keep the objects for themselves or share. The 4 target students will be tracked. o The 4 target students are also being tracked for presence or absence of “thank you” when a peer shares a sticker or edible with them.	
13a	During task: □ If student performs task correctly on attempt #1, give him/her a high five with verbal acknowledgement that the behavior was performed (“You did it! You were able to [briefly describe task].”)	
13b	During task (cont’d): □ If student performs the task incorrectly on additional attempts: o Provide corrective feedback	
	During task (cont’d): □ If student performs the task incorrectly on additional attempts (cont’d): o Ask a peer who has performed it correctly to demonstrate the behavior correctly (done 3 times at most)	
	During task (cont’d): □ If student performs the task incorrectly on additional attempts (cont’d): o Invite the student to perform the behavior / complete the task 1 more time ▪ If performed correctly, give the student a high five with verbal acknowledgement that the behavior was performed (“You did it! You [briefly describe task].”)	
	During task (cont’d): □ If student performs the task incorrectly on additional attempts (cont’d): o Invite the student to perform the behavior / complete the task 1 more time (cont’d) ▪ If performed incorrectly, give the student a high five with verbal encouragement (“Nice try, [name of student]! You [describe briefly what was done correctly]. Practicing more tomorrow can help you get better.”]	

#	Procedure	Check
14	Implementer recorded whether student performed task correctly on attempt #1, whether s/he attempted the behavior again, and whether s/he performed it correctly on attempt #2	

Notes or Comments:

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