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DOCTORAL THESIS

*Mindfulness in an Elementary School for
Improving the Executive Functions*

Programa de Doctorat en Educació
Departament de Teories de l'Educació i Pedagogia Social
Facultat de Ciències de l' Educació

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Dedication

To my magnificent husband, Sven.

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Abstract

Objectives: Mindfulness training is an accepted and practical didactic approach to improve the executive functions of elementary school students. However, previous mindfulness studies that were conducted on elementary school students have been primarily led by external instructors, outside of the natural classroom and school-day routine. More teacher-led, curriculum-embedded mindfulness research is needed. The Mind Yeti program is a mindfulness intervention that fulfills these requirements. This study evaluates the effects of mindfulness training programs on the administrative components of Mind Yeti, impacting the executive functions of elementary school students. We also looked how students interpreted their experience with the intervention. We hypothesize that this curriculum-embedded intervention would have positive effects on each executive function: inhibition, emotional control, cognitive flexibility, sustained attention, working memory, and organization.

Method: A diverse sample of 3rd, 4th, and 5th-grade elementary school students ($n = 177$; aged 8 to 11 years old) participated in a Mind Yeti intervention in their general education classroom, with six sessions per week for six weeks. Students self-reported their executive functions on pretest and posttest questionnaires. The participants in the brief mindfulness intervention program, Mind Yeti, were implemented on a school-wide basis. Teachers followed a specifically tailored calendar to play Mind Yeti sessions to their classes for a total of 45 minutes weekly. Students completed a pretest questionnaire before the intervention, and posttest questionnaire after the intervention to report on their perceived levels of executive functions, and their scores were used to calculate the composite score for each executive function. Students also completed posttest surveys to share their opinion of their perception of the mindfulness intervention program.

Results: The results indicated that students significantly improved scores of inhibitions, working memory, and cognitive flexibility. Additionally, students in 5th grade responded better to Mind Yeti than students in 3rd grade. Unexpectedly, changes in emotional-control, sustained attention, and organization were not significant. The qualitative aspect of the study generated three themes and seven categories showing that students preferred the breathing, listening, and imagining activities. Additionally, the qualitative findings showed that the mindfulness activities made them calm, relaxed, and focused. Students also recommended having more frequent mindfulness sessions than were offered.

Conclusion: Results were partially consistent with the hypothesis, suggesting that Mind Yeti is an appropriate and effective intervention for improving students' executive functions, and thus may be a positive addition to elementary schools' curriculum. Future research is required to replicate these findings.

Keywords: Mind Yeti. Inhibition. Working Memory. Cognitive Flexibility. Organization. Emotional Control. Sustained Attention.

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Chapter 1: Introduction

GENERAL STATEMENT

Elementary school students are often faced with social, behavioral, and cognitive difficulties in their school environments. Over recent years, some of these challenges have been attributed to the executive functions, an area in which deeper understanding is being developed due to increased inquiry. The executive functions are important in the carrying out of daily undertakings (Huguet et al., 2017; Willcutt et al., 2005) and are essential in helping students achieve better personal and academic outcomes (Blair & Razza, 2007; Flook et al., 2010).

Difficulties with the executive functions can have deleterious impacts “on the quality of children’s lives [that] often persist into adulthood, negatively affecting academic achievement, relationships, and employment” (O’Toole et al., 2017). These negative consequences of executive functioning difficulties may include challenges controlling “thoughts, emotions and actions” (Rueda, & Paz-Alonzo, 2013), poor follow through on assignments, disorganization, and the inability to attend to required tasks (Kusnyer & Stanberry, 2013). Therefore, providing students who face executive function difficulties with tools and coping skills to develop their competence in these areas, may improve their educational outcome, educational success, and general school life (Klingbeil et al., 2017; Diamond, 2013).

Mindfulness-based intervention is proving to be an accessible option to reduce the symptoms of executive function difficulties in students (Flook et al., 2010). In the general sense, mindfulness is a receptive type of meditation practice that aims to provide students with an unbiased and meaningful open awareness to the present moment (Shapiro & Walsh, 1984, p. 28). The general consensus of researchers who have conducted studies on the effects of mindfulness training on elementary students is that such intervention may be helpful in regulating these onerous symptoms (Felver et al., 2015). In other words, mindfulness training has proven to improve

elementary school students' ability to mentally shift, initiate new thoughts, and use their working memories (Dariotis et al., 2016; Flook et al., 2010; Tarrasch, 2017).

The current literature is lacking in the area of field studies where schools adopt school-wide mindfulness intervention programs, and researchers were studying this in the natural setting. More specifically, many of the studies on mindfulness and elementary school students have been conducted outside of the natural school and classroom setting. Furthermore, many of these studies focused on feasibility and did not include students' personal experiences with the interventions.

This introductory chapter presents the theoretical framework of this study. A summary of the area of need, as well as the rationale for addressing this problem area, will be discussed. Justification for additional research in this area of need will also be provided. Additionally, theoretical definitions will be provided of key terms that will be used throughout the chapters. Current and relevant literature relating to the concepts will also be presented before concluding the chapter with the research questions and hypotheses.

STATEMENT OF PROBLEM

The increasing educational demands for high academic performance, “appropriate” self-regulating requirements, and the general daily rigors and expectations of the school day may pose a significant challenge for children who demonstrate executive function difficulties. They are more likely to be at risk for “lower average marks, more failed grades, more expulsions, increased dropout rates... and missing important details in assignments, daydreaming during lectures and other activities, and difficulty organizing assignments” (U.S. Department of Education, 2008).

The research shows that school-implemented mindfulness training is beneficial for multiple concerns faced by elementary school children, including difficulties with their executive function (Flook et al., 2010). These findings are being supported by the ever-increasing number of

studies on the feasibility of mindfulness training, and as such, the sale of implementation programs is on the rise. In fact, the consumer market is plagued with “programs and curricula with differences in the underlying content, methods, [and] dosage” (Klingbeil et al., 2017) as well as articles that have not been peer-reviewed (Meiklejohn et al., 2012). Some researchers, especially those who have conducted analytical investigations, have specified that varying aspects of mindfulness programs, such as dosage (the duration and frequency), instructor, and location of implementation, conclusively influence the actual outcome and findings of mindfulness intervention studies (Water et al., 2015). Nonetheless, some previous studies on mindfulness and the executive functions did not thoroughly analyze the administrative components of the mindfulness program, but rather only focused on the effects of such training (Burke, 2009). When furnished, the results are inconsistent in recommending the essential administrative components needed for students’ improvement after receiving mindfulness training, suggesting that more research is needed in this area (Klingbeil et al., 2017; Renshaw & Cook 2017).

Therefore, since the administrative components play such an essential role in the outcomes of mindfulness studies, it is vital to move beyond merely the effectiveness and conduct studies and move towards understanding which continuum of administrative components of mindfulness interventions are the most appropriate in achieving success in improving students’ executive functions at the elementary school level (Flook et al., 2010; Greenberg & Harris, 2012; Moreno 2017; Renshaw & Cook, 2017). More specifically, there is still an area of need in the literature to understand precisely how carefully curated and selected components of a mindfulness program, using only the most highly recommended administrative components, will influence the executive functions of elementary students, if at all, and how students explain their participation.

In the practical sense, students have challenges with their executive functions, it is therefore necessary so to teach them useful and accessible skills that will improve these processes. Previous research shows that the administrative component, dosage, instructor, and location are essential variables in the results achieved from mindfulness studies, as well as whether or not schools adopt these programs as part of their curriculum. More specifically, some schools, although knowing the benefits of a mindfulness intervention, have declined to implement such practices due to the demanding dosage, cost, and time-related to teacher preparation or paying for external instructors, and well as the overall opportunity cost of such programs. Since we would like to get mindfulness into the natural school setting, and since these areas are deemed essential by previous research, a closer look should be paid to the administrative components of elementary school-based mindfulness intervention to identify the most plausible format available to the school community as well as the researcher. Furthermore, the research is lacking in the representation of students' voices; the way they interpret a mindfulness intervention embedded in their school curriculum.

There is a need in the literature to understand better the archetypical administrative components (i.e., dosage - frequency and duration of the intervention program and sessions, instructor, and location) as they relate to mindfulness programs in schools (Renshaw & Cook, 2017; Felver et al., 2015) since, despite their importance, there is relatively little investigated work on them. Furthermore, how students feel about their participation in such mindfulness activities should be further explored since the majority of the data on mindfulness, and the executive functions primarily address feasibility.

PURPOSE OF THE STUDY

The purpose of this study is to fill the gap in the literature by identifying how the administrative components (dosage, instructor, and location) of mindfulness training influence symptoms of executive function difficulties in elementary school students in the public-school setting. Additionally, the research would provide possibility to understand how students interpret and experience such an intervention program. This study encompasses executive function theories, mindfulness theories, emergent analysis, as well as responses to intervention.

Importance of the Study

The severity of the implications of not providing appropriate interventions for elementary school students who have executive function difficulties, the fact that research into the administrative components of mindfulness programs is nascent, as well as the encouragement from professional literature, are all crucial factors which make it essential to conduct this study. We hope to contribute to improvements in the executive functions of elementary school students through evaluation and verification. We hope that this research design will allow us to better understand how the ideal administrative components of a mindfulness program influence these outcomes and how students perceive these changes in their own words.

Theoretically, conducting this study may make a significant contribution to the existing gap in the literature for carefully measured comparisons of important administrative components of mindfulness programs. Extent research of mindfulness training for elementary school children who demonstrate executive function challenges has predominantly been conducted outside of the regular school day and classroom setting (Crescentini et al., 2016). Furthermore, outside instructors were administered those studies that were embedded inside the regular curriculum and not the regular classroom teacher (Tarrasch, 2017). Thus, this study was conducted to verify the

relationship between a mindfulness program with key administrative components and how these variables affect the outcome of executive function difficulties in elementary school students.

This empirical study would be beneficial in providing information to school curriculum selection committees, principals, and school districts when they seek to select and implement a mindfulness curriculum. Klingbeil et al., (2017) cautions, “In the absence of empirically derived guidelines, practitioners should carefully consider the evidence for the specific program when selecting from the numerous mindfulness-based interventions available.” Therefore, this study would provide necessary insight into the different types of mindfulness programs as well as their shortcomings and benefits. Furthermore, it will help to contribute evidence-based theories for the administrative components of mindfulness programs for elementary school students.

Theoretical Basis

The way in which students engage in their learning environments and the processes which allow them to achieve learning outcomes have been studied extensively, especially in the school context. This study focuses on understanding how students interpret their engagement in a mindfulness curriculum and how mindfulness practices impact their mental processes, in particular, their executive functions. Theoretically, constructivism approaches and methods involving executive function theories, mindfulness theories, emergent design, and response to Intervention were explored in this study. This section provides brief overviews of these theories, detailed explanations of which will be explored in the literature review, and Chapter 2.

The theory of constructivism focuses on the development, cognitive abilities, and learning in children. Theoretically, the executive functions are a Neo-Piagetian theory focused on understanding the “anatomical and physiological” development of the brain (Bolton and Hattie,

2017). They are intricately intertwined neuropsychological processes that are important in the areas of initiation, behavior, and cognition, and “are mainly supported by the frontal lobes, engaging however a larger brain network, including posterior and subcortical brain regions” (Allain, 2013). The process of developing the executive functions is initiated in the brains of infants soon after birth and progressively advances with age (Flook et al., 2010; Dawson, 2013), being fully developed at different ages. The executive function comprises of a wide range of “cognitive processes such as working memory, cognitive flexibility, attention control... communicative behavior and social cognition (Bolton and Hattie, 2017). The research shows that these processes are particularly important in the school environment since difficulties with these processes can affect the academic outcome (Flook et al., 2010). It is theorized that challenges with the executive functions may be improved by engagement in mindfulness practices, which introduces another theory guiding this study, the mindfulness theory.

Mindfulness theory centers around being perceptive of what is being experienced in any given moment and reducing automatic impulsive behaviors (Glogowski, 2011). Mindfulness is a goal-directed practice which “can be cultivated by a variety of techniques” including focusing on the breath and movement (Allen et al., 2006). Additionally, research shows that mindfulness training increases the physical structure of the prefrontal cortex (Lazar et al., 2005), a section of the brain that has been linked to the development of the executive functions (Basso et al., 2019). This study takes a universal school-wide approach to implement mindfulness.

A universal approach is consistent with Tier 1 of the Response to Intervention. Response to Intervention is a best practice approach to early intervention and prevention of behaviors, academics, and social, emotional learning (Gutierrez, 2018). Response to Intervention is an appropriate implementation model for the improvement of executive functioning, and this is due

in part to some overlaps in social-emotional skills and the benefit it generates when implemented on a school-wide level. The relationships between social-emotional learning and executive functions will also be explored further in Chapter 2.

RESEARCH QUESTIONS

Through evaluation and verification, we hope to contribute to improvements in executive function skills (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) of elementary school students. We also hope that this research design will allow us to get a better understanding of how the ideal administrative components (dosage - frequency and duration, location and instructor) of a mindfulness program influence these outcomes. The following questions were posed:

Research Questions and Hypotheses

RQ.1: What are the ideal administrative components (i.e., dosage, location, and instructor) of a mindfulness intervention training program to improve the executive function (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties of upper elementary school students?

RQ.2: What is the effectiveness of a model mindfulness-based intervention on the executive function (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties of upper elementary school students as measured by the Student Executive Function Mindfulness Questionnaire (SEFMQ)?

H02: There will be reductions in the executive function (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties, indicating improvements, of upper elementary school students as measured by the SEFMQ.

RQ.3: How do students who engage in mindfulness activities rank these mindfulness activities in relation to their improved executive functions?

RQ.4: How do students who engage in a mindfulness practice understand how the mindfulness activities affect their executive functions?

RQ.5: What is the experience of engaging in a mindfulness curriculum at the elementary school level?

Since the research of the ideal administrative components of a mindfulness intervention training program to improve the executive function difficulties of upper elementary school students is nascent, and how students interpret their experience with these programs is even less common, it only fits to conduct a mixed-methods study. With both the qualitative data and the quantitative findings, we were able to compare the changes in the executive functions to what students reported about their experiences with the mindfulness intervention.

Chapter 2: Literature Review

INTRODUCTION

Experiences during school, especially at the elementary level, play essential roles throughout our lives. Understanding the executive functions, knowing how they affect educational experiences, is a role that all school communities should meaningfully consider. As the research will show, when students have difficulties with their executive functions, these challenges can have profound consequences in students' lives. As such, students should be given skills and tools, such as mindfulness training, to help them improve these areas and make the best of their educational experiences. This chapter reviews the previous literature on the variables for which we are making our theoretical argument. The variables, in particular, the executive functions and the administrative components of mindfulness programs, will be explored. Additionally, the methodologies of previous studies with similar variables will be evaluated before making the argument for the methodology of this current study.

THEORETICAL FRAMEWORK

This theoretical framework seeks to introduce, describe, and connect research with the existing knowledge and theories regarding mindfulness and the executive functions of elementary school students. The first problem is that elementary school students are often required to perform tasks that require excellent executive function skills, such as paying attention in class, but have not been given the tools and skills to do so. One theoretically proven strategy to improve executive functions is the practice of mindfulness. The second problem is that, although this is a proven strategy, there is not much time allocated for such interventions in the public-school setting. The third problem is that often when elementary school students participate in mindfulness training, it is done in

isolation outside of their regular classroom by external instructors. Significantly, we need to address these problems since they will benefit students.

The first aim of this study is to provide students with mindfulness training as a skill and strategy to help them reduce their levels of executive function difficulties. The second aim of this study is to add to current knowledge in the field, supporting shorter and more frequent dosages of mindfulness intervention training for elementary school students. The third aim of this study is to contribute to the literature supporting school-wide mindfulness intervention training.

Introducing mindfulness as a part of a school's curriculum is an essential topic because schools are continuously demanding more of students, and educators need to provide support that will contribute to the overall executive functions of the students in these continuously demanding environments. This topic is important to educators and administrators because they are responsible for providing support for the students. Additionally, more research must be conducted on the dosage to inform program developers and leaders in the field of mindfulness. The next sections will explain the executive function and mindfulness theories before presenting studies relevant to each.

EXECUTIVE FUNCTION THEORY

Brief Overview of the Executive Functions

The executive function theory was seen in the literature as early as the 1970s when Posner and Snyder (1975) studied the ideas of selective attention and cognitive control. These early studies set the foundation for more intense research in developing what is now called the executive functions. The executive functions are a set of intertwined cognitive and behavioral competencies that are often called “the CEO of the brain” (McCloskey, 2011), “executive control” or “cognitive control” (Diamond, 2013). Today there are many different categories of executive functions, sometimes as many as 33 have been identified. For this study, six (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) of the executive functions presented by Dawson and Guare (2009) will be considered.

As is shown by the analysis of changes in the anatomical and physiological structure of the brain, the executive function matures with age (Bolton and Hattie, 2017). They originate in the brain of infants soon after they are born and continues to ameliorate with age until full maturity in adulthood, around 25 years old (Flook et al., 2010; Dawson, 2013). This process can take longer in children with disabilities, such as attention disorders or other developmental disorders, including attention deficit hyperactivity disorder (Dawson, 2013). As will be discussed later in the chapter, there are different types of executive functions, and although somewhat synchronous, the interrelated yet distinct components of the executive functions reach maturation at different ages. For example, inhibition is shown to be the earliest to develop, with the next being working memory around 7–8 months old, and organization developing a little later. The sequential and yet entwining developmental stages of the executive functions are said to play critical roles in neo-Piagetian theories of how children progress through the stages of development (Bolton and Hattie, 2017). In other words, the growth in the executive functions has a direct link to how students learn.

The Executive Functions and the Brain

The executive functions are controlled by a set of multifaceted intimately interconnected neural systems (Diamond, 2013; Flook et al., 2010; Graham, 2017; Willcutt et al.) that develop in the prefrontal cortex, the front part of the frontal lobe (SoP, 2017), through the production of neurons (nerve cells). These neurons connect axons and dendrites at synapses in the gray matter area of the brain (Dawson, 2013). The gray matter area is “involved in muscle control, and sensory perception such as seeing and hearing, memory, emotions, speech, decision making, and self-control” (Miller et al., 1980). Generally, the prefrontal cortex is responsible for carrying out the executive functions (Flook et al., 2010; Bonelli et al., 2007), “planning complex cognitive behavior, personality expression, decision making, and moderating social behavior” (SoP, 2017). They help us to monitor, evaluate, regulate our behaviors, perform tasks in continuous and coherent manners, and to “modulate affective and interpersonal behavior” (Dawson & Guare, 2009). These interconnected complex higher-order processes are foundational skills that students use to pay attention, plan and to fulfill specific tasks (Diamond, 2013; Salimpoor & Desrocher, 2006). More specifically, the executive functions are necessary for students to make preparations, attend and follow through on tasks (Flook et al., 2010; Sergeant et al., 2002); skills which are important for academic, social and functional success (Diamond, 2013; Guare et al., 2012). When the symbiosis of the diverse interrelated cognitive processes of the executive functions work in a synchronized way, they help students to “organize, strategize, pay attention to and remember details and manage time and space” (Diamond, 2013; Graham, 2017). In other words, when our frontal lobes are functioning properly, we can decide on prioritizing tasks. On the other hand, impairments of the frontal lobes are manifested as emotional behaviors such as “flatness and

indifference, irritability and belligerence, and childishness” (Dawson & Guare, 2009). They can also manifest as inflexibility, the dearth of insight, and an inability to learn from experience. “Distractibility, poor sustained attention and effort, perseveration, confusion, inability to plan and execute a sequence of behaviors needed to meet a goal,” are also side effects of impaired frontal lobes (Dawson & Guare, 2009).

The Core Executive Functions

Inhibitory

Inhibition, or inhibitory control, is the aptness to resist the temptations to act or change one’s attention, emotions, thoughts, and behavior impulsively. It is the delay of automatic and spontaneous response in order to achieve a goal. According to Barkley (2014), children generally exhibit inhibition at age three or four years old, and this trait continues to develop through adolescence. In the classroom setting, students demonstrate inhibitory control when they do not rush through things, can wait their turn, and are not easily distracted. Inhibition helps students to regulate their responses (Oberle et al., 2012) and to make thoughtful and appropriate choices instead of engaging in impulsive emotions, behavior, or thoughts. Inhibitory control can be separated into two distinct areas; response inhibition and interference inhibition (Diamond, 2013).

Response Inhibition is thinking before acting by resisting the urge to say or do something by taking the time to evaluate the situation and how our behavior might impact it (Dawson & Guare, 2009). It has to do with self-control or behavioral inhibition. Self-control is the regulation of behaviors and emotions to act appropriately so that one does not engage in impulsive behaviors but remain on task and engaged (Diamond, 2013). For example, in a typical classroom during a lesson, students may be tempted to engage in off-task behaviors like play with their phones or chat

with another classmate, instead of listening to the teacher or read the assigned text. Comparably, exhibiting emotional self-control may include students resisting the urge to argue with the teacher or with a classmate for an injustice they incurred. Self-control is the self-restraint to remain engaged in non-preferred activities despite the compulsion to do something more stimulating and fun. It also has to do with delaying gratification to engage and endure a current task in order to earn a reward. The ability to think before acting or not jumping to conclusions are examples of exhibiting self-control (Diamond, 2013).

The second type of inhibition, interference control, encompasses selective attention (inhibitory control of attention) and cognitive inhibition. Inhibitory control of attention involves demonstrating the ability to redirect the involuntary exogenous and endogenous attention from salient or indistinct stimuli to focus the attention on a goal. In other words, inhibitory control of attention allows the student to appropriately redirect their attention to the task at hand when distracted by external or internal movements. For example, during a classroom lesson after being unexpectedly distracted by a sudden loud noise or chatter made by a classmate, students may need to refocus their automatic attention to only the teacher. Consistently, the other type of interference control, cognitive inhibition, is the ability to resist irrelevant or unwanted mental images (Diamond, 2013) that may float into the mind at an undesired time.

Inhibitory control continues to develop with age and is often difficult for children to master (Luna et al., 2004; Luna, 2009). Throughout adolescence and into adulthood, those with poor inhibitory control have more social, behavioral, and academic struggles than their similar-aged peers (Moffitt et al., 2011). Therefore, providing students with strategies to improve their inhibitory control may be an excellent opportunity to help them live better lives (Diamond, 2013). The research shows that the executive functions, particularly inhibition, are responsible for

students' development of many foundational readings and writing skills, such as the application of automatic letter naming and spelling (Berninger et al., 2008) and mathematics (Blair & Razza, 2007). The inability to regulate the executive functions appropriately may have adverse effects on students' necessary academic skills needed for their educational and emotional lives.

Emotional Control

Emotional control is the ability to modulate one's emotional response. According to Dawson and Guare (2009), Emotional Control is "the ability to manage emotions in order to achieve goals, complete tasks, or control and direct behavior." In the classroom setting, students demonstrate emotional control when they do not have emotional outbursts for little reason, do not have mood changes frequently, and do not get emotionally upset quickly. The research shows that mindfulness training is beneficial in improving emotional control (Basso et al., 2019).

1) Sustained Attention

Sustained attention is the awareness of the impact of one's behavior on others. According to Dawson and Guare (2009), sustained attention is "the capacity to maintain attention to a situation or task despite distractibility, fatigue, or boredom." Children begin to control their attention in infancy, and these skills progress quickly through childhood. "In contrast, cognitive flexibility, goal setting, and information processing experience a critical period of development between 7 and 9 years of age and are relatively mature by 12 years of age" (Dawson & Guare, 2009). Students may demonstrate sustained attention in the classroom when they can remember and perform a 2- to 3-step routine, complete short tasks within time limits, and start classwork with one reminder.

Working Memory

Working memory involves keeping the information in one's mind and being able to access it at the appropriate time (Oberle et al., 2012). More specifically, working memory is "holding information in mind and manipulating it" (Diamond, 2013). According to Dawson & Guare (2009), Working Memory is "the ability to hold information in memory while performing complex tasks. It incorporates the ability to draw on prior learning or experience to apply to the situation at hand or to project into the future." Verbal working memory and nonverbal (visual-spatial) working memory are the two main types of working memory, and these functions are crucial for helping students understand and process information. One crucial role of functional working memory is that it allows students to solve problems mentally and logically (Diamond, 2013).

Additionally, working memory is vital for the sequencing of events and the comprehension of written or spoken language. Any mental mathematical computation, listening to instructions and then executing them, and mentally categorizing things or events, are done through the working memory. Working memory helps with creativity and reasoning because it helps develop relationships between objects, events, and concepts. Additionally, as stated by Diamond (2013), working memory "enables us to bring conceptual knowledge and not just perceptual input to bear on our decisions, and to consider our remembered past and future hopes in making plans and decisions." Working Memory also helps students with expected skills, such as knowing and following classroom rules (Diamond, 2013).

Working memory differs from other types of memories, such as short-term memory. Unlike with short-term memory, the working memory holds information in the brain where it is manipulated, not just stored. Additionally, working memory develops at a slower rate. Concerning other EFs, working memory and inhibition are closely related. As indicated by Diamond (2013),

“You must hold your goal in mind to know what is relevant or appropriate... inhibit internal and external distractions.” Therefore, working memory can remind students that there is a goal at hand, and inhibition will disregard the distractions that may interrupt the achievement of this goal. Engaging the executive functions may be a challenge for some students (Diamond, 2013) and their struggles with these processes may demonstrate difficulties. These difficulties may include challenges remembering recent information necessary for initiating and completing tasks, forgetting instructions easily, having a short attention span, or forgetting what they are doing in the middle of things. Additionally, students with poor working memory may have difficulty understanding what they recently read and may have problems memorizing the multiplication table.

Organization

Organization is the ability to manage current and future task demands. According to Dawson & Guare (2009), Planning is “the ability to create a roadmap to reach a goal or to complete a task. It also involves being able to decide what is important to focus on and what is not important. Organization [is] the ability to create and maintain systems to keep track of information or materials.” Students may demonstrate planning or organizing difficulties in the classroom if they demonstrate trouble prioritizing activities, do not plan for future activities, have trouble finding their belongings in their desks.

2) Cognitive Flexibility

Cognitive flexibility is the ability to have flexible thoughts, perspectives, and actions when dealing with complex or mundane tasks and when engaging in tasks that require problem-solving.

Cognitive flexibility is a skill that develops with age and allows students to change behaviors and actions in various circumstances (Oberle et al., 2012). According to Dawson and Guare (2009), flexibility is “the ability to revise plans in the face of obstacles, setbacks, new information, or mistakes. It relates to adaptability to changing conditions.” The ability to change perspectives allows students to virtually stand in others’ shoes or approach an idea, topic, or challenge by viewing it from another person’s perspective. Cognitive flexibility relates closely to inhibition and working memory because it requires inhibition to disengage previous thoughts and working memory to trigger a new perspective.

In the classroom setting, students may demonstrate cognitive flexibilities if they do not get over problems quickly, are bothered by having to deal with changes, and have trouble changing from one activity to another. For example, if a student is engaged in a mathematics activity (e.g., solving word problems) and encounters a problem with the strategy he or she is using (e.g., addition instead of multiplication), that student may change the strategy to one that applies to the task at hand. Therefore, cognitive flexibility includes prioritizing activities, acknowledging errors, and being lithe in the situation.

Executive Functions in Students with Disabilities

Although difficulties with the executive functions can be identified as a stand-alone symptom, “weaknesses are often associated with an array of psychological disorders, and hence it is important to understand the skill weaknesses within a wider context of social-emotional functioning” (Dawson, P, 2013). Executive function difficulties are often comorbid with other disabilities such as Specific Learning Disabilities (SLD), Attention Deficit Hyperactivity Disorder (ADHD) (Barkley, 2014; Willcutt et al., 2005), and other psychological disorders and behaviors.

According to the Learning Disabilities Association of America, “although not a learning disability, different patterns of weakness in executive functioning are almost always seen in the learning profiles of individuals who have specific learning disabilities or ADHD.” Therefore, students with SLD are highly likely to have executive function difficulties.

According to the Individuals with Disabilities Education Act (IDEA), SLD refers to “a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations.” Research shows that in the area of SLD, students with dyslexia typically exhibit difficulty with inhibition and cognitive flexibility (Berninger et al., 2008). Students with dyslexia often have affected Inhibition, Working Memory, and design and verbal Fluency (Reiter, Tucha, & Lange, 2005). Additionally, students who have dysgraphia often present with executive functioning difficulties, especially in working memory, which is required for them to perform the motor planning and orthographic formation of words (Altemeier et al., 2008). Data collected by the Department of Education shows that in 2014, of the total 5,944,241 students ages 6 through 21 served under IDEA, SLD was the most prevalent (39.2 percent) of the thirteen disability categories. “A strong correlation has been found between certain LDs and working memory difficulties. In *Understanding Working Memory: A Classroom Guide* (2007), psychologists Gathercole and Alloway report that approximately 70% of students with LDs in reading score very low on working memory assessments—something that is very rarely seen in students who do not have LDs” (Houston, & Paquet-Bélanger, 2016).

Correspondingly, ADHD is a developmental disorder that is identified during childhood and is diagnosed by the combination of inattention, hyperactivity, and impulsivity (American Psychiatric Association, 2013; Huguet et al., 2017). Research by Rowland et al. (2015) shows that

according to the DSM-IV criteria for ADHD, approximately sixteen percent of students between grades one to five have ADHD. The executive functions are the “unifying abstraction that currently best encompasses the faculties principally affected in ADHD” (Quay & Hogan, 2013). Although ADHD and difficulties with the executive functions are comorbid, no data is showing the percentage of students with ADHD who have EF difficulties and or vice versa. “ADHD is associated with significant weaknesses in several key EF domains. However, executive function weaknesses are neither necessary nor sufficient to cause all cases of ADHD” (Willcutt et al., 2005). As indicated by Huguet et al. (2017), not all students diagnosed with ADHD have executive functioning difficulties.

Nonetheless, symptoms of ADHD (inattention, hyperactivity, and impulsivity) are strongly related to deficits in executive functions (attention, working memory, and inhibition). The consensus is that ADHD mainly affects “task initiation, sustained attention, and response inhibition, as well as goal-directed persistence” (Dawson, 2013). Since there is a high and increasing percentage of students with ADHD in elementary schools, it is essential to provide universal interventions to address these issues (Stuart et al., 2017).

The research also shows that students with autism spectrum disorder tendencies may also “have profound executive skill weaknesses (Hume, Loftin, & Lantz, 2009), including weaknesses in the initiation, planning, and metacognition” (Dawson, 2013). Students with other disabilities such as fetal alcohol syndrome and traumatic brain injury often show difficulties with the executive function especially having “impairments in attention, spatial working memory, planning, set-shifting” (Dawson, 2013).

Executive Functions in Typically Developing Students

As children advance through school, their academic demands continue to increase, so those who are typically developing but have vulnerable executive function challenges may experience academic struggles and may not demonstrate the ability to function in the classroom independently. Executive function difficulties can cause many challenges in students' lives, so providing them with tools to develop competence in these areas is essential and may improve their educational outcome, academic achievement, and school life (Diamond, 2013; Klingbeil et al., 2017). These students may be expected to comply with everyday educational and social norms and rules, which may be unrealistic without proper strategies and support. For example, students who have all the cognitive abilities and skills to complete required classroom tasks may still receive failing grades if they are not able to inhibit their impulse to engage in off-task activities while the teacher is explaining the steps necessary to complete required assignments. Since the general tendency in society is for people to be less understanding of others who do not have a visible disability, students with difficulties with their executive functions may be at a disadvantage. When students demonstrate some of the symptoms of difficulties with their executive functions, especially when these students are cognitively sound, their teachers and families may consider them to be lazy, unmotivated, and ill-mannered and forgetful. Even more disconcertingly, in order to compensate for the difficulties, they are experiencing in their academic lives, students may with EF difficulties develop inappropriate coping skills, such as losing interest in their work and school, ultimately giving up or acting out inappropriately.

Despite their academic or cognitive ability, students with executive function difficulties find it challenging to perform in core academic areas. In the area of reading, typically developing students with executive function difficulties may have difficulty with reading comprehension and

making inferences. Students may also have difficulty with reading fluency. Furthermore, the executive functions are needed for students to develop writing abilities and to work through the steps of the writing process – planning, drafting, writing, editing and revising, take notes, and write at the connected level (Altemeier et al., 2006). Students may also have challenges with writing. They may find it challenging to organize their written work which is evident by poor formatting and cohesion of arguments, grammar, and spelling errors. This type of dysfluent writing does not transition well within the text. Students may also have a slow writing output. Equally, in the area of mathematics, students are often required to use their executive functions to analyze, interpret, and solve mathematical problems. Students may have challenges with multiple step problems such as algebraic equations and word problems. They may also make careless errors. According to Altemeier et al., (2008), students who are learning to read will need to use their executive functions to integrate visual and linguistic information and to retrieve linguistic information from memory automatically. If students are not able to inhibit irrelevant information to retrieve the required responses quickly, they might demonstrate difficulty in encoding information, a critical step in converting new knowledge to memory.

Causes of Executive Function Difficulties

So far, the research shows that there is no single cause leading to the difficulties with the executive functions. However, instead, there is an amalgamation of possibilities such as differences in the development of individual brains, brain injuries, other neurological conditions, and genetics. The executive functions can be affected by a wide range of environmental factors and psychological disorders. Additionally, the executive functions' core areas may have different and multiple producers, such as "behavioral hyperactivity, distractibility, or impulsivity," which are sometimes produced by prefrontal lesions (Willcutt et al., 2005) or genetics. Dysregulation of the executive functions can be comorbid with congenital disabilities (e.g., ADHD, SLD, and Autism), but is neither a cause nor a mandatory requirement for these conditions. However, difficulties with the executive functions are "displayed to various extents as a symptom accompanying many cases of these disorders or conditions" (Salimpoor et al., 2006). Furthermore, the severity of the executive function limitation varies based on the factors outlined above, including the intricacies of the prefrontal cortex, which is responsible for these neural systems.

One's cognitive abilities do not determine the executive functions, so a cognitive disability does not mean that students will have difficulties with the executive functions. Neither does having average cognitive abilities signify that students do not have executive function difficulties. Nor do difficulties with the executive functions mean that students have a disability. Typically developing students as well as those with cognitive disabilities may have executive function difficulties. The cognitive abilities and executive functions are different. The executive functions play a vital role in helping students to make the best use of their cognitive capacities, such as "reasoning, language, visual and spatial, and memory capacities" (Diamond, 2013). The interaction of executive

functions and cognitive abilities is mutually responsible for students' efficiency and effectiveness in performing day-to-day tasks.

Diagnosing Executive Function Difficulties in Students

Difficulties with executive functions are often referred to as Executive Function Disorder (EFD). However, this is not a formal definition under the Diagnostic and Statistical Manual of Mental Disorders (DSM) (American Psychiatric Association, 2013). Therefore, difficulties with the executive functions do not currently fall under any formal medical definition. Nonetheless, students can be classified, diagnosed, or identified to have executive function difficulties by both standardized and informal assessments. Diagnosing dysfunctions with the executive functions is similar to that of other formal disabilities. Symptoms (e.g., poor planning and executing of tasks) are identified and assessed by the clinical practitioners and researchers who are treating the students. Possibilities of other disabilities are eliminated before assessments geared at diagnosing executive function difficulties are administered. The executive functions are “important for problem solving and reasoning, and difficulties with executive function can often make simple tasks challenging. Assessing a child or adolescent’s executive function is an important step to formulate a diagnosis and treatment plan” (Naglieri & Goldstein, 2013). Generally, the available assessments measure specific components of the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) and some of their underlying deficits.

Behavior Rating Inventory of Executive Function (BRIEF)

The Behavior Rating Inventory of Executive Function (BRIEF) is one of the more common assessment tools that assess impairment of executive functions in children between 5 and 18 years old. The BRIEF is completed by the teacher and parents of the children who are suspected of having EF difficulties. The test is structured by “eight clinical scales (Inhibit, Shift, Emotional Control, Initiate, Working Memory, Plan/Organize, Organization of Materials, Monitor) (BRIEF; Gioia et al., 2000). The BRIEF also has two validity scales (Inconsistency and Negativity), which give the clinician a comprehensive picture of the child’s behavior. “The clinical scales form two broader Indexes (Behavioral Regulation and Metacognition) and an overall score, the Global Executive Composite” (BRIEF; Gioia et al., 2000). The BRIEF assessment has a “high internal consistency ($\alpha = .80-.98$) and test-retest reliability ($r_s = .82$ for parents, $.88$ for teachers)” (Gioia et al., 2000). The parent and teacher versions of the BRIEF contain “86 items that are rated on a 3-point scale indicating whether each behavior never occurs, sometimes, or often” (Flook, 2010). The test has an estimated completion time of approximately 10-15 minutes per questionnaire (Gioia et al., 2000).

Then there is also an adult version of the BRIEF, Behavior Rating Inventory of Executive Function—Adult Version (BRIEF-A), that is relevant to examining adults' executive functions. The BRIEF-A is similar to the student’s version but has questions tailored to measuring the executive functions in adults. The BRIEF-A consists of 75 items that measure nine clinical scales of executive functions (Inhibit, Self-Monitor, Plan/Organize, Shift, Initiate, Task Monitor, Emotional Control, Working Memory, Organization of Materials) that were theoretically and empirically derived. The nine clinical scales are further divided into “two broader indexes:

Behavioral Regulation (BRI) and Metacognition (MI)... [which] form the overall summary score, the Global Executive Composite (GEC)” (Roth, et al., 2005).

Comprehensive Executive Function Inventory

The Comprehensive Executive Function Inventory (CEFI®) “is a comprehensive behavior rating scale of executive function strengths and weaknesses in children and youth aged 5 to 18 years” (Naglieri & Goldstein, 2013). The CEFI scores are measure executive functions “strengths as well as weaknesses to form a comprehensive evaluation of executive function behaviors” (Naglieri & Goldstein, 2013). The CEFI measures a list of constructs such as “attention, inhibitory control, planning, emotional regulation, initiation, self-monitoring, flexibility, organization, and working memory” (Naglieri & Goldstein, 2013). CEFI also provides an Interpretive Report with intervention strategies that can be implemented with students. The CEFI has 100 items and is completed by a parent, teacher, and students with at least a 4th and 5th-grade reading level. The estimated administration time is approximately 15 Minutes.

Formative Measures of Executive Function Difficulties in Students

In addition to standardized assessments, some researchers have used assessments such as executive function questionnaires inspired by the BRIEF or questionnaires from Coaching Students with Executive Skills Deficits (Dawson and Guare, 2012). While others conduct observations to measure students’ executive functions (Chan et al., 2008) Although the informal assessments have not scientifically successfully demonstrated the construct validity, they have demonstrated reliability in identifying difficulties in the executive function processes. Generally, assessments are completed by the students’ teachers and parents, or by the students themselves.

Executive Function Difficulty Treatments

Based on the significance of the difficulties resulting from deficits with the executive functions, it is essential to identify solutions that can help students cope, manage, and reduce the symptoms of executive function difficulties. "Children become strategic learners when the schools they attend teach strategies explicitly and systematically and require them to approach their classwork and homework strategically" (Meltzer, L., 2010). The literature shows that some temporary coping strategies and accommodations such as a checklist, time limits, planners, routines, and rewards, both in the classroom and at home, may help students strengthen their executive functions. Unfortunately, although these strategies may work in the short term, they are only temporary solutions and are not generalizable for students to use independently and in all settings.

Another means by which students may strengthen their executive functions is by taking medication (Riggs et al., 2006). Medication is a conventional and effective treatment for the symptoms of executive function difficulties (Hosenbocus & Chahal, 2012). However, these are often iatrogenic and can cause more harm than good (Barkley, 2014). Furthermore, medications are often developed for other diseases, not specifically for executive function difficulties, thus not targeting all the symptoms. In fact, at the time of publication, there are no known medications specifically developed to treat executive function difficulties.

On the other hand, one relatively new strategy that is already showing benefits in strengthening students' executive function skills is mindfulness training (Huguet et al., 2017). Multiple systematic reviews (Burke, 2009; Felver et al., 2016; Harnett & Dawe, 2012; Meiklejohn et al., 2012; Waters et al., 2015) have collected, synthesized and summarized empirical evidence in support of mindfulness training to reduce the effect of executive function difficulties. These

systematic reviews of the literature found that repeated mindfulness practice is "effective at reducing psychosocial problems" (Felver et al., 2016) and improving the executive functions, especially cognitive functioning, emotional regulation (Waters et al., 2015), attention and behavioral self-regulation (Meiklejohn et al., 2012). Also, during implementation, mindfulness program did not cause any adverse effects on students and is thus appropriate and feasible to be implemented (Burke, 2009) and can be beneficial to a variety of student population (Felver et al., 2014), including those in elementary grades, with or without disabilities.

Furthermore, multiple comprehensive meta-analyses (Kallapiran et al., 2015) have findings indicating that, in addition to improving psychological and physiological functioning, mindfulness training produced long-term results. Similar to Burke (2009), who found that over ten percent of participants maintained improvements during a twenty-four-week follow-up period, Kallapiran et al. (2015) found that after three, then six months follow up, participants of mindfulness programs had unchanging or better results. Considering the long-term benefits of implementing a mindfulness program, it may be an "important addition to the repertoire of existing therapeutic techniques" (Harnett & Dawe, 2012) used in reducing executive function challenges in elementary school-aged children.

MINDFULNESS THEORY

Scientists theorize that mindfulness training may be beneficial in improving students' executive functions by changing specific physical structures of the brain. Mindfulness changes the brain by shrinking the amygdala, which is responsible for responses to stress. Additionally, research shows that mindfulness training increasing the physical structure of the prefrontal cortex (Lazar et al., 2005); a section of the brain that has been linked to the development of attention, working memory, response inhibition, and cognitive flexibility (Basso et al., 2019). Mindfulness training also increases the density of the gray matter (Pagnoni & Cekic, 2007; Hölzel et al., 2010), the region of the brain which is responsible for memory, emotions, speech, and decision making, and self-control, (Hölzel et al., 2010). For example, the results from an eight week Mindfulness-Based Stress Reduction (MBSR) study, with a control group suggested that by partaking in the MBSR program the participants showed "changes in gray matter concentration in brain regions involved in learning and memory processes, emotion regulation, self-referential processing, and perspective-taking" (Hölzel et al., 2010). Analysis of the pretest and posttest whole-brain anatomical MRI images of the adults in this study showed that there were increases in other areas of the brain, as well as "the posterior cingulate cortex, the temporoparietal junction, and the cerebellum in the MBSR group compared to the controls" (Hölzel et al., 2010). Mindfulness is also shown to increase cortical thickness in the hippocampus, responsible for emotion regulation, learning, and memory processes.

Brief History of Mindfulness

Throughout history, there have been many different types of meditation practices, which include some similar and some very different activities. For example, some meditation practices focus on attention. ‘Attention meditation encourages concentration on a single object, such as the breath, a part of the body, or an external object. In contrast, open-monitoring meditation encourages non-judgmental and nonattached monitoring of all things coming into our conscious awareness’ (Basso et al., 2019). Still, other types of meditation, such as Transcendental Meditation (TM), require the participants to chant mantras confidentially assigned by their meditation teachers.

Practiced for centuries by Eastern contemplative traditions, mindfulness, a type of meditation, is research-based validated practice. With a religious base in Buddhism and Hinduism (Trousselard et al., 2014), mindfulness meditation found its way to western countries in the early 1900s when a Hindu teacher, Paramahansa Yogananda, traveled to the United States with his teachings. Maharishi Mahesh Yogi, with a slightly different type of meditation practice, the TM, soon followed Yogananda. In 1960, then a part of popular culture, including music bands such as The Beatles and Beach Boys, TM was the dissertation topic of Robert Keith Wallace, a University of Southern California, Los Angeles student. In his study of the physiological effects of TM on college students, Wallace “found that on average they showed significant changes in their physiological state: reductions in oxygen consumption, reductions in resting heart rate, and changes in skin resistance” (Harrington, 2008, p. 213-214). This finding, later coined the fourth level of consciousness, making way for further university studies; including that of Herbert Benson, a cardiologist at Harvard Medical School who named his TM based research “The Relaxation Response” (p. 218-219). With an emphasis on the idea that meditation could be

achieved without any religious affiliation and that the “techniques worked regardless of faith or belief system,” Benson’s research on TM putatively played a crucial role in the secularization (p. 219) of meditation practices. Before long, a secular version of mindfulness, which did not include the chants associated with TM, was adopted.

This contemporary temporal view of mindfulness encouraged other researchers, such as Kabat-Zinn at Massachusetts Institute of Technology (MIT), to experiment with the effects of mindfulness practices. Kabat-Zinn designed an eight weeks Mindfulness-Based Stress Reduction (MBSR) prototype program to study the effectiveness of “the regular, disciplined practice of moment -to- moment awareness or mindfulness,” on patients suffering from stress, chronic disorder, and pain (Kabat-Zinn, 1990, as cited by Harrington, p. 220). The positive findings from the MBSR study led to the burgeoning interest and development of other adult based mindfulness programs for the reduction of stress-related ailments, especially in the hospital setting. Soon adolescents began taking part in the ongoing studies on mindfulness. Ultimately, Mindfulness-Based Intervention (MBI) studies were designed for children at the elementary level. In the early 2000s, researchers began generalizing mindfulness studies to children (Biegel et al., 2009; Grossman et al., 2004). The earlier studies focused on the effects of mindfulness on social and emotional well-being. However, soon after, researchers began studying the effects of mindfulness on the executive functions.

Mindfulness Practice

According to Burke (2014), students engage in mindfulness practice by “paying attention in a particular way,” to obtain a state of mindfulness, the present-centered state of “awareness that emerges when we pay attention in this way.” Although the physical practice of mindfulness varies based on the program, intention, attention, and non-judgment are the three primary non-hierarchical dimensions of mindfulness (Eklund et al., 2017). For mindfulness to occur, the practitioner must have the intention to engage in mindfulness, attention on the act of being mindful, and the right attitude (Shapiro et al., 2006). To engage in a mindfulness practice, the student must conscientiously and intentionally decide to focus their minds on the present moment (Eklund et al., 2017). During the mindfulness practice they seek to pay attention in order to maintain concentration on the body, feelings, the mind, or on the mind and an object (Bishop et al., 2004; Goldstein, 2013; Goleman, as seen in Shapiro & Walsh, 1984, p.334;) all the while seeking to overlook distractions (Eklund et al., 2017). The students accept the physical and mental sensations that they feel and bring their complete attention to the immediate and continuous experience of being in the present moment (Bishop 2004; Kabat-Zinn 2005; Kozak, 2003, p. 22; Siegel 2007; Trousselard et al., 2014). Thirdly, practitioners practice mindfulness nonjudgmentally. While engaging in the mindfulness practice, explanations nor comprehension of the feelings and observations are not required nor subpoenaed. Instead, the students engage in the repetitive practice of refocusing their attention on the breath without judgment, engagement, elaboration, desire, or despise (Baer et al., 2006; Earle, as seen in Shapiro & Walsh; Eklund et al., 2017). They wholeheartedly and consciously observe their thoughts, feelings, and sensations as they come and go in the mind, and as if they are being experienced for the first time (Bishop et al., 2004; Goleman, as seen in Shapiro & Walsh, 1984; Kabat-Zinn, 2005; Siegel, 2007).

It can be deduced that mindfulness is both a process and an outcome that creates the opportunity to reflect on the physical and mental state in the present moment. The state of mindfulness is understood by the “cultivation of the habit of simply noticing sensory perceptions, and not allowing them to stimulate the mind onto thought-chains of reaction” (Goleman, as seen in Shapiro & Walsh, 1984, p. 322 & 332). There is no mandatory setting or condition under which students should engage in mindfulness. Students can engage in mindfulness “anytime and anywhere” (Ott, 2002). However, like with any other new skills, the practice of mindfulness requires commitment, sometimes daily, in order to achieve results (Ott, 2002). During any given mindfulness practice, the actual physical body position can differ significantly from student to student. For example, a student practicing independently may choose to practice in a seated position in either a chair or on the floor with eyes closed. On the other hand, as stated by de Carvalho et al. (2017), mindfulness in the classroom often includes “physical props and using vivid metaphors and images.” Therefore, in a group classroom setting, students may follow a guided program where they play games or engage in movements.

Mindfulness and the Executive Functions

Mindfulness and Inhibition

When the mind is unable to inhibit thoughts, it may wander, become cluttered with unwanted thoughts, or get distracted by external and internal stimuli. Mindfulness training reduces, inattention, and “mind-wandering by disciplining the mind in the art of staying focused” (Diamond, 2013) and maintaining attention on the breath or bodily sensations. In a study investigating the role of meditation on behavior and social-emotional skills in elementary school students, Riggs et al. (2006) found that meditation had a positive effect on students’ behavior,

social-emotional regulation, and inhibition. These results are consistent with other empirical evidence suggesting that mindfulness regulates inhibitory control (Zylowska et al., 2008), “inhibiting distractions or unwanted thoughts” (Moore & Malinowski, 2009).

Mindfulness and Emotional Control

Engaging in mindfulness activities promotes changes in the brain that are responsible for cognitive functioning and emotional regulation; functions that help students “learn, plan, engage in goal-directed activity, handle their own emotions and behave appropriately” (Water et al., 2015). Mindfulness training has shown to be beneficial in improving social-emotional wellbeing (Moreno, 2017) and calmness (Broderick & Metz, 2009) in elementary school students. So far, neurologists can conclude that when people engage in mindfulness practice, they shrink their amygdala, which is responsible for responses to stress. When this area shrinks, we tend to react and respond to stress in a more thoughtful and calculated manner (Ireland, 2014; Renshaw & Cook, 2017). Homogeneously, mindfulness training increases the cortical thickness of the hippocampus, a part of the limbic system, that is “associated with emotion, memory, resilience,” (Wolkin, 2015) and learning (Congleton et al., 2015). Hippocampus is extraordinarily susceptible to stress and stress-related disorders. Researchers have found that mindfulness training increases the gray matter of the hippocampus, concurrently leading to emotional regulation.

Mindfulness and Sustained Attention

Mindfulness training changes the volume of the gray matter in the brain, which is strongly related to attentional processing (Pagnoni & Cekic, 2007; Lazar et al., 2005). Identically, the prefrontal cortex is the part of the brain responsible for “higher-order brain functions” (Moreno,

2017), and when this part of the brain increases, we become more aware and find it easier to concentrate and make decisions (Ireland, 2014). Therefore, when students engage in mindfulness, they begin to experience changes in their executive functions. Similar to the case of inhibition, mindfulness training reduces wandering and refocuses the mind to pay attention (Chambers et al., 2013; Heeren et al., 2009), and improves attention (Felver et al., 2017), concentration (Jayawardene et al., 2017), and focus (Bögels et al., 2008; Rix & Bernay, 2014; Tarrasch, 2017) in elementary school students.

Mindfulness and Working Memory

Quach et al., (2016) conducted one of the first studies investigating the effectiveness of a mindfulness intervention on working memory capacity in adolescents. After the intervention, participants showed significant improvements in their working memory capacity while the waitlist control groups did not. Other research also show that mindfulness training directly improves working memory (Jha et al., 2010).

Mindfulness and Organization

Mindfulness training can increase productivity through the reaction of the mind “to thoughts, sensations, and information, seeing past the old storylines and habitual patterns that unconsciously guide behavior. This creates space to deliberately choose how to speak and act” (Talbot-Zorn & Frieda, 2016). Taking these steps allow students to organize their thoughts and actions.

Mindfulness and Cognitive Flexibility

According to Heeren et al., (2009), when people meditate, they display “higher levels of mindfulness, better attentional performance and higher cognitive flexibility” (Heeren et al., 2009). Previous empirical studies support the claim that mindfulness training may influence and encourage substituting automatic un-thoughtful responses with responses that are deliberate and flexible in changing situations (Moore & Malinowski, 2009). For example, in the case of students with cognitive inflexibility, mindfulness training may give them the skills to carefully evaluate and be flexible with their strategies, especially when solving critical thinking problems.

SYNTHESIS OF THE METHODOLOGICAL THEORIES

Research on the theories of the executive functions and mindfulness is still developing. Nevertheless, enough is known to theorize that, although not a panacea for all, mindfulness may have positive effects on behavior (Felver et al., 2017; Tarrasch, 2017; O’Toole et al., 2017), emotions (de Carvalho et al., 2017; Bannirchelvam et al., 2017; Moreno, 2017), academic performance (Bakosh et al., 2015; Flook et al., 2015; Schonert-Reichl et al., 2015; Weare, K., 2014), and concentration (Jayawardene et al., 2017; Weare, 2014) in students (e.g., Bakosh et al., 2015; Biegel & Brown, 2010; Black & Fernando, 2013; Schonert-Reichl et al., 2015; Crescentini et al., 2016). However, to our knowledge, only a few studies have individually examined the effects of mindfulness training on the executive functions of upper elementary school students as a part of the schools’ curriculum and led by their classroom teacher. Moreover, when implemented, there are many inconsistencies in the methodological designs of the study. This section offers a brief synthesis of the variables relating to implementing a school-wide mindfulness curriculum to improve students’ executive functions.

Mindfulness and the Executive Functions

The literature review shows that mindfulness training has a positive impact on students' psychological and cognitive functions, especially improvements in their attention (Napoli et al., 2005), self-regulation (Gouda et al., 2016; Yoo et al. 2016), behavior (Bögels et al., 2008), and mental processing (O'Toole et al., 2017).

Flook et al. (2010) conducted one of the pioneering works on the effects of mindfulness on elementary students. They researched the effects of school-based Mindful Awareness Practices (MAPs) on the executive functions of elementary school children. The study consisted of 64 elementary school students between 7 and 9 years old and from diverse ethnic backgrounds. The students were evenly separated into an intervention group, receiving ad hoc Mindful Awareness Practices (MAPS) training, and a control group participating in silent reading. Both groups received implementation by an external instructor outside the regular classroom schedule. The researchers collected both pre and posttest data. The study lasted for eight weeks and consisted of 30 minutes biweekly sessions entailing sitting meditation, body scan or lying meditation, games, and focused on awareness of the self, others, and the environment (Flook et al., 2010). Analysis of the Behavior Rating Inventory of Executive Function (BRIEF) questionnaires completed by parents and teachers showed that students improved their ability to "shift, initiate, and monitor" (Flook et al., 2010). With these findings, the researchers concluded: "mindfulness introduced in a general education setting is particularly beneficial for children with executive function difficulties" (Flook et al., 2010). They also acknowledged the limitations with their study and recommended that future studies should be conducted with a larger sample and have post-intervention follow-up test a few months later to check if the findings are lasting and to measure for the ideal "time frame and format for delivery" (Flook et al., 2010). Despite the positive finding of this study, the

intervention time of bi-weekly 30 minutes sessions may not be ideal for implementation in a public education classroom.

Carboni et al., (2013), conducted a pretest and posttest design study to evaluate the effect of mindfulness training on "the cognitive processes of attention regulation, and behavior" of four eight-year old (on average) elementary school boys who were diagnosed with ADHD. The students received one-on-one intervention approximately 30-45 minutes twice weekly over eight weeks from a trained instructor. The Mindfulness-Based Stress Reduction (MBSR) intervention program was used with students at times when they were likely to engage in off-task behaviors. Parents and teachers completed the Behavior Assessment System for Children, Second Edition (BASC-2), and Behavior Rating Inventory of Executive Function (BRIEF) (Carboni et al., 2013). Analysis of the results show that the students' on-task behaviors, inhibition, initiation, and ability to monitor, all increased while their hyperactivity decreased. Despite the positive findings of this study, the sample was tiny.

In New Zealand, Rix and Bernay (2014) investigated the effects of an eight-week elementary school mindfulness curriculum on 126 students between 6 and 11 years old, and their six classroom teachers. The one-hour weekly, mindfulness program was specially designed curriculum delivered by a trained mindfulness facilitator in the regular classroom. The program was designed to incorporate "breath-body awareness, sensory awareness, practices for promoting kindness and gratitude, emotion-regulation, and interconnectedness" (Rix & Bernay, 2014). To collect data, teachers completed biweekly journals and one post-intervention three-month journal documenting the changes they noticed in their students. The researchers found that the students' calm, focus, attention, self-awareness, and positive relationships were positively affected by the intervention (Rix & Bernay, 2014). The researchers also found that the mindfulness intervention

training had a positive impact on teachers because it reduced stress levels. On the other hand, Rix and Bernay (2014) acknowledged that the small sample size was a limitation of their study and recommended that further research should be carried out with a larger sample.

Crescentini et al. (2016) conducted a study to test the effects of mindfulness meditation training on students' attention regulation and psychological wellbeing. For this particular study, the 31 students, who were between ages 7 and 8, were randomly assigned to either an intervention group using a Mindfulness Oriented Meditation (MOM) program or a control group. A private instructor executed the intervention during school hours over three weekly sessions, lasting between 8 and 30 minutes. The sessions were separated into a "series of three meditation exercises or [games], which focused on three types of activities: mindfulness of breathing, mindfulness of body part, and mindfulness of thoughts" (Crescentini et al., 2016). The students completed a self-reporting children version of the Short Mood and Feelings Questionnaire, while the teachers completed the Child Behavior Checklist - Teacher Reporting Form, and the Conner's Teacher Rating Scale. Reporting from the teachers indicated that MOM intervention helped improve the students' emotional functions and attention skills, thus reducing symptoms of ADHD and EFD. Although the results from this study are promising, the small sample size, and intervention outside of the regular curriculum by a private instructor, reduces the chance of detecting an actual effect of mindfulness on the general population. Furthermore, with the current high demands of a typical classroom, it would be challenging to generalize the progressively increasing time requirement of the MOM intervention design into a general education classroom setting.

Tarrasch (2017) offers unconditional support for mindfulness intervention on aspects of self-regulation of attention and emotions. The Mindfulness Language intervention was administered to 242 elementary school students as a part of the school curriculum in grades 2, 4,

and 6, during weekly 45 minutes mindfulness sessions over three months. The Mindfulness Language intervention was embedded in the curriculum at an elementary school in Israel. The activities which include "attention to breathing, attention to sensations or thoughts, and guided imagery" are led by a trained instructor in "in front of a full class with its teacher, in a quiet room with mattresses" (Tarrasch, 2017). Data was collected by the Continuous Performance Test (CPT) Location–Direction Stroop-like task, and Anxiety was assessed using the trait section of the State-Trait Anxiety in Children (STAIC). Positive and negative affect levels were assessed using the Positive and Negative Affect Schedule. After three months of intervention, participants had lower levels of impulsivity and more considerable executive attention, suggesting that "mindfulness may help regulate impulsivity and executive attention, and in turn help children cope with social, emotional, and academic obstacles" (Tarrasch, 2017). Similar to other studies that collected post-intervention follow-up data (Bögels et al., 2008; Lam, 2016), Tarrasch's study indicated that the participants maintained the positive behavioral results that were attained during the intervention. This study is an excellent example of a mindfulness program implemented in the curriculum. However, like the other studies, a 45 minutes session may not be feasible for many public-school settings with the current fast-paced school environment. Another limitation of this study was that there was no randomization, which precluded the reliability of the mindfulness training. Nonetheless, this study has evidence to make a reasonable assumption that mindfulness training was responsible for the improvements in impulsivity.

De Carvalho et al. (2017) conducted a quasi-experiment to evaluate the efficacy of the MindUp curriculum on 454 elementary school students in grades 3 and 4 and 20 teachers. The students were separated into the experimental group, where they received the intervention with the MindUp curriculum or the control group. The MindUp intervention was administered over 15

weekly 45-60-minute sessions, for a total of 50 hours (25 hours delivered by a facilitator and 25 delivered by the classroom teacher). In addition to the 15 sessions, students engaged in a mindfulness practice three times daily for 3 minutes. During these classroom-based mindfulness practices, students focus "their attention on a single resonant sound, then on one's breathing and body sensations and ending the exercise back on the sound, without judgment, while remaining responsive to their internal and external experiences" de Carvalho et al., (2017). Students completed the Positive and Negative Affect Schedule and the Emotional Regulation Questionnaire—children and adolescents, while teachers completed the Emotion Regulation Questionnaire, Self-Compassion Scale questionnaire, and the Maslach Burnout Inventory—educators survey. Despite finding positive effects of the mindfulness intervention program on students' emotional regulation, the data showed no significant effects on students' mindfulness. The results obtained by de Carvalho et al. were inconsistent with other studies conducted on mindfulness intervention and students' level of mindfulness. Additionally, de Carvalho et al., (2017) indicated that there were limitations to their study and future researchers should collect follow up data to show, conduct a randomized study, and "analyze the role of the quality and fidelity of implementation and teachers' characteristics and their effects on children's outcomes" (de Carvalho et al., 2017).

Nadler et al., (2017) conducted a pretest and posttest pilot quasi-randomly study to test the effect of mindfulness training on the calmness, mood, and social dominance of students. The study consisted of 45 students (Fifteen children were in sample 1, and 30 children were in sample 2) between 7 and 9 years old. Students were randomly assigned to either an intervention group where they participated in 10-minutes mindfulness practice (mindful stretches with guided breath-based meditation) or a quiet play activity led by a certified yoga instructor, a trained undergraduate

research assistant, or a local schoolteacher. Students completed an age-appropriate self-report measure of calmness, mood, and social dominance, manikin. Nadler et al. (2017) found that "brief mindfulness practice increases self-reported calmness in young children." The researchers recommended that more brief studies should be conducted since relatively little is known about the effects of briefer practices with young children.

Huguet et al. (2017) conducted a pretest-posttest design pilot study to investigate the effectiveness of group-based mindfulness training on the executive functions of students newly diagnosed with Attention-Deficit Hyperactivity Disorder (ADHD). The participants were five Hispanic children between 7 and 12 years old who were newly diagnosed with ADHD, were not currently being treated otherwise and had no previous mindfulness training. The study was conducted in a clinical setting and consisted of 8 weekly 75 minutes sessions of ad hoc mindfulness intervention training and homework. Researchers used multiple instruments to measure, such as the Stroop Test and the Continuous Performance Test-3, to measure student's levels of executive functions. The study showed that hyperactivity/impulsivity, cognitive inhibition, cognitive task performance, cognitive flexibility, automatic response inhibition, attentional capacity, and processing speed were "improved significantly" after the intervention (Huguet et al., 2017). On the other hand, the results did not show a significant difference in working memory, "inattentiveness, sustained attention, vigilance and impulsivity" (Huguet et al., 2017). Being conducted in a clinical setting with a small sample and long weekly sessions were limitations of the study. These limitations make it difficult to generalize these designs in a typical general education classroom.

Felver et al. (2017) conducted a multiple-baseline single-subject design study on four individual education students between grades four and seven to assess the usefulness and social

importance of the Soles of the Feet (SOF) curriculum on their low academic performance, low academic engagement, and behavioral problems. The SOF intervention was implemented during five consecutive days for 20-30 minutes by outside instructors in a "private room reserved for the school psychologist" (Felver et al., 2017). Baseline and post-intervention data were collected by direct observation of students' behavior during academic times, as well as by social validity questionnaires completed by teachers and students. Upon comparing the baseline and post SOF intervention, researchers found that this means of mindfulness training is feasible for students with special education. Furthermore, academic and behavioral data indicated that the students showed improvements in their academic and behavioral performance. One of the significant advantages of the SOF intervention was that it produced positive improvements in a short period. Nonetheless, there were limitations to this study due to the small sample size. Additionally, the implementation of the intervention took place outside of the regular classroom.

In a recent meta-analysis, the researchers reviewed studies with "randomized controlled trial, quasi-experimental, single group pre-posttest or single-subject design and reported at least one of these outcomes: cognition, academic performance, behavior, socio-emotional, and physiological" (Maynard et al., 2017). The systematic review by Maynard et al. (2017) included 6270 student participants from 61 summaries and 35 syntheses. The analysis showed that mindfulness-based intervention training statistically improved the executive functions (Maynard et al., 2017).

School Wide: Tier 1

Schools are fundamental in educating the whole child by providing students with holistic knowledge that may apply to their academic, emotional, and social lives in an integrated general education classroom setting. Current studies on the effectiveness of mindfulness for improving students' executive function often separate general education students from those who are clinically diagnosed with disabilities. For example, a study conducted by Bögels and his colleagues (2008) only involved students who were clinically diagnosed with "attention deficit-hyperactivity disorder, oppositional-defiant and conduct disorder, and autism spectrum disorder." Similarly, Huguet et al. (2017) conducted a study with a small sample of only students who had been clinically diagnosed with Attention-Deficit Hyperactivity Disorder (ADHD) and symptoms of executive function difficulties. It appears that there are only a few mixed population studies (e.g., O'Toole et al., 2017) in the literature that has been conducted on the whole class or school.

In the same way, when the age of the population is considered, most of the studies conducted to date were implemented on adults and adolescents (e.g., Bögels et al., 2008; Gouda et al., 2016; Dariotis et al. 2016). In general, the research on experienced mindfulness practitioners shows that there are many benefits for adults and adolescents, which comes with a long term mindfulness practice such as "enhanced emotional regulation, attention, and self-awareness...decreasing levels of depression, anxiety, pain, psychological stress, and substance abuse... decreased blood pressure and inflammation, improved immune function and glucose and insulin resistance, and increased telomerase activity" (Basso et al., 2019). Researchers also propose that new studies should be conducted on children at the elementary level since adults' findings are not always applicable to them. In a recent study, some "parents suggested that the training would

have been more effective if their children had received it earlier because adolescence might have made them more resistant to comply" (Bögels et al., 2008).

When new mindfulness programs and interventions are being designed, the entire population should be considered. Nonetheless, although mindfulness training has proven to be a "feasible and acceptable modality of intervention for use in school settings" (Felver, 2015) for the diverse population that can be found in today's classrooms, there has not been much universal school-based mindfulness training. Instead, most researchers have conducted studies outside of the routine of the classroom environments with only a few researches conducted in the natural classroom settings in the regular schedule (Klatt et al., 2013; Black and Fernando 2014). "Mindfulness can be incorporated in significant ways within the public curriculum and does not necessarily have to be some elite practice" (Tarrasch, 2017). Furthermore, by providing intervention in general education, regular classroom setting, students will not need to face the additional stresses associated with being pulled out of the general education classroom (O'Toole et al., 2017). Therefore, researchers should consider implementing long-term mindfulness studies integrated within the general education core curriculum in the ordinary course of the classroom and the school day.

Instructor

The research shows that there are multiple mindfulness studies conducted to date that were implemented by experienced cognitive behavior therapists (e.g., Bögels et al., 2008), external mindfulness instructors (e.g., Crescentini et al., 2016; Flook et al., 2010; Rix & Bernay, 2014), or external facilitators (e.g., Schussler et al., 2015) and not by the regular classroom teachers. Some researchers suggest using outside instructors to guarantee that mindfulness training is implemented

with fidelity (O'Toole et al., 2017; Burke, 2009). Additionally, critics are skeptical of teachers who do not have a mindfulness background (e.g., Meiklejohn et al., 2012). Researchers suggest that although this would be an asset to the benefit of students, "having such a prerequisite may serve as a barrier, especially in communities with low levels of familiarity with contemplative traditions" (Moreno, 2017). Although teachers will need training before or simultaneously with implementing the mindfulness program, their practice of mindfulness is not a necessity, but rather a bonus (Moreno, 2017).

Proponents of classroom teacher-led mindfulness programs suggest that teachers know their students best and thus are better equipped to implement mindfulness programs. They state the importance of teacher-led mindfulness programs to allow the "collective investment in the health of the classroom community in a holistic manner throughout the school day" (Moreno, 2017). Furthermore, teachers will have the advantage of sensing when mindfulness breaks are needed and will thus be able to spontaneously implement movement or stillness as needed (Burke, 2014). Unfortunately, so far, only a few peer-reviewed mindfulness studies have been conducted by the classroom teachers (Shapiro et al., 2015; Zenner et al., 2014). Despite the paucity, research also shows that having teachers implement the mindfulness programs to their students may play a decisive role in increasing students' mindfulness and reduce their symptoms of executive function difficulties (Meiklejohn et al., 2012; Moreno 2017).

Dosage

The dosage is the duration and frequency of mindfulness programs and this varies from daily to weekly or even monthly practices (Huppert & Johnson, 2010). Duration is the length of the mindfulness sessions, and the program implemented. The frequency of a mindfulness program

is the number of sessions that have been completed. Additionally, the systematic review of the literature conducted by Maynard et al., (2017) shows that mindfulness programs at the elementary level generally lasted for eight (e.g., Flook et al., 2010, Bögels et al., 2008; Rix & Bernay, 2014; Huguet et al., 2017) or twelve weeks. There is little investigated work of "minimum commitment" of mindfulness training "needed to attain specific benefits" (Allen et al., 2006) at the elementary level. Burke (2014) recommended a brief mindfulness session correlating to "one minute per year of age." However, many mindfulness studies that have been conducted on elementary school students were typically thirty (e.g., Flook et al., 2010), sixty (Rix and Bernay, 2014) or ninety minutes (e.g., Bögels et al., 2008; Huguet et al., 2017). For some studies, the mindfulness sessions started shorter (e.g., 10 minutes – Crescentini et al., 2016) but slowly increased as the weeks went by (e.g., Crescentini et al., 2016; Flook et al., 2010) to as much as ninety minutes weekly (e.g., Crescentini et al., 2016). Crescentini et al. (2016) noted that this gradual increase in the required duration to meditate was due to the students' initial "immature attentional capacity... and their difficulty to engage in a single activity for long periods." However, these researchers also recommend conducting more systematic investigations on the increasing time model's effects where data is collected during and after the intervention.

According to Tang et al., (2007) "Less information is available on the effects of meditation practices that are both shorter in overall duration and shorter in terms of individual meditation sessions, though the data thus far suggests that shorter practices may offer some of the same cognitive and functional benefits as longer, intense meditation practices." There are no general measures to decide the accurate dosage, which involves the duration and frequency. "Standardized instruments developed to evaluate the frequency of mindfulness practice are needed" (Napoli, M., 2004). Carmody (2009) conducted a study where he found a "correlation between mean effect size

and number of in-class hours was non-significant for both clinical and nonclinical samples. He suggested and suggested that adaptations that include less class time may be worthwhile for populations for whom reduction of psychological distress is an important goal and for whom longer time commitment may be a barrier to their ability or willingness to participate" (Carmody, 2009). Carmody (2009) found that there is a need for more systematic studies to determine the effects of several aspects of MBSR, including time spent in class, amount of homework practice and experience, the spacing of the class sessions, and skills of the instructors, on both immediate and long-term outcomes.

Understanding the dosage of a mindfulness program is an integral part of the implementation. "Analyzing variations in intervention frequency and intensity could also address the possibility that limited exposure to mindfulness practice may initially increase awareness of stress and emotional experience before observable benefits occur" (Greenberg & Harris, 2011). Furthermore, repetition and practice may be critical to alter neural activity and create healthy habits of mind and body, so understanding the differential effects of dosage and intensity and how they may vary by age is a crucial goal for future research.

Mindfulness Programs

There are multiple mindfulness programs marketed to elementary school. These programs generally include fundamental mindfulness activities such as body scanning, paying attention to the breath (Broderick & Metz, 2009) and paying attention to what is happening in the current moment, movement (Rix & Bernay, 2014; Napoli et al., 2005), and physical activities such as games (Meiklejohn et al., 2012). These programs are often advertised as appropriate and are labeled with the corresponding age groups. However, the literature shows that teachers do not always agree with the language in some of the mindfulness programs marketed to the elementary age group and may consider them too abstract or too advanced to engage students. These have led to arguments against the implementation of mindfulness programs in schools, primarily when they are not research-based (Chadwick & Gelbar, 2016, p. 106; Davidson & Kaszniak, 2015).

Although the mindfulness programs for elementary school students "have been derived from different philosophical and theoretical constructs" (Kallapiran et al., 2015), theoretically, they should be age-appropriate and incorporate activities that are engaging and fun for children. For example, age-related issues such as the "increasing self-consciousness" of early adolescents should be considered when designing mindfulness practices that are introspective and could lead "to critical self-evaluations" (Water et al., 2015). Additionally, researchers should be cognizant of developmental theories of younger children to avoid "iatrogenic effects that certain practices could have with children of different ages and characteristics" (Water et al., 2015). The literature shows that programs should include "creatively integrate multimedia technologies and culturally relevant examples into learning materials" (Burke, 2014). When developing mindfulness in schools, there are some fundamental principles for successful implementation including "balancing universal and targeted approaches, developing the mindfulness of school staff, teaching skills and attitudes in

ways that start where young people are by making learning lively, fun and immediate" (Weare, K., 2014). One reputable program with activities that are engaging for kids is the Inner Kids program. It is a home-based family activity mindfulness-based program developed by Susan Kaiser Greenland, "an internationally recognized leader in teaching mindfulness and meditation to children, teens, parents, and professionals" (Greenland, 2016). After reviewing the Inner Kids website, the researchers decided that this was not the appropriate program for this study since the dosage of the sessions was not identified, and the program is designed to be implemented at home with the family. Additionally, Mindful Awareness Practices (MAPs) have a consortium of various types of movements, such as meditation, yoga, and manipulation of breath that seeks to teach practitioners to pay attention to the experiences of the present moment (Bishop et al., 2004; Siegel, 2007). Flook et al. (2010) conducted a study on the effects of MAPs on executive functions of 64 second- and third-grade elementary students between "ages 7–9 years. The program was delivered for 30 minutes, twice per week, for eight weeks" (Flook et al., 2010). The research shows MAPS is effective in improving attentional regulation MAPs in children, and researchers have used ad hoc versions of the MAPs curriculum (incorporating age-appropriate activities) to study its effect on the executive functions of elementary school students. Although the MAPs program was designed for a diverse population, the researchers did not use it since there was no budget to pay for an outside instructor or to pay for the teachers to be MAPs trained. Additionally, the dosage was inconsistent with the shorted dosage being proposed in this study.

Mindfulness programs need to be well tested and evaluated by both evaluators and students to see that they are not only doing what they claim but also engaging for all students. Van de Weijer-Bergsma et al. (2012) conducted a waitlist, pretest, posttest, with follow-up design study to test the effects of a longer duration of a MindfulKids intervention program, modeled after the

MBSR and MBCT, for elementary school students' stress and behavior problems. The 95 students between 8 and 12 years old received the MindfulKids intervention in their classroom from a trained external instructor during twelve, 30 minutes sessions over six weeks. The researchers used the Non-Productive Thoughts Questionnaire for Children, Emotion Awareness Questionnaire, and parent report about their child, social competence and behavior evaluation, Sleep Disturbance Scale for Children, and Teacher Report about Class climate. The researchers found that "some primary prevention effects on stress and wellbeing were found directly after training, and some became more apparent at follow-up" (Van de Weijer-Bergsma et al., 2012). The findings of this study are promising. However, the frequency of the sessions may not be feasible for many public elementary schools.

Mindfulness programs are also delivered by different formats, which range from computer-based (innerexplorer.org; MindYeti.com), app-based (Calm Schools Initiative) to teacher-guided (mindfulschools.com). The Inner Explorer program was one of the primary programs considered for this study. Janice Houlihan and Laura Bakosh created the Inner Explorer mindfulness program based on their training and adaptations of practices from the Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1994) and Relaxation Response (Benson & Klipper, 1992) (Semple et al., 2016). Inner Explorer Kids was designed to teach students "practical techniques to appropriately handle negative emotions such as stress, anxiety, [and] anger" (Inner Explorer) and to "become more aware of there, "inner worlds of senses, thoughts, and emotions" (Semple, et al., 2016). At the elementary level, "teachers and students participate together" to listen to brief (5-10 minutes) audio-recorded mindfulness exercises daily for 18 weeks (Semple et al., 2016). After an introductory week to necessary information about mindfulness and its applications, subsequent segments of the Inner Explorer Kids program guide "students through mindfulness or relaxation

activities (e.g., breath meditation, body scan, and progressive muscle relaxation) ... each segment ends with a few minutes of personal journaling (Semple et al., 2016). The training for teachers to implement the program consists primarily of "a manual and four 15-minute audio recordings that introduce mindfulness concepts, practices, and relevant research" (Semple et al., 2016). Two studies have been conducted using the Inner Explorer program. A waitlist control partially randomized research design study was conducted on a sample of 383 elementary school students by Bakosh (2013). The researcher found that compared to the control group, after the ten weeks of Inner Explore intervention, students' math, science, and social studies improved significantly, especially in the areas. Additionally, the teachers "self-reported greater mindfulness and less perceived stress" (Semple et al., 2016). The researchers also found "little adverse impact on the classroom curriculum" (Semple et al., 2016). The other study was a "non-randomized, controlled study" conducted by Bakosh et al. (2016) on 191 3rd grade low-income elementary students (Semple et al., 2016). In the second study, after eight-weeks of 10-minutes daily Inner Explorer "audio-recorded mindfulness exercises followed by a drawing or writing activity," the researchers found a significant decline in "behavioral events (e.g., first visits, calls home, suspensions, and classroom disruptions)... whereas control group incidents increased. No adverse impact on classroom operations was identified" (Semple et al., 2016). However, this program was not selected due because of the price. The community licenses with full, year-round access for school staff, families, and stakeholders, which would have been needed for the entire school, were more expensive than the selected program.

A pioneering mindfulness program, A Still Quiet Place, was also considered for this study. The MBSR group program was designed by Kabat-Zinn in the 1970s to be used in a clinical setting on "patients suffering from chronic psychological and physiological ailments" (Gouda et al.,

2016). MBSR is developed to be taught over eight weekly classes for meeting 2 hours per week (e.g., Kabat-Zinn, 1990). In general, the research shows that MBSR is effective in improving stress, anxiety, and depression (Kallapiran et al., 2015). In their meta-analysis, Kallapiran et al. (2015) found that "modified MBSR was the most common type of intervention used" in many mindfulness studies. One such adaptation was the creation of a children's version of MBSR called the Still Quiet Place (SQP). The SQP program was designed for children to improve their attention and focus (Saltzman & Goldin, 2008). The program is generally implemented over eight weeks, with weekly sessions ranging from 45 to 90 minutes (Burke, 2014). "The training consists of both formal practice (including body scan, sitting, eating, and walking exercises) and informal practice (focusing attention, attending to the present moment, choosing responses to everyday events)" Materials include a workbook, audio practices, and home-practice monitoring sheets (Saltzman & Goldin, 2008). The program has shown benefit in improving emotional and behavioral self-regulation and general wellbeing in children. To implement the SQP curriculum, teachers must have "established personal mindfulness practice, and participation in an MBSR/MBCT 8-week course or similar" (Burke, 2014). The researchers decided that the MBSR program was not appropriate for this study since its duration was not aligned with the design and financial resources of this study.

Kabat-Zinn's MBSR program influenced mindfulness Oriented Meditation (MOM) program. The MOM program includes specific training on focusing the attention and emotional awareness (Crescentini et al., 2016). Crescentini et al. (2016) conducted a study using an adapted version of the MOM intervention program. This adaptation was implemented during three weekly meetings over eight weeks. Initially, each session lasted for approximately 10 minutes but gradually increased, reaching a maximum of approximately 45 minutes per session at the end of

the eight weeks. The MOM sessions included "mindfulness of breathing, mindfulness of body parts, and mindfulness of thoughts" activities (Crescentini et al., 2016). Results from studies, including MOM training, have found that this type of intervention is feasible in improving students' cognitive, emotional, and social abilities (Crescentini et al., 2016). Despite the positive results found after using the MOM intervention program, the researchers decided that this was not the appropriate program due to the progressively increasing dosages of the intervention sessions. This current student was seeking the program with the shortest dosage.

The programs are often implemented by instructors affiliated with the programs and not by the students' regular teachers. A "theoretically derived, teacher-taught universal preventive intervention that focuses on facilitating the development of social and emotional competence and positive emotions" in children (Schonert-Reichl & Lawlor, 2010) is the Mindfulness Education program. This program was very appealing since it was designed for universal teacher implementation. Schonert-Reichl & Lawlor (2010) conducted a study with a sample of 246 students in grades 4 to 7 to evaluate the effectiveness of the Mindfulness Education program. The program included activities such as "sitting in a comfortable position, attentive listening to a single sound (i.e., a resonating sound instrument, such as a bell or chime), and then using the breath as a focal point for being mindful in the present moment are seen as central to the program to enhance children's self-awareness, focused attention, self-regulation, and stress reduction" (Schonert-Reichl & Lawlor, 2010). It was implemented "three times per day (3 min for each practice, which is extended to longer periods for the students) throughout the program... [over] 10 weeks" (Schonert-Reichl & Lawlor, 2010). The researchers found that students who participated in the ME program showed significant improvement in optimism and self-concept. Besides, there was an increase in "teacher-rated classroom social competent behaviors" (Schonert-Reichl & Lawlor,

2010). To implement the program, "teachers underwent an intensive 1-day training session and received bi-weekly consultation from one of the authors of the ME program curriculum (Nancy Fischer)" (Schonert-Reichl & Lawlor, 2010). Although the program appeared appealing, the researchers did not select it because of the fees associated with training teachers.

Mindfulness-Based Cognitive Therapy for Children (MBCT-C) is another useful mindfulness program that we considered. MBCT-C is the children's version of Mindfulness-Based Cognitive Therapy (MBCT). The MBCT program was designed to treat adults with unhappiness and depression (Segal et al., 2002) and to teach more effective patterns of thought and feelings, encompasses various mental imagery such as body scanning and sitting meditation (Segal et al., 2002). Many studies (e.g., Bögels et al., 2008; and Huguet et al., 2017) have adapted to the MBCT program to make it appropriate for a younger sample. Subsequently, the developers created the children's version of the MBCT, MBCT-C. The MBCT-C includes 12 sessions specifically designed to be implemented in a small group for children between 9 and 12 years old. Many researchers have found that MBCT-C shows positive effects in reducing children's "anxiety, attention, and behavior" (Burke, 2014). The researchers decided that the MBCT-C program was not appropriate for this study since it was designed to be implemented in a small group setting and not as a part of the curriculum by the regular classroom teacher. Additionally, there were not enough financial resources to cover the cost of purchasing the program and training the teachers.

Mindful Schools is a mindfulness program that was created in California and sought to integrate mindfulness in education and is one of the more popular mindfulness programs (Meiklejohn et al., 2012). It is a teacher lead (both external facilitator and classroom teacher), a classroom-based curriculum designed for elementary students through high school. To implement the Mindful Schools curriculum, teachers must have "established personal mindfulness practice,

developed in an 8-week MBSR/MBCT or equivalent learning path," and this is satisfied with the Mindfulness Fundamentals Course (Burke, 2014). The mindfulness lessons take the form of "sound, breath, body, emotions, test-taking, generosity, appreciation, kindness and caring, and others" (Meiklejohn et al., 2012). Lessons can be implemented for "fifteen minutes of sessions, two to three times weekly (Semple et al., 2016) for five to fifteen weeks. The program uses developmentally appropriate strategies to develop students' "attention, self-regulation, and empathy" (Semple et al., 2016). Posttest results from the Mindful Schools intervention training assessments have shown improvements in students' attention. The researchers decided that Mindful Schools inappropriate since the dosage was longer sessions and required teacher training.

MindUp is a popular mindfulness program that was developed for use "by teachers in the Vancouver School Board as part of the Social Emotional Learning program" (Rix & Bernay, 2014). It is a teacher-led curriculum designed to teach mindfulness to children from preschool to 8th grade (de Carvalho et al., 2017). The program's design includes "yoga movements, game, and sitting still" (Meiklejohn et al., 2012). MindUp interventions typically last for 15-weekly, with lessons ranging from 45-60 minutes. By training students using the MindUp program, the researchers on how to improve students' behavior, emotions, and Executive (Rix & Bernay, 2014). Teachers have reported that MindUp requires extensive prep work, which discourages implementation with fidelity. The MindUp curriculum was not selected because the dosage was longer than the design of the study. Additionally, the MindUp program requires teachers to invest preparation time to set up the intervention sessions, which were not included in this study's design.

Intervention Program Selected

After careful consideration of all the programs, the Mind Yeti curriculum was selected as the intervention training program that met all the administrative components most important to stakeholders and school personnel and was appropriate for upper elementary school students. Additionally, Mind Yeti was chosen since it targeted the executive functions, which would be measured. The Mind Yeti curriculum is a resource from the Committee for Children. It was designed to help kids reduce stress, improve focus, and build empathy through an app/website-based mindfulness program. Mind Yeti actively engages and guides the students through short narrated meditative scripts for a variety of moods. It refers to mindfulness as settling the Hubbubbles. All the Mind Yeti sessions were primarily audio with the Hubbubbles floating on the screen except for the first one.

The Mind Yeti program was selected for this study because it allowed for the implementation of the specific determining factors (dosage, instructor, location) that have been analyzed. The program was appropriate for the target population of the study. For example, the Mind Yeti sessions used language that was suitable for students in a school setting between eight and eleven years old. The short duration of the sessions, 5-7 minutes, was also consistent with the recommendation of previous empirical studies. The program was app-based and was easily implemented in the regular classroom setting without any formal training to teachers. This Mind Yeti program was explicitly chosen as an appropriate intervention because it was designed to be a working, mindfulness learning experience that could take place online and be conducted in the classroom setting. This app-based program also allowed us to gauge the exact time frame of how long students were mindful based on the length of the mindfulness sessions. Additionally, this program allowed us to monitor the frequency of the sessions via the same online system.

Although the framework of the Mind Yeti program was designed based on empirical and theoretical research in the area of mindfulness and social-emotional learning, to our knowledge, this is the first evidence-based research that has been conducted on the Mind Yeti program for elementary school students between 3rd and 5th grade. A recent study conducted using Mind Yeti was done by Stanley (2018). The researcher conducted the study to determine the feasibility and effectiveness of a mindfulness meditation program on the self-regulation skills of preschoolers (N=102) from a rural Appalachian Pre-K program over six weeks using the Mind Yeti intervention. For that study, teachers completed pretest and posttest measures. The results did not find a significant interaction effect between time and intervention as both intervention and control groups equally improved from pretest to posttest.

CUMULATIVE THEORETICAL ARGUMENT

When students have difficulties with their executive functions, it is the school's responsibility to ensure that accommodations and strategies are provided to these students. One such strategy is mindfulness. Implementing mindfulness-based intervention programs has significantly increased in public schools around the world. Although there is more research coming out about individual programs, there is very little information about how students use and interpret their mindfulness practices. The limited research across different age groups and populations is the methodological limitation of many studies, making it difficult to generalize findings to general education settings. We have seen studies that have adapted the manual outline of implementation to make mindfulness programs more accessible and appropriate for elementary school students. Due to their limited attention span or lower levels of metacognitive ability, "some forms of sitting meditation practices may be developmentally inappropriate for younger children and even adolescents" (Water et al., 2015). These studies have sessions that may be too long for most public

schools to implement with fidelity, and thus may not be a feasible option (Ritchhart & Perkins, 2000) for elementary schools. Some schools have declined to participate in mindfulness programs due to the frequency factor (Carmody & Baer, 2009). Additionally, Carmody and Baer (2009) found that "adaptations that include less class time may be worthwhile" when implementing mindfulness programs. Brief, daily meditation enhances attention, memory, mood, and emotional regulation in non-experienced meditators (Basso et al. 2019). We need mindfulness programs that are "low-cost, easy-to-implement... do not require extensively trained facilitators and minimize disruption of normal classroom activities... little preparation and minimal time investment required" (Semple et al., 2016). Additionally, recent studies generally have methodological issues, such as relatively small sample sizes of less than 200 participants (e.g., Rix & Bernay 2014), or even smaller than 100 participants (e.g., Flook et al., 2010, Bögels, S. et al., 2008, Crescentini et al., 2016, Gouda et al., 2016, Huguet et al. 2017), with only very few studies (e.g., Tarrasch, 2017) having samples over 200 participants. The study conducted by Tarrasch (2017) exemplifies sample selection since it includes students from multiple elementary grade levels (2nd, 4th, sixth). Researchers such as Moreno (2017) suggest that school-wide mindfulness programs are beneficial as they "may provide insight for other communities where a spontaneous, insider-initiated implementation is unlikely ever to occur."

There have been incongruent theoretical approaches to the field of mindfulness when used to improve the executive functions of elementary school children. There remains the unanswered question of which combination of administrative components of the mindfulness program will produce the best outcomes for students who demonstrate executive function difficulties. The dosage, location, and instructor are all critical variables to be studied before deciding to implement a mindfulness program. In this study, the researchers will expand on previous research by pilot

testing the effectiveness of specifically tailored administrative components (dosage, location, and instructor) that are necessary for successfully improving the executive functions and how these variables are perceived by students when delivered in inclusive school settings.

Chapter 3: Method

INTRODUCTION

The purpose of this chapter is to introduce the research methodology for this pretest-posttest study regarding how the administrative components of a mindfulness intervention program influence the executive functions of elementary school students. The approach we took for this study allowed for a deeper understanding of the students' self-reported executive functions changes pretest to posttest. Additionally, this approach allowed for a deeper understanding of how students perceived the mindfulness training in the elementary school setting.

This chapter discusses the applicability of methodological theories and philosophical assumptions that steered the course of gathering and analyzing the data. It provides detailed steps and justification regarding the method that was used to answer the research questions. The research process is described, and a detailed description of the participants was provided. In general, the primary components of this chapter include the methodology, research questions, hypothesis, research design, variables, measures, treatment, participants, data analysis, delimitations, and procedures taken after data collection.

RESEARCH PROBLEM

There is a gap in the literature of identifying how specifically tailored administrative components (low dosage, classroom implementation location, online delivery method, and little to no required instructor training) of a mindfulness program influence the symptoms of executive function (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties in elementary school students. Furthermore, there is also a gap in the literature of students' opinions regarding mindfulness intervention training.

THE AIM OF THIS STUDY

Conducting this study may make a significant contribution to the existing literature gap for carefully measured comparisons of important administrative components (i.e., dosage, location, and instructor) of a mindfulness program. This study was conducted to verify the relationship between a mindfulness program's key administrative components and how these variables affect the outcome of executive function difficulties in elementary school students. This study will be beneficial in providing insight into the different types of mindfulness programs, as well as their shortcomings and benefits for school curriculum selection committees, principals, and school districts when they seek to select and implement a mindfulness curriculum. Additionally, this whole-school intervention was to provide mindfulness training to students equitably. The severity of the implications of not providing appropriate interventions for elementary school students who have executive function difficulties, the fact that research in this area is nascent, as well as the stimulation from professional literature, make it essential to conduct this study.

RESEARCH QUESTIONS AND HYPOTHESES

Research Question Answered by the Literature Review

RQ: 1. What are the ideal administrative components (i.e., dosage, location, and instructor) of a mindfulness intervention training program to improve the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties of upper elementary school students?

Research Question Answered by the Quantitative Results

RQ.2. What is the effectiveness of a model mindfulness-based intervention on the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and

cognitive flexibility) difficulties of upper elementary school students as measured by the Student Executive Function Mindfulness Questionnaire (SEFMQ)?

H02: There will be reductions in the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties, indicating improvements, of upper elementary school students as measured by the SEFMQ.

Research Questions Answered by the Qualitative Results

RQ. 3. How do students who engage in mindfulness activities rank these mindfulness activities in relation to their improved executive functions?

RQ. 4. How do students who engage in a mindfulness practice understand how the mindfulness activities affect their executive functions (EFs)?

RQ.5. What is the experience of engaging in a mindfulness curriculum at the elementary school level?

The research questions were not adequately answered by the prior literature and as such this research methodology was carried out to answer the research questions. More specifically, the purpose of this pretest-posttest quasi-experiment is to quantitatively evaluate the executive functions of elementary school students after the implementation of mindfulness-based intervention, as well as to gain qualitative insight on the students' self-reported perception of the intervention.

RESEARCH VARIABLES

Independent Variables

The *independent variables* are the conditions being tested and, in this study, was the Mind Yeti program. The independent variable was treated as categorical variables and took on values that were labels (Mind Yeti numbers).

Dependent Variables

The *dependent variables* are the executive functions that (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) were measured and reported by a Likert scale. They are treated as continuous.

Confounding Variables

Additionally, this study wanted to examine if the relationship between participation in the mindfulness intervention and changes in the executive functions exist after controlling for grade level and gender. In this case, grade level and gender are confounding variable.

RESEARCH DESIGN

Quasi-Experiment

We approached an elementary school, and they were receptive to introducing a mindfulness practice as part of their curriculum, but not as a randomized control study because of the school's goal to foster educational equity. Therefore, the reason for not having a control group was due to the ethical considerations from the school board wanting all groups to participate in the intervention at the same level. In this case, conducting a randomized control study was not possible

(Campbell & Stanley, 1963) and was a threat to the internal validity of this study. A prudent option would have been not to perform the study. However, the researchers were zealous in testing the intervention in the natural classroom and school setting, so they accepted the virtual impracticability of this field experimentation being randomized and agreed that conducting a quasi-experiment was an excellent alternative (Cohen et al., 2018, p. 406). Additionally, because of the exceptionally unique nature of this school at the state level, one of the highest performing school districts in California, assessing the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) of students in such a setting was indispensable (Tarrasch, 2017). Thus, it was also determined that this study design would have been appropriate for the evaluation of the effectiveness of this type of educational intervention.

Qualitative and Quantitative Tools

In addition to conducting a quasi-experiment, we decided to use both qualitative and quantitative tools to measure the changes in the students' executive functions and their attitudes towards the intervention. Pretest and posttest data were collected to show the changes after the intervention (e.g., Bögels et al., 2008; Crescentini et al., 2016; Gouda et al., 2016), while qualitative data was collected using self-reporting (Rix & Bernay, 2014) to get information about the lived experience of students in the mindfulness research and to provide more vibrant descriptions of the underlying processes of mindfulness. In other words, this pretest-posttest design study will measure the dependent variables once before the intervention is implemented and twice after implementation. Collecting this type of data allows for the evaluation of outcomes longitudinally in the cohort of subjects managed with a single mindfulness intervention treatment

strategy. Furthermore, there is a strong argument in the literature supporting qualitative (Rix & Bernay, 2014) and quantitative studies. The inclusion of qualitative tools will add an essential dimension to the review of the effects of meditation because they will help the researchers and educators to more deeply understand students' experience with mindfulness (Langdridge 2004). Qualitative methodologies explore narratives, rather than tested predictions about variables, and looks for participants' defined meanings, rather than impose the researchers' meaning (Willig 2008). Additionally, the quantitative and qualitative findings were used to explain and 'provide validation for each other to create a solid foundation for concluding the intervention' (Wisdom & Creswell, 2013).

From an epistemological perspective, conducting this pretest-posttest research is feasible since it contains diverse methodological approaches and combined multiple paradigms (a single paradigm and multiple paradigms), which strategically 'adds rigor, breadth complexity, richness, and depth to a research inquiry' (Venkatesh et al., 2016), as well as provides a model prospect for contribution to the literature and best practices. This pretest-post-test research simultaneously uses both inductive and deductive logic to address research questions (Venkatesh et al., 2016). It also allows for the contribution to the theoretical literature supporting mindfulness and the executive functions in elementary school students. Creswell and Plano Clark (2017) described pretest-posttest research as "methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative data in a single study or series of studies." The general premise of a pretest-posttest approach is that the different combining methods can provide a more comprehensive understanding of the problem than using one method.

Mixed-Methods

This research methodology was carried out to answer the research questions. More specifically, the purpose of this mixed methods research was to quantitatively evaluate the executive functions of elementary school students after the implementation of a mindfulness program as well as to gain qualitative insight on the self-reported perception of the intervention. Conducting a mixed-methods study was due to the core research design of collecting, analyzing, and integrating both qualitative and quantitative data through rigorous procedures (Creswell and Plano Clark, 2017). Additionally, drawing from the strengths and minimizing the weaknesses of qualitative and quantitative methods (Venkatesh et al., 2016), this mixed-methods approach was the appropriate methodological choice since the quantitative and qualitative findings were used to explain and 'provide validation for each other to create a solid foundation for concluding the intervention' (Wisdom & Creswell, 2013).

Creswell and Plano Clark (2017) described a mixed methods research as "methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative data in a single study or series of studies." The general premise of a mixed-methods approach is that combining different methods can provide a more comprehensive understanding of the problem than using one method.

The previous research on executive function difficulties in the classroom show that there are many disadvantages to having such deficits. For example, students may fall behind in their academics and have social challenges. Researchers have been looking at different types of interventions that may reduce the effects of executive function difficulties. Mindfulness intervention has been shown in the research as an effective intervention that could improve the executive functions, and the research lacks in one key area, students' voices. To date, and to our

knowledge, very little research was conducted, which asked students about their interpretation of engaging in mindfulness practice and how they perceive their personal use and generalization of mindfulness skills.

Mind Yeti

After careful consideration of the most popular school-based mindfulness programs, the Mind Yeti curriculum was selected to fit the specifically tailored administrative components (low dosage, classroom implementation location, and little to no required instructor training) for a mindfulness intervention program to be used to improve the executive functions of elementary school students in a school a public elementary school. The Mind Yeti curriculum is an app/website-based mindfulness program designed to help students reduce stress, improve focus, and build empathy. The program actively engaged and guided the students through short narrated mindfulness scripts for a variety of moods to settle the Hubbubbles, unwanted feelings, or thoughts. The Mind Yeti program allowed for the implementation of the specific administrative factors that have been analyzed and appropriate for the study's target population. For example, the Mind Yeti sessions used language that was suitable for students in a school setting between eight and eleven years old and had sessions with short durations, 5-7 minutes, that was consistent with the recommendation of previous empirical studies. The program was app-based and was easily implemented in the regular classroom setting without any formal training to teachers. During the study, teachers followed the Mind Yeti Playlist sequence, which focused on different core executive functions each week. The sequence of the lessons was:

- Week 1: Introduction to mindfulness and inhibition.
- Week 2: Emotional control

- Week 3: Sustained attention
- Week 4: Focused on working memory
- Week 5: Organization
- Week 6: Cognitive flexibility.

There were thirty different Mind Yeti lessons taught over the six weeks. The critical listening components or skills of the Mind Yeti program included: focusing the attention on specific sounds, focusing the attention on counting breaths, imaginations by pretending to be planted (tree in the city), animals (whale talk), or professional workers (sound scientist), identifying their feelings, calming down through belly breathing (diaphragmatic breathing). Greenberg & Harris (2012), recommends “developing a more rigorous scientific base” of mindfulness by designing studies to provide high-quality evidence. This study seeks to address this recommendation as we implemented the most rigorous methodology allowed in this setting, a quasi-experimental design with one group pretest-posttest, a methodology that is widely used for prospective and diagnostic purposes across health and educational professional research.

Participants & Recruitment Procedure

The participant section includes the target population, from which the actual sample was drawn, and used for quantitative and qualitative findings. Additionally, the procedures and justification for selecting the sample were presented. Research shows that intervention on the elementary level is crucial since it sets the foundation for further learning on the secondary level (Walker & Stevens, 2017). The statistical population, studied in the academic year 2018-2019, consisted of 3rd, 4th, and 5th graders in a high performing elementary school in California. Some

of the students in this targeted population demonstrate executive function challenges. Additionally, to adequately address the research questions, the researchers applied the general “rule of thumb” of having a minimum of thirty cases per variable” (Cohen et al., 2018). This sample size was selected to have an adequate number of participants to maximize the efficiency of participant and investigator time, resources to conduct the assessments, and analytic efforts. Having a large sample size is recommended by researchers when there are “multiple variables, only small differences or small relationships are expected or predicted, the sample was broken down into sub-groups, the sample is heterogeneous in terms of variables under study, reliable measures of the dependent variable are unavailable” (Cohen et al., 2018). The researchers also chose this sample size to take into account the non-responses and attrition rates. This sample size produced a confidence interval estimate of approximately 95% with a specified margin of error 2%, which provided some assurance that there was a high probability of detecting a meaningful difference in the parameters.

Sample

To catch the variability of the entire population (N=281), cluster sampling, a probability sampling where the researcher selected all the students and classes in the population, was used (Cohen et al., 2018). Using cluster sampling, the researchers addressed the probability and chance of sample accurately representing the whole. There was a total of three grades (3rd, 4th, and 5th grades). In 3rd grade, there were four classes with an average of 25 students in each class. In 4th grade, there were three classes with approximately 29 students in each class. In 5th grade, there were four classes with each class having an average of 28 students. The pretest sample that received intervention consisted of 88.9% of the population (N=250) heterogeneously mixed, male

and female general education and special education students from 3rd, 4th, and 5th grades. The pretest sample consisted of all four of the 3rd-grade classes, two of the 4th-grade classes, and all four of the 5th-grade classes. The posttest sample that received intervention consisted of 80% of the population (N=210) heterogeneously mixed, male and female general education and special education students from 3rd, 4th, and 5th. The posttest sample consisted of three of the four classes at the 3rd-grade level, two of the three classes at the 4th-grade level, and all four classes at the 5th-grade level.

Ethnic Diversity Index

The sample consisted of students from a high performing school district in a high socioeconomic city in California. According to the California Department of Education, the Ethnic Diversity Index of the sample was 43 during the academic year when the study was conducted. The Ethnic Diversity Index reflects how much racial/ethnic diversity there is among the students enrolled in this district. The Ethnic Diversity Index reflects how evenly distributed these students are among the race/ethnicity categories. The more evenly distributed the student body, the higher the number. A school where all of the students are the same ethnicity would have an index of 0. The exact source of the Ethnic Diversity Index was omitted for confidentiality.

Human Subjects Protections

Regulations and ethical codes from the Institutional Review Board (IRB) at UAB governed this research. The public school granted permission to implement the intervention program in the entire school. Data were collected anonymously to protect the identity of the subjects. The data was protected. Teachers and students did not receive any incentive for participation. The students

were blind to the study and only knew they were expected to participate in the Mind Yeti sessions with their classes.

Pre-Data Collection Procedures

A few days before the intervention, parents were informed of the intervention and activities by email notification sent by the school. Informed consent was obtained from all parents, except for two, who did not give consent for their children to participate in the study. Before the study, all the students, excluding those from whom parental consent was not obtained, were asked for their assent, and they all assented to take part in the study. The recruitment rate was 99.3% of all students. Parents were told that the intervention was a school-wide program. However, their participation in the data collection process was voluntary. The research followed ethical guidelines and was approved by the School's Institutional Board.

The researchers conducted a 15-minute presentation to the classroom teachers to inform them of the study and data collection procedure and answer questions. Teachers were also sent a PowerPoint document with all additional information about the study and the intervention program. Teachers were instructed to describe the study to their students in age-appropriate language and answer questions students may have (Schonert-Reichl & Lawlor, 2010).

Additionally, before the study, teachers were provided with Mind Yeti Playlists that they would use to follow the sequence of the Mind Yeti sessions. This study created two versions of a Mind Yeti Playlist, which the teachers were instructed to use as a guide for the six weeks implementation. The first version of the Mind Yeti Playlist had only the weeks, days, and links to the Mind Yeti sessions. The second version of the Mind Yeti Playlist included one to two sentences about the skills and activities of that lesson, which could have been used as a script to introduce

and conclude the sessions. They were also instructed to follow an intervention dosage of playing a Mind Yeti session at least three times weekly and twice daily (in the morning and after lunch) with their entire class; for implementation, teachers were instructed to use the links that were assigned on the Mind Yeti Playlist. Beyond the introduction to the Mind Yeti session and PowerPoint presentation which they were sent, teachers did not undergo Mind Yeti training with a “curriculum manual that specifically delineated the theory and research guiding the mindfulness program lessons” (Schonert-Reichl & Lawlor, 2010).

Then the students were assigned confidential Mind Yeti numbers on the first day of the study before the pretest data collection. Each student was assigned a number that was distributed by the teachers. Only the researcher and the classroom teachers had access to the Mind Yeti numbers. Teachers were instructed to remind the students to keep the numbers confidential and discard them after the posttest survey.

QUANTITATIVE DATA COLLECTION

The quantitative data collection occurred over two months spanning from October to November. Analysis began shortly after the completion of the intervention and posttest data collections. It was completed over approximately twelve months. There were no significant setbacks or delays in data collection or analysis of the quantitative results. The instruments used by this study allowed the researchers to focus on measuring the changes, if any, in the executive functions as well as the other study objectives. Quantitative analysis was conducted for all the students to compare their pretest to posttest responses. The analysis was conducted for the whole sample, by grade level, and by class level. Further analysis was conducted to compare the performance of classes to each other and to compare grades to each other. It is important to note that this study did not focus on content areas.

The teachers were sent a link by email with the student questionnaires on the first day of the study. They were asked to send out the questionnaires to their students using Google Classroom. Executive Function Questionnaires data were collected online with an electronic compilation of questionnaires. The questionnaire encompassed questions about gender, grade level, and perceived levels of executive functions. Students were encouraged to answer the questions as best as they could. They were also encouraged to ask their teacher for clarification if they had any questions about the items on the questionnaire. Teachers guided the students through the questionnaires and answered questions and made clarifications. Questionnaires were administered in the same order in all classrooms. There were two students without parent/guardian consent, and their classroom teacher gave them alternative assignments during the data collection process. The pretest questionnaires were completed between 24 and 48 hours preceding the first intervention session. Teachers also completed their version of a pretest questionnaire.

After the six weeks intervention program, the students completed the posttest questionnaire. Teachers were sent the link to the posttest by email and asked to forward it to their students through Google Classrooms. Students used the same Mind Yeti numbers that were distributed during the pretest. Similar to the pretest, the teachers guided the students through the posttest questionnaires, answered questions, and made clarifications. The teacher read the questions aloud to guard against biases due to variability in reading proficiencies, and the students marked their answers. Students were encouraged to answer the questions as best as they could. They were also encouraged to ask their teacher for clarification if they had any questions about the items on the questionnaire.

Student Executive Function Questionnaire (SEFQ)

The instrument section provides information about the data-collection instruments used to collect the quantitative data. The researchers used students' questionnaires to collect data. They used the Likert Scale questionnaire to "build in a degree of sensitivity and differentiation of responses whilst still generating numbers" (Cohen et al., 2018, p. 480). This study used the Student Executive Function Questionnaire (SEFQ) to measure students' opinions of the changes in their executive functions before and after the mindfulness intervention. The EFSQ was used to measure the students' executive functions at the beginning and the end of the study ($\alpha=.75$). It was inspired by the Behavior Rating Inventory of Executive Function - Adult Version (BRIEF-A) (Roth, Isquith, and Gioia 2005) ($\alpha=.73-.90$) and the Executive Function Skills Questionnaire (Dawson and Guare 2013). To develop the EFSQ, the researchers reviewed the questions on the Behavior Rating Inventory of Executive Function (Gioia et al. 2000) and the Executive Function Skills Questionnaire (Dawson and Guare 2013). "The BRIEF has demonstrated good reliability, with

high test-retest reliability ($r_s \approx .88$ for teachers, $.82$ for parents) internal consistency (Cronbach's alphas $\approx .80 - .98$), and moderate correlations between parent and teacher ratings ($r_s \approx .32 - .34$)" (Gioia et al., 2018). The BRIEF allowed for a self-reflective examination of the different executive functions using a variety of meaningful data collected and analyzed over time. It was designed to assess the abilities of students' executive function behaviors in the school and home environments. Uniformly, the Executive Skills Questionnaire from *In Coaching Students with Executive Skills Deficits* (Dawson & Guare, 2012) was designed to be completed by the caregivers of students who demonstrate symptoms of executive function difficulties. The questions on the two assessments were compared, and 18 of the most appropriate questions relating to the six executive function composites being studied were selected. Some of the questions were adapted to age-appropriate language.

There were 18 questions covering the six executive function subscales, with three questions targeting each EF subscale, and had a Likert Scale design. The researchers chose the Likert Scale questionnaire because it "build in a degree of sensitivity and differentiation of responses whilst still generating numbers" (Cohen et al., 2018, p. 480). Students were asked to answer each item/question by selecting one of the following five options (Likert scale): 1 Strongly Disagree, 2 Disagree, 3 Neutral, 4 Agree, to 5 Strongly Agree. The mean score of the three questions in each section was calculated to obtain the students' self-reported executive function composite score for each of the six categories (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility). For each executive function, the inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility, higher mean scores indicated higher levels of executive function difficulties. In addition to finding the mean of the categories, the researchers also looked at how students reported on individual items/questions.

Questions were electronically compiled as a questionnaire to be completed online. On the morning of the pretest, teachers were sent the link to the EFSQ and then forwarded this link to their students via Google Classroom. Students were encouraged by their teachers to answer the questions as best as possible and ask their teachers for clarification if they had any doubts about the items on the questionnaire. Data collection was administered in the same order in all classrooms and lasted approximately 30 min in each classroom. Due to limited timing and in order to minimize fatigue, students were only required to complete one pretest and one posttest.

The SEFQ was separated into six sections (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility), with each of the six sections having three items or questions (see the Student Questionnaire subsection below for a detailed list of the sections and items). Students were asked to answer each item/question by selecting one of the following five options: 1 Strongly Disagree, 2 Disagree, 3 Neutral, 4 Agree, to 5 Strongly Agree. The Likert Scale was chosen because it is a standardized and reliable way to measure opinions, perceptions, attitudes, and behaviors. Additionally, this measure gave us more granular feedback about students' perceptions and opinions about their pre-intervention and post-intervention executive functions.

The questionnaire encompassed questions about gender, age, grade level, and perceived levels of executive functions. To obtain the students' self-reported executive function score for each of the six categories (inhibition, emotional control sustained attention, working memory, organization, and cognitive flexibility), the mean score of the three questions in each section was calculated. In general, higher mean scores indicated higher levels of executive function difficulties. While lower scores from the pretest to posttest meant improvements in the levels of executive

functions. In addition to finding the mean of the categories, the researchers also looked at how students reported on individual items/questions.

Student Executive Functions Questionnaire Sections and Items:

- 1) The questionnaire measured students' inhibition; their ability to recognize the need to stop their own behavior and resist impulses. To measure inhibition, students were asked to rate themselves in the following areas: I rush through things, I have problems waiting my turn, and People say I am easily distracted.
- 2) The questionnaire measured students' levels of emotional control; the ability to modulate your emotional response. To measure emotional control, students were asked to rate themselves in the following areas: I have emotional outbursts for little reason, my mood changes frequently, and I get emotionally upset easily.
- 3) The questionnaire measured students' levels of sustain attention; awareness of the impact of your behavior on others. To measure this, students were asked to rate themselves in the following areas: I can remember and carry out a 2- to 3-step routines, I can complete a short task within time limits set by an adult, and I can start homework at an established time, with one reminder.
- 4) The questionnaire measured students' levels of working memory; holding information to solve a problem or carry out a task. To measure this, students were asked to rate themselves in the following areas: I forget instructions easily, I have a short attention span, and I forget what I am doing in the middle of things.
- 5) The questionnaire measured students' levels of organization; managing current and future task demands. To measure this, students were asked to rate themselves in the following areas: I

have trouble prioritizing activities, I don't plan ahead for future activities, and I have trouble finding my things in my desk or in my room.

- 6) The questionnaire measured students' levels of cognitive flexibility; the ability to switch between thinking about different concepts. To measure this, students were asked to rate themselves in the following areas: After having a problem I don't get over it easily, I am bothered by having to deal with changes, I have trouble changing from one activity to another.

Evidence of Reliability

The researchers ensured that the measures were reliable to produce consistent and replicable responses “if it were to be carried out on a similar group of respondents in a similar context” (Cohen et al., p. 268). To reduce the effect of unreliability as seen with longer measures, the researchers used a relatively short assessment. Both the questionnaires and surveys were anonymous since anonymity produce greater honesty. Additionally, Cohen et al. (p. 284) recommended “documenting all aspects and stages of the researched so that they can be checked.” Accordingly, the researchers in this study have kept careful documentary evidence.

Evidence of Validity

The particular instruments used in this study are valid and measure what they proprot to measure. The internal consistency reliability was found to be adequate for the SEFQ through internal (using theoretical pattern matching), external (transferability), and construct (using multiple sources of evidence) validity of this mixed method research. This study follows the Auerbach's and Silverstein's (2003) category of transparency, as well as the Onwuegbuzie's and Johnson's nine type of legitimation (Cohen et al., 2018, p. 250). To further ensure validity, the

researchers also used instrument and sampling triangulation to get a more holistic view of the outcome based on the students' viewpoints from different data collection tools. Additionally, triangulation was used to validate students' responses as a way of accommodating for the possible problem of them not being completely honest or misunderstanding the questions about their executive functions on the quantitative instruments.

Appropriateness of Measures

There was a direct link between the intervention program and the instruments used in this study. As outlined in the Mind Yeti Playlist, each week the intervention training targeted a different category of executive function. For example, week one focused on inhibition, week two targeted emotional control, week three looked at sustained attention, and so on. Additionally, each mindfulness activity was directly related to the questions that were asked on the survey. For example, the mindfulness sessions during week one focused on inhibition.

Quantitative Data Analysis

The data collection instruments as well as the research questions, were considered when choosing the appropriate statistical analysis methods and software. Statistical analysis was accomplished using the Statistical Package for the Social Sciences (SPSS) version 24. The quantitative data was analyzed using the paired sample *t*-test, mixed ANOVA, and Mann-Whitney U statistical methods. A composite score for each executive function subscale was calculated by finding the mean of the three questions relating to each subscale. The descriptive statistics was used to explain general information of the changes in scores.

Preliminary Analysis

One of the first steps taken in analysis was to ensure that there was no missing data and that students had both pretest and posttest results. The researchers screened the data collected from the questionnaires to certify that they were completed seriously and to verify that individual students did not have multiple or missing questionnaires and/or the same answer for all questions. Questionnaires were removed from the results if they met one or all of these exclusion criteria. For the main analyses we only included students who had both pretest and posttest and were not otherwise excluded from the study. We started with data from 281 participants but only 177 was analyzed.

Quantitative Statistical Analyses

Quantitative data was analyzed to check for discernable differences from pretest to posttest which “may increase generalizability within the scientific, scholarly community” (Mertens, 2007). The research questions were used to generate SPSS and SAS v9.4 analysis. Means were compared from pretest to posttest to check for observable changes in the measures. For the Student Executive Function Questionnaire (SEFQ), each of the six executive function category score were computed independently. The questions on the SEFQ instruments used were used to calculate the mean of the executive functions. To find the mean of each executive function, the mean of the three questions relating that each of the six executive function categories will be calculated. The changes in the mean executive function scores from pretest to posttest will then be analyzed using the statistical software Statistical Package for the Social Sciences (SPSS) version 24 and the Statistical Analysis System (SAS) v9.4, SAS Institute Inc., Cary, NC, USA. Quantitative data were analyzed using the paired sample *t*-test, mixed ANOVA, and Mann-Whitney U statistical methods.

SPSS Analysis

The SPSS was the statistical software used to analyze the data. Using SPSS allowed the researchers to conduct complex statistical data analysis with both parametric and nonparametric tests. The significant value was set at an alpha level of .05 ($p < .05$). The results were reported with the p-value and effect size. The p-value is a number between 0 and 1 and interpreted in the following way: A small p-value (typically ≤ 0.05) indicates strong evidence against the null hypothesis, so you reject the null hypothesis. While the p-value reported whether the main effects and interaction terms were statistically significant, the effect size characterizes the degree to which sample results diverge from the null hypothesis (Cohen, 1988, 1994). The effect size is a statistical concept that measures the strength of the relationship between two variables on a numeric scale. We calculated the effect size (Cohen's d) when there was significance. The Cohen's d suggested that $d=0.2$ be considered a 'small' effect size, 0.5 represents a 'medium' effect size, and 0.8 a 'large' effect size. This means that if two groups' means don't differ by 0.2 standard deviations or more, the difference is marginal, even if it is statistically significant. By reporting the effect size, the researchers were able to see the differences between the groups (Kotrlik et al., 2011).

Paired Sample t-Test

The second research question asked, “What is the effectiveness of a model mindfulness-based intervention on the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties of upper elementary school students as measured by the Student Executive Function Mindfulness Questionnaire (SEFMQ)?” To assess if there were statistical differences from pretest to posttest for the whole group and grade

levels, paired sample *t*-tests were conducted. The paired sample *t*-test is a parametric test that compares two means that are from the same individual, object, or related units with an intervention between the two time points. The purpose of the test is to determine whether there is statistical evidence that the mean difference between paired observations on a particular outcome is significantly different from zero. The paired sample *t*-test is the statistical model that compares two means from the same subject at two different times (e.g., pre and post intervention).

To use this parametric procedure, before analyzing the data, we ensured that several assumptions were met in order to assess the quality of the results. Firstly, the dependent variable is numeric and continuous (Likert Scales were used). Secondly, independence of observations was reasonably assumed since the participants in the sample were only counted once. Thirdly, the data was inspected visually using graphical measures, scatterplots, and reasonably showed that the dependent variable was approximately normally distributed. Additionally, the Shapiro-Wilk's significance test demonstrated normal distribution of the dependent variables and no statistically significant differences for the executive functions; Inhibition (p-value < 0.001), emotional control (p-value < 0.001), sustained attention (p-value < 0.001), working memory (p-value = 0.002), organization (p-value < 0.001), or cognitive flexibility (p-value < 0.001). Fourthly, the dependent variables did not contain any outliers as was indicated by the visual examination of boxplots. Finally, the samples are related since the subjects in the pretest are also in the posttest. Subjects who did not meet this criterion were removed during the preliminary analysis. After the assumptions were met, it was deemed appropriate to use the paired sample *t*-test to determine if the mean differences in the executive functions from pretest to posttest were statistically significant.

Mann-Whitney U

To further answer the second research question, we used the Mann-Whitney U test to understand the extent to which the changes after a mindfulness intervention differ by gender, male and female. To conduct this analysis with the Mann-Whitney U, we compared the median between two unrelated groups (male and female) on the same continuous dependent variable, executive functions. To begin, the researchers tested that the data met the basic assumptions to use a Mann-Whitney U test. Firstly, the dependent variable was measured at the ordinal level (Likert Scale items). Secondly, the independent variable consists of two categorical independent groups (male and female). Thirdly, there was independence of observations (there were different participants in each group with no participant being in more than one group). Fourthly, the data was not normally distributed, and the researchers determined that the two distributions had the same shape. The Mann-Whitney U test was deemed an appropriate statistical analysis to compare changes in the executive functions of the sample by gender.

Mixed-Model ANOVA

After determining that mindfulness training enhanced inhibition, working memory, and cognitive flexibility for the entire sample, the researchers wanted to further understand how the grade levels compared to each other. Therefore, a mixed ANOVA was used to determine if the mean differences in executive functions (the dependent variables) were the results of the interactions between grade level (3rd, 4th, or 5th grade, the "between-subjects" factor) and "time" (pretest and posttest, the "within-subjects" factor). Before analyzing the data, we ensured that several assumptions were met in order to assess the quality of the results. Firstly, the dependent variables are continuous. Secondly, within-subjects factor (i.e., within-subjects independent variable) consists of two or more categorical, "related groups" or "matched pairs", indicating that

the same subjects are present in both groups. Thirdly, the between-subjects factor (i.e., between-subjects factor independent variable) each consist of at least two categorical, "independent groups"; gender (2 groups: male or female) and grade level (3 groups: 3rd, 4th, or 5th). Fourthly, side by side plotting of the raw data (histograms and box plots) showed that the data did not demonstrate any significant outliers. Fifth, the dependent variable was approximately normally distributed for each combination of the groups of the two factors (i.e., the within-subjects factor and between-subjects factor). Sixth, we used the Levene's test for homogeneity of variances. The variances are not equal if "Sig." < 0.05. The Levene's test indicates that variances are homogenous for both pretest and posttest in all six areas of executive functions [inhibition pretest (p=.14) and posttest (p=.65); emotional control pretest (p=.35) and posttest (p=.59); sustained attention pretest (p=.50) and posttest (p=.11); working memory pretest (p=.30) and posttest (p=.12); organization pretest (p=.77) and posttest (p=.85); cognitive flexibility pretest (p=.46) and posttest (p=.24)] because all significance values are greater than .05. That is, the variables did not violate the homogeneity of variance assumption needed for a mixed ANOVA. The other equality assumption concerns the bivariate correlations (across subjects) between levels of each within-subject factor. These must all be approximately equal, which is known as sphericity. This assumption is usually assessed via Mauchly's Test and the null hypothesis is that the assumption is being obeyed, evidence against sphericity. When a significant violation of sphericity is found, some form of correction (e.g., Greenhouse-Geisser or Huyhn-Feldt) should be applied to the degrees of freedom, to prevent an increase in the rate of Type-I errors. We conducted the Mauchly's test of sphericity which did not return any results for us. This may be because there were only 2 levels of repeated measures. As such, there is only one set of difference scores and nothing to compare those difference scores against to indicate a violation of sphericity. Therefore, the F-value for the main

effect of time (and its interaction with the between-group variable) does not need to be corrected for violations of sphericity. When the assumption of homogeneity of variance was not met for a data set, we used the obtained *Welch's* adjusted *F* ratio. The characteristics of the design and the meeting the assumptions determined that the mixed model ANOVA was an appropriate analytic approach to compare the students by classes.

SAS v9.4

SAS 9.4 is another software that was used to analyze the quantitative data. In fact, we used the SAS 9.4 to double check that the results shown with the paired sample *t*-test, as well as the mixed ANOVAS were in fact accurate.

Longitudinal Linear Mixed Model

Specifically, we used the SAS 9.4 software to conduct longitudinal linear mixed model with repeated measures (Verbeke and Molenberghs, 1997) to analyze each factor. Covariates included in all models were gender/grade, time and their interaction. Subject was included as a random effect. Post hoc pairwise comparisons were computed using Tukey's Honestly Significant Difference. Statistical decisions were made at the significance level of 0.05.

QUALITATIVE DATA COLLECTION

To determine students' overall perception of the Mind Yeti intervention, after the 6 weeks of intervention, students completed surveys which asked open ended questions about their experiences.

Qualitative Instrument

The second measure, the Student Executive Function Survey (SEFS), asked open-ended questions about students' personal insights and experiences with the Mind Yeti intervention. The researchers used the SEFS as a qualitative research method to develop a rich, detailed understanding of the use of mindfulness training and its effects on students' executive functions from an individual perspective. The SEFS was inspired by the SEFQ and had seven questions relating to inhibition, emotional control, sustained attention, working memory, organization, cognitive flexibility, and the overall opinion of the Mind Yeti program. The questions were open ended and generally asked the students to describe how the particular mindfulness practices influenced their executive functions. This allowed for the students voices to be heard since they had to review what they experienced and how they did or did not benefit from the mindfulness intervention.

Student Survey Sections and Items

The survey asked the students to describe or explain their personal experience with Mind Yeti based on each of the six areas of the EFs.

1. The survey measured students' inhibition; their ability to recognize the need to stop their own behavior and resist impulses. To measure inhibition, students were asked to "explain how the deep breathing activities help you slow down instead of rushing through things."
2. The survey measured students' levels of emotional control; the ability to modulate your emotional response. To measure emotional control, students were asked to "describe the Mind Yeti activities you use to help you to control your feelings when you are angry or sad."
3. The survey measured students' levels of sustain attention; awareness of your attention. To measure this, students were asked "How do the Mind Yeti imagination activities (e.g., imagining you are a scientist) remind you to complete daily routines?"
4. The survey measured students' levels of working memory; Holding information to solve a problem or carry out a task. To measure this, students were asked to "describe any Mind Yeti tricks you use to help you remember your teacher's instructions."
5. The survey measured students' levels of Plan/Organization; Managing current and future task demands. To measure this, students were asked "how do the Mind Yeti lessons help you to keep your things organized?"
6. The survey measured students' levels of Cognitive Flexibility; the ability to switch between thinking about different concepts. To measure this, students were asked "after you have made a mistake, how do the Mind Yeti lessons help you to think about the problem in a different way."

7. The survey measured students' overall opinion of the Mind Yeti program. To measure this, students were asked "is there anything else you would like to say about using Mind Yeti at your school."

Gathering Information

To gather information for this study, students at the elementary school level, at a California public school, were asked to complete a posttest survey after engaging in a six weeks mindfulness intervention program. Students were sent the Student Executive Function Survey (SEFS) by their classroom teachers via Google Classroom. Details about the SEFS measure can be found under the section in qualitative data collection instrument. Students answered the survey questions in their classrooms by typing their short answer responses to the online survey. The responses were automatically sent to the researchers, and only the researchers had access to this information.

Qualitative data was collected to get an overview of students' perception of their experience with the Mind Yeti intervention. The afternoon after the pretest questionnaire, or the following day, students completed the posttest survey. Similar to the with the pretest and posttest questionnaires, teachers were sent a link to the survey. They then they shared the link with their students. To complete the survey, students used the preassigned Mind Yeti numbers. The surveys were open for completion up to 5 days after completing the last intervention session. Questionnaires and surveys were administered in the same order in all classrooms. There are two students without parent/guardian consent, and they were given alternative assignments by their classroom teacher during the data collection process.

Coherence

The aim of this study is to identify the effects of a curriculum embedded school wide mindfulness curriculum on the executive functions of elementary school students. The theoretical goal is to add to the existing literature on mindfulness and the executive functions in elementary schools. Several steps were taken in the design of the study to ensure coherence which included identification of the researchers' philosophical position and detailed description of the sampling strategy.

Transparency Criteria

To meet the transparency criteria for qualitative research, the researchers in this study referred to articles and books on the topic of mindfulness, education, and research. An extensive literature review of elementary and procedural journals from education, sociology, psychology, mindfulness, and meditation was conducted. The searches were conducted on multiple databased such as EDSCO and Google Scholar and included the keywords such as "executive functions," "mindfulness," "elementary schools," "meditation," and "Mind Yeti." Books on the theme of mindfulness and some on the executive functions were ordered from Barnes and Nobles and Amazon. Secondly, the evidence documenting the transparency of this research is the ongoing meticulous citation of sources that were referenced. Proper citation standards were followed. (Moravcsik, 2014). Thirdly, the rationale for choosing the particular measure was that the researchers felt strongly about using measures that were appropriate for assessing students in a classroom setting with a time constraint. The survey was short and had questions that the students were able to answer independently. The research shows that in order to show transparency, researchers should, "provide a rationale for the relevance of a measurement or classification and

an interpretive commentary that provides a deeper understanding of the research findings” (Jackson, 2014).

Validity

The validity of the qualitative section of this study was tested by having two researchers review the patterns in the data and generate categories and themes. To begin, the researchers independently identified the categories and themes before going over them together and validating them.

Credibility

The researchers used triangulation to confidently show the accuracy of the findings. Multiple methods quantitative and qualitative data was collected to allow for the “convergence of information from different sources” (Carter et al., 2014). Analyst triangulation, where multiple researchers analyzed the data was also utilized.

Preliminary Analysis

Once the researchers had the responses to the survey questions, they conducted some preliminary analysis using the printed version of the data. One of the first steps conducted was for the first researcher to read the data and make minor corrections to grammar and spelling errors in students’ reporting. Once the grammar errors were corrected and data could have been easily read, the researchers checked that there was no duplication of records. The labels were also carefully reviewed to ensure students’ identification numbers correctly matched the numbers assigned to their classrooms. In the cases where students had the wrong numbers, they were removed from the study.

Triangulation

Once the preliminary analysis was completed, the project was then sent to the second researcher by the first researcher in order for both researchers to identify patterns in the data. The next step in the preliminary analysis was for each researcher to individually, independent of the other, reread the data to find patterns, or codes. Once found the codes were written down. The researchers then sat together, discussed, and compared the codes that they had identified. The researchers then agreed on the codes which they will be using in the study. These codes were then used to generate themes.

Qualitative Data Analyses

The qualitative data collection occurred over a three-day period in November while analysis and coding began a few months after the completion of the intervention and quantitative data analysis. The qualitative data analysis was completed over the span of approximately six months. There were no major setbacks or delays in data collection or coding the qualitative findings. To find patterns in students' responses, the data was coded by thematic analysis, "a method for identifying, analyzing, and reporting patterns (themes) within data" (Braun & Clark, 2006).

NVivo Software

The Computer Assisted Qualitative Data Analysis Software, NVivo 12, is the data analysis program that was used to code the qualitative data. NVivo 12 was chosen because it is a well-researched qualitative data management program that allows researchers to analyzed data from

different formats. NVivo 12 allowed researchers to store and organize the qualitative data in one platform and provided rich insights from quantifiable demographic information and responses.

Chapter 4: Results and Findings

INTRODUCTION

This chapter delineates the data collection procedures and the quantitative results and qualitative findings of this study which evaluated the efficacy of a mindfulness intervention curriculum with specifically tailored administrative components (short dosage, classroom implementation location, online delivery method, and little to no required instructor training) of a mindfulness intervention program on the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) of elementary school students in a school a public elementary school in California. In addition to collecting numerical data, we also evaluated students' perception of the mindfulness intervention by asking them open ended questions about their experiences. The first section of this chapter outlines the quantitative results and includes the study design, data analysis procedures, research questions, as well as the results outlined in order of statistical analysis. Whereas the second part of this chapter presents the quantitative findings and is organized by the data analysis procedures, research questions, and themes.

QUANTITATIVE RESULTS

To attain the objective of this quasi-experiment, students completed pretest and posttests questionnaires. Although 230 pretest student questionnaires and 180 student questionnaires posttest were returned, only the results from 177 students were included in the study. This was due to the process of preliminary analysis where the researchers removed some results owing to incomplete or obvious disingenuous responses. In fact, after receiving the student questionnaires, the researchers conducted multiple rounds of preliminary data analysis to screen for and remove multiple entries by single students and highly repetitive answers, especially when the same answer

was used for all the questions. Therefore, the data calculated in this result section reflects the questionnaires deemed by the researchers to have been completed prudently and earnestly. The pretest was collected the morning prior to the intervention. The posttest was conducted six weeks post intervention. For the students, each test took 15-20 minutes to be completed.

Participants Characteristics

The quantitative study consisted of 177 students, 96 males and 81 females, from 8 classes on 3 different grade levels (3rd, 4th, and 5th). Grade level were further separated into classes (Class A-H). 3rd grade had 64 students separated into three classes; Class A had 24 students, Class B had 19 students and Class C had 21 students. 4th grade had one class, Class D, and 27 students. 5th grade had a total of 86 students which was separated into four classes; Class E had 19 students, Class F had 25 students, Class G had 21 students, and Class H with 21 students.

Student Attrition

The method of collecting data, the rate of return, and description of the procedures used in follow up and a description of the non-responders are provided. Copies of materials used in intervention are included in the appendix. The student attrition rate was 10% for the student pretest questionnaire, 20% for the student posttest questionnaire, and 72% for the student survey. Not all the teachers collected the assessment data with their classes because the data collection overlapped with other scheduled school activities. Additionally, some teachers did not budget time to collect the data. For the student pretest questionnaire, one of the three fourth grade classes dropped out because the teacher did not collect the data. For the student posttest questionnaire, one of the four third grade classes dropped out of the study because the teacher did not budget enough time to

collect the posttest data. Also, one of the four fourth grade classes (a different class from the pretest), dropped out of the posttest because the teacher did not collect the data. With the student survey, of the 281 surveys sent out, only 181 were completed by the students. Table 3.1 shows the student sample attrition rate for the quantitative data while table 3.2 shows the student sample attrition rate for the qualitative data.

Data Analysis

The Statistical software used to analyze the data were the Statistical Package for the Social Sciences (SPSS) version 24 and the Statistical Analysis System (SAS) v9.4, SAS Institute Inc., Cary, NC, USA. Quantitative data were analyzed using the paired sample *t*-test, Mixed ANOVA, and Mann-Whitney U statistical methods. paired sample *t*-test were used to assess the significance of pretest–posttest changes in the executive function subdomain scores. We examined the change from pretest to posttest for the whole group (grades 3, 4, and 5 combined), changes at grade level (grades 3 and 5 only), and changes at the class level (classes A-H). Mixed ANOVAs were conducted to comprehend if there were interactions between grade level and time on each executive function (inhibition, emotional control, sustained attention, working memory, organization, or cognitive flexibility). The Mann-Whitney U was used to see if the executive functions of the genders changed over time. In other words, we compared the medians between the gender (male (n=96) or female (n=81)) of each executive function (inhibition, emotional control, sustained attention, working memory, organization, or cognitive flexibility) before and after the mindfulness intervention training.

Statistical decisions were made at the significance level alpha 0.05 ($p < 0.05$). Cohen's *d*: small effect = 0.2; medium effect = 0.5; large effect = 0.8. Cronbach Alpha was used to measure

the reliability and internal consistency of the variables. Additionally, to reveal the possible presence of outliers, Z-scores were also calculated and examined for all variables. No outliers were detected. For summarizing and reporting the findings, descriptive statistics such as means, standard deviations, number (N), missing data number (NMiss), mean, median, and minimum and maximum values were generated. Additionally, summaries of the results are graphical presented on tables, charts, and box diagrams.

Research Questions

RQ2: What is the effectiveness of a model mindfulness-based intervention on the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties of upper elementary school students as measured by the Student Executive Function Mindfulness Questionnaire (SEFMQ)?

H02: There will be reductions in the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties, indicating improvements, of upper elementary school students as measured by the SEFMQ.

Whole Sample Analysis

A bivariate paired samples *t*-test was conducted on a sample of 177 elementary school students to compare students' pretest and posttest executive function values (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) before and after a mindfulness intervention training. There were statistically significant differences in the areas of inhibition, working memory, and cognitive flexibility. There were no statistically

significant differences from pretest to posttest in the areas of emotional control, sustained attention, and organization. Table 4.1 shows a summary of the analysis for the whole sample.

Table 4. 1: Descriptive statistics for the entire sample.

EFs	Pretest		Posttest		t	df	Sig. (2-tailed)	Cohen's <i>d</i>
	M	SD	M	SD				
Whole Sample (n = 177)								
Inhibition	2.50	.77	2.23	.77	5.77	176	.00*	.40
Working Memory	2.31	.85	2.13	.83	3.60	176	.00*	.30
Cognitive Flexibility	2.43	.69	2.21	.83	4.56	176	.00*	.30
Emotional Control	2.42	.87	2.25	.93	3.19	176	.09	.20
Sustained Attention	3.80	.63	3.74	.80	1.16	176	.25	.10
Organization	2.39	.81	2.33	.80	1.07	176	.29	.10

($p < 0.05$)

Inhibition

There was a statistically significant difference in the area of inhibition ($t(176) = 5.77$, $p < .001$; $d = .40$) from the pretest ($M = 2.50$, $SD = .77$) to posttest ($M = 2.22$, $SD = .77$) conditions with a small effect. Figure 4.1 shows the difference in the inhibition scores from pretest to posttest.

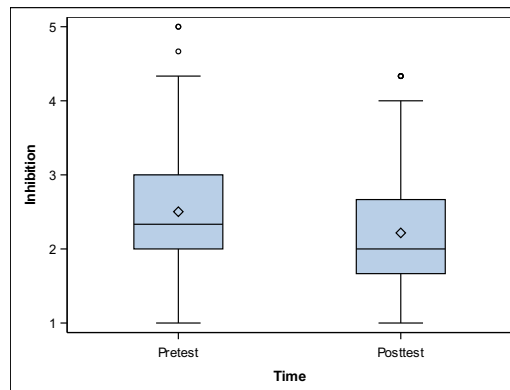


Figure 4. 1: Difference in the scores

Working Memory

There was a statistically significant difference in working memory ($t(176) = 3.6, p < 0.05; d = .30$) with a small effect size ($d = .30$) between the pretest ($M = 2.3, SD = .85$) and posttest ($M = 2.1, SD = .83$) conditions. Figure 4.2. shows the difference in the scores from pretest to posttest for working memory.

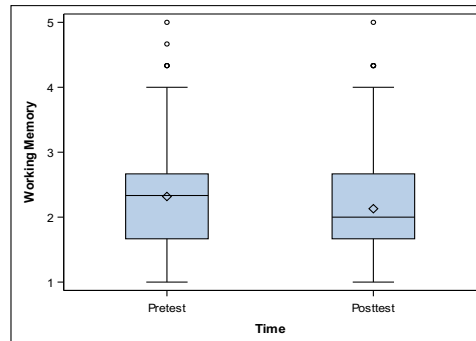


Figure 4. 2: Difference in the scores for working memory

Cognitive Flexibility

There was a statistically significant difference in cognitive flexibility ($t(176) = 4.6, p < .001; d = .30$) with a small effect ($d = .30$) from the pretest ($M = 2.4, SD = .69$) to the posttest ($M = 2.2, SD = .83$) conditions. Figure 4.3 shows the difference in the scores from pretest to posttest for cognitive flexibility.

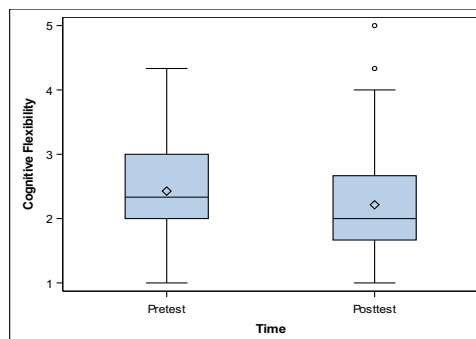


Figure 4. 3: Difference in the scores for cognitive flexibility

Emotional Control

There was no statistically significant difference in emotional control ($t(176) = 3.19$, $p = .08$; $d = .20$) in the scores for the pretest ($M = 2.4$, $SD = .87$) and posttest ($M = 2.3$, $SD = .93$) conditions. Figure 4.4. shows the difference in the scores from pretest to posttest for emotional control.

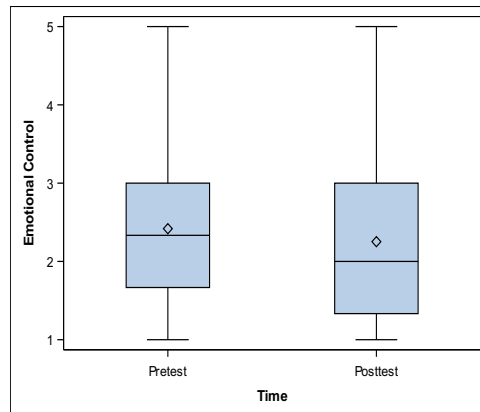


Figure 4. 4: Difference in the scores for emotional control.

Sustained Attention

There was no statistically significant difference in sustained attention score ($t(176) = 1.16$, $p = .43$) for the pretest ($M=3.8$, $SD=.63$) and posttest ($M = 3.7$, $SD = .90$) conditions. Figure 4.5. shows the difference in the scores from pretest to posttest for sustained attention.

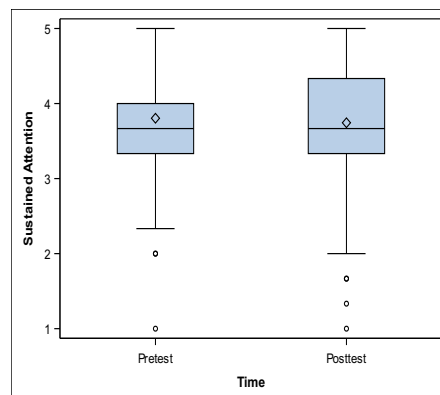


Figure 4. 5: Difference in the scores for sustained attention

Organization

There was no statistically significant difference in the organization scores ($t(176) = 1.10$, $p = 0.48$) for the pretest ($M = 2.4$, $SD = .81$) and posttest ($M = 2.3$, $SD = .80$) conditions. Figure 4.6. shows the difference in the scores from pretest to posttest for organization.

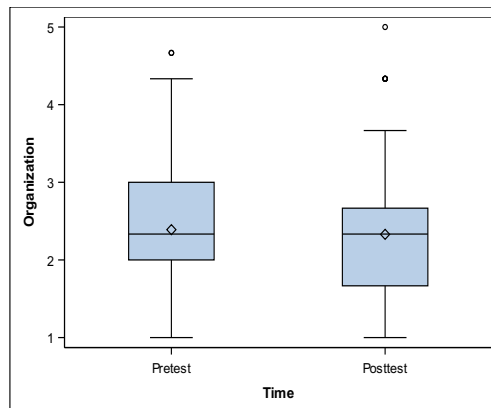


Figure 4. 6: Difference in the scores for organization

Whole Sample Results Summary

In summary, analysis of the results from the whole sample paired sample t -test suggest that when elementary students take part in a mindfulness intervention program with specifically tailored administrative components, their level of inhibition ($t(176) = 5.77$, $p < 0.05$; $d = 0.40$), working memory ($t(176) = 3.6$, $p < 0.05$; $d = .30$), and cognitive flexibility ($t(176) = 4.6$, $p < 0.05$; $d = .30$) is statistically significantly different from pretest to posttest. On the other hand, emotional control ($t(176) = 3.19$, $p = 0.09$; $d = .20$), sustained attention ($t(176) = 1.16$, $p = .25$), and organization ($t(176) = 1.10$, $p = 0.48$) do not show statistically significant differences.

Grade Level Analysis

3rd Grade Analysis

A paired sample *t*-test was conducted on a sample of 64 students in 3rd grade to compare students' executive function (inhibition, emotional control, sustained attention, working memory, organization, cognitive flexibility) before and after a mindfulness intervention training. Results are presented by executive functions and significance. The summary of the results for the 3rd grade classes are given in Table 4.2.

Table 4. 2: Results for 3rd Grade

Scale	Pretest		Posttest		t	df	Sig. (2- tailed)	Cohen's <i>d</i>
	M	SD	M	SD				
Inhibition	2.58	.83	2.31	.81	2.55	63	.02*	.32
Cognitive Flexibility	2.63	.71	2.44	.86	2.10	63	.04*	.23
Emotional Control	2.67	.87	2.54	.93	1.39	63	.17	.14
Sustained Attention	3.80	.93	3.74	.93	1.31	63	.20	.06
Working Memory	2.39	.84	2.35	.87	.42	63	.68	.04
Organization	2.53	.83	2.57	.77	-.37	63	.71	.05

($p < 0.05$)

Inhibition

There was a statistically significant difference in inhibition ($t(63) = 2.55$, $p = .01$; $d = .32$) in the scores with a small effect ($d = .32$) from the pretest ($M=2.56$, $SD = .83$) to the posttest ($M = 2.31$, $SD = .81$) conditions.

Cognitive Flexibility

There was a statistically significant difference in the cognitive flexibility scores ($t(63) = 2.10$, $p = .04$; $d = .20$) with a small effect ($d = .20$) for the pretest ($M = 2.63$, $SD = .71$) and posttest ($M = 2.44$, $SD = .86$) conditions.

Emotional Control

There was not a statistically significant difference in the emotional control scores ($t(63) = 1.39, p = .17$) for the pretest ($M = 2.67, SD = .87$) and posttest ($M = 2.54, SD = .93$) conditions.

Sustained Attention

There was no statistically significant difference in the scores sustained attention ($t(63) = 1.309, p = .195$) for the pretest ($M = 3.8041, SD = .92676$) and posttest ($M = 3.7439, SD = .92677$) conditions.

Working Memory

There was not a statistically significant difference in working memory ($t(63) = .42, p = .68$) the scores for the pretest ($M = 2.39, SD = .84$) and posttest ($M = 2.35, SD = .87$) conditions.

Organization

There was no statistically significant difference in the organization scores ($t(63) = -.374, p = .710$) for the pretest ($M = 2.53, SD = .83$) and posttest ($M = 2.57, SD = .77$) conditions.

3rd Grade Analysis Summary

The results suggest that mindfulness intervention can improve the inhibition ($t(63) = 2.55, p = .01; d = .32$) and cognitive flexibility ($t(63) = 2.10, p = .04; d = .23$),) of 3rd grade students. However, the emotional control ($t(63)=1.39, p=.17$), sustained attention ($t(63)=1.31, p=.20$), working memory ($t(63)=.42, p=.68$), and organization ($t(63)=-0.37, p=.71$) of these students do not show statistically significant differences from pretest to posttest after the mindfulness training.

4th Grade Analysis

A paired sample *t*-test was conducted on the 27 students in the fourth-grade class, Class D, to compare students' executive functions (inhibition, emotional control, sustained attention, working memory, organization, cognitive flexibility) before and after a mindfulness intervention training. Results are presented by executive functions and significance. The summary of basic descriptive statistics for 4th Grade is given in Table 4.3.

Table 4. 3: Results for 4th Grade

Scale	Pretest		Posttest		95% for Mean Difference		t	df	Sig. (2-tailed)	Cohen's <i>d</i>
	M	SD	M	SD						
Inhibition	2.54	.83	2.23	.73	.49	.49	3.40	26	.00	.39
Emotional Control	2.63	.96	2.19	1.03	.69	.69	3.77	26	.00	.45
Sustained Attention	3.86	.48	3.65	.59	.40	.40	2.30	26	.03	.39
Working Memory	2.57	.90	2.07	.83	.76	.76	3.87	26	.0	.57
Cognitive Flexibility	2.35	.68	2.01	.77	.52	.52	3.67	26	.00	.46
Organization	2.27	.72	2.16	.74	.37	.37	.87	26	.39	

($p < 0.05$)

Inhibition

For inhibition, there was a statistically significant difference in the inhibition scores ($t(26) = 3.41$, $p < .05$; $d = 0.39$) with small effect ($d = 0.39$) for the pretest ($M = 2.54$, $SD = .828$) and posttest ($M = 2.23$, $SD = .73$) conditions.

Emotional Control

There was a statistically significant difference in the Emotional Control scores ($t(26) = 3.77$, $p = .00$; $d = 0.45$) small effect ($d = 0.45$) for the pretest ($M = 2.63$, $SD = .96$) and posttest ($M = 2.19$, $SD = 1.03$) conditions.

Sustained Attention

There was a statistically significant difference in the scores with a small effect ($d = 0.39$) for the pretest ($M = 3.86$, $SD = .48$) and posttest ($M = 3.65$, $SD = .59$) conditions; $t(26) = 2.31$, $p = .03$; $d = 0.39$.

Working Memory

There was a statistically significant difference in the Working Memory scores ($t(26) = 3.87$, $p = .00$; $d = 0.57$) with a small effect small effect ($d = 0.57$) for the pretest ($M = 2.57$, $SD = .90$) and posttest ($M = 2.07$, $SD = .85$) conditions. The effect size for this analysis was considered a Cohen's (1988).

Cognitive Flexibility

In the area of Cognitive Flexibility, there was a statistically significant difference in the scores Cognitive Flexibility ($t(26) = 3.67$, $p < .05$; $d = 0.46$) small effect analysis ($d = 0.46$) for the pretest ($M = 2.35$, $SD = .68$) and posttest ($M = 2.01$, $SD = .77$) conditions.

Organization

In the area of Organization, there was no statistically significant difference in the organization scores ($t(26) = .87$, $p = .39$) for the pretest ($M = 2.27$, $SD = .722$) and posttest ($M = 2.16$, $SD = .74$) conditions.

4th Grade Analysis Summary

In summary, analysis of the results from a paired sample *t*-test suggest that when 4th grade students take part in a mindfulness intervention program with specifically tailored administrative components, their level of inhibition ($t(26) = 3.41, p < .05; d = 0.39$), emotional control ($t(26) = 3.77, p=.00; d = 0.45$), sustained attention ($t(26) = 2.31, p = .03; d = 0.39$), working memory ($t(26) = 3.87, p = .00; d = 0.57$), and cognitive flexibility ($t(26) = 3.67, p < .05; d = 0.46$) is statistically significantly different from pretest to posttest. On the other hand, organization ($t(26) = .87, p=.394$) does not show statistically significant differences.

5th Grade Analysis

A paired sample *t*-test was conducted on a sample of 86 students in 5th grade to compare students' executive functions (inhibition, emotional control, sustained attention, working memory, organization, cognitive flexibility) before and after a mindfulness intervention training. Results are presented by executive functions and significance. The summary of basic descriptive statistics for the 5th grade classes is given in Table 4.4.

Table 4. 4: Results for 5th Grade

Scale	Pretest		Posttest		95% for Mean		<i>t</i>	df	Sig. (2-tailed)	Cohen's <i>d</i>
	M	SD	M	SD	Difference					
Inhibition	2.43	.71	2.14	.75	.17	.42	4.85	85	.00*	.40
Cognitive Flexibility	2.31	.65	2.11	.79	.17	.42	4.85	85	.00*	.27
Working Memory	2.19	.83	1.98	.76	.06	.35	2.79	85	.01*	.26
Emotional Control	2.16	.72	2.06	.86	-.04	.25	1.48	85	.14	.13
Sustained Attention	3.86	.69	3.88	.83	-.19	.15	-.23	85	.82	.03
Organization	2.33	.82	2.21	.80	-.02	.26	1.70	85	.09	.15

($p < 0.05$)

Inhibition

There was a statistically significant difference in the inhibition scores ($t(85) = 4.85$, $p < .00$; $d = .40$) small effect ($d = .40$) for the pretest ($M = 2.14$, $SD = .75$) and posttest ($M = 2.31$, $SD = .81$) conditions.

Working Memory

There was a statistically significant difference in the working memory scores ($t(86) = 2.791$, $p = .01$; $d = .26$) with a small effect ($d = .26$) for the pretest ($M = 2.19$, $SD = .83$) and posttest ($M = 1.98$, $SD = .76$) conditions.

Cognitive Flexibility

There was a statistically significant difference in the scores Cognitive Flexibility ($t(86) = 4.85$, $p < .00$; $d = .27$) with a small effect ($d = .27$) for the pretest ($M = 2.31$, $SD = .65$) and posttest ($M = 2.11$, $SD = .79$) conditions.

Emotional Control

There was not a statistically significant difference in the Emotional Control scores ($t(85) = 1.48$, $p = .82$) for the pretest ($M = 2.16$, $SD = .72$) and posttest ($M = 2.06$, $SD = .86$) conditions.

Sustained Attention

There was not a statistically significant difference in the sustained attention scores ($t(86) = -.23$, $p = .82$) for the pretest ($M = 3.86$, $SD = .69$) and posttest ($M = 3.88$, $SD = .83$) conditions.

Organization

There was no statistically significant difference in the organization scores ($t(85) = 1.702$, $p = .092$; $d = .15$) with effect size ($d = .15$) for the pretest ($M = 2.33$, $SD = .82$) and posttest ($M = 2.21$, $SD = .80$) conditions.

5th Grade Analysis Summary

In summary, analysis of the results from a paired sample t -test suggest that when 5th grade students take part in a mindfulness intervention program with specifically tailored administrative components, their level of inhibition ($t(85) = 4.85$, $p < .00$; $d = .40$), working memory ($t(85) = 2.79$, $p = .006$; $d = .26$), and cognitive flexibility ($t(85) = 1.48$, $p < .001$; $d = .27$) are statistically significantly different from pretest to posttest. On the other hand, emotional control ($t(85) = 1.48$, $p = .144$), sustained attention ($t(85) = -.23$, $p = .82$), and organization ($t(85) = 1.70$, $p = .09$) does not show statistically significant differences.

Grade Level Comparisons

A two-way (time: pretest or posttest) by three (grade level: 3rd, 4th, or 5th) mixed ANOVA was conducted for each of the six executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) to compare students' grade level scores to each other before and after a mindfulness intervention training. The results of the mixed ANOVA are presented by executive functions. The outputs are split into three sections for each of the effects; time, grade level, and time by grade level. Firstly, the effect of time for each of the executive functions shows students' performance before and after the mindfulness intervention training when the grade levels are ignored. Secondly, the effect of grade level

compared students' performance by grade level before and after the mindfulness intervention training while ignoring all other variables. Finally, the effect of time by grade level shows the effect of time on each executive function between the three grade levels. Particular attention is placed on the effect of time by grade level and these results are further reported on a table. Lower scores reflect higher executive function. Improvement in executive function is indicated by a decrease in score from pretest to posttest

Inhibition

Inhibition had a statistically significant main effect of time, $F(1, 174) = 26.79, p < .00$, though this was a weak effect ($\eta^2 = .13$). This effect tells us that if we ignore the grade level of participants, inhibition scores after the mindfulness intervention ($M = 2.23$) were significantly lower than before the intervention ($M = 2.52$). There was no statistically significant main effect of grade, $F(2, 174) = 0.98, p = 0.38$. This effect tells us that if we ignore all other variables, grade level ratings of *inhibition* were significantly different from each other. There was not a statistically significant interaction between the time and the grade level of the participants for inhibition, $F(2, 174) = .02, p = .99$. This effect tells us that time had similar effects on inhibition between the three grade levels. Descriptive statistics showed that while fifth grade participants had a bigger reduction in inhibition score from pretest (mean = 2.43) to posttest (mean = 2.14), the pretest responses for the third grade and fourth grade classes showed a similar pattern, a reduction, in inhibition. Table 4.5 shows the estimated marginal means and time for the effect of time and the grade level for inhibition.

Table 4. 5: Estimated marginal means and time for inhibition.

Effect	Num DF	Den DF	F Value	P-Value	
Grade	2	174	0.98	0.38	
Time	1	174	26.69	<0.00	*
Grade*Time	2	174	0.05	0.95	

(p < 0.05)

Emotional Control

There was a statistically significant main effect of time, $F(1, 174) = 15.08, p < .00$, though this was a weak effect ($\eta^2 = .08$). This effect tells us that if we ignore the grade level of participants, *Emotional Control* scores after the mindfulness intervention ($M = 2.26$) were significantly lower than before the intervention ($M = 2.49$). There was a statistically significant main effect of grade, $F(2, 174) = 5.96, p = .00$, though this was a weak effect ($\eta^2 = .06$). This effect tells us that if we ignore all other variables, grade level ratings of *emotional control* were significantly different from each other. Descriptive statistics showed that while fourth grade participants had a bigger reduction in emotional control score from pretest (mean = 2.63) to posttest (mean = 2.19), the pretest responses for the third grade and fifth grade classes showed a similar pattern, a reduction, in emotional control. There was not a statistically significant interaction between the time and the grade level of the participants for emotional control, $F(2,174) = 2.63, p = .08$. This effect tells us that time had similar effects on *emotional control* between the three grade levels. Table 4.6. shows the estimated marginal means and time for the effect of time and the grade level for emotional control.

Table 4. 6: Estimated marginal means and time for emotional control.

Effect	Num DF	Den DF	F Value	P-Value	
Grade	2	174	7.10	0.00	*
Time	1	174	15.28	0.00	*
Grade*Time	2	174	2.66	0.07	.

(p < 0.05)

Sustained Attention

There was not a statistically significant main effect of time, $F(1,174) = 2.87, p = .09$. This effect tells us that if we ignore the grade level of participants, sustained attention scores after the mindfulness intervention ($M = 3.708$) were not significantly lower than before the intervention ($M = 3.81$). There was no statistically significant main effect of grade, $F(2, 174) = 2.66, p = .07$. This effect tells us that if we ignore all other variables, grade level ratings of sustained attention were not significantly different from each other. There was no statistically significant interaction between the time and the grade level of the participants for sustained attention, $F(2, 174) = 1.26, p = .28$. This effect tells us that time had similar effects on sustained attention between the three grade levels. Table 4.7. shows the estimated marginal means and time for the effect of time and the grade level for sustained attention.

Table 4. 7: Estimated marginal means and time for sustained attention.

Effect	Num DF	Den DF	F Value	P-Value
Grade	2	174	2.46	0.09*
Time	1	174	2.84	0.09*
Grade*Time	2	174	1.34	0.26

($p < 0.05$)

Working Memory

There was a statistically significant main effect of time in the area of working memory, $F(1, 174) = 17.89, p < .00$, though this was a weak effect ($\eta^2 = .09$). This effect tells us that if we ignore the grade level of participants, working memory scores after the mindfulness intervention ($M = 2.14$) were significantly lower than before the intervention ($M = 2.38$). There was no statistically significant main effect of grade in the area of working memory, $F(2, 174) = 2.45, p = .09$. This effect tells us that if we ignore all other variables, grade level ratings of working memory were not significantly different from each other. There was a statistically significant interaction between the time and the grade level of the participants for working memory, $F(2,174) = 3.87, p$

= .02. This effect tells us that time had different effects on working memory between the three grade levels. While fourth grade participants had a bigger reduction in working memory score from pretest (mean = 2.57) to posttest (mean = 2.07), the pretest responses for the third grade and fifth grade classes showed a similar pattern, a reduction, in working memory difficulty. These findings support the notion that 3rd, 4th and 5th grade students have similar changes in their level of working memory difficulty when they engage in an mindfulness program. Table 4.8. shows the estimated marginal means and time for the effect of time and the grade level for working memory.

Table 4. 8: Estimated marginal means and time working memory.

Effect	Num DF	Den DF	F Value	P-Value
Grade	2	174	2.78	0.06
Time	1	174	17.98	<0.00 *
Grade*Time	2	174	4.29	0.02 *

(p < 0.05)

Organization

There was not a statistically significant main effect of time in the area of *organization* $F(1, 174) = .95, p = .33$. This effect tells us that if we ignore the grade level of participants, *organization* scores after the mindfulness intervention ($M = 2.37$) were significantly lower than before the intervention ($M = 2.31$). The interaction between grade and time is not statistically significant (p-value = 0.40). There was a statistically significant main effect of grade in the area of *organization*, $F(2,174) = 2.97, p = .03$. This effect tells us that if we ignore all other variables, grade level ratings of *organization* were significantly different from each other. Descriptive statistics showed that while fourth grade and fifth grade classes showed a similar pattern, a reduction, in organization difficulty from pretest to posttest, 3rd grade students showed an increase in organization difficulty from pretest (mean = 2.51) to posttest (mean = 2.55). There was not a statistically significant interaction between the time and the grade level of the participants for organization ($F(2,174) = .90, p = .41$). This effect tells us that time had similar effects on *organization* between the three

grade levels. Table 4.9. shows the estimated marginal means and time for the effect of time and the grade level for organization.

Effect	Num DF	Den DF	F Value	P-Value
Grade	2	174	3.64	0.02*
Time	1	174	0.99	0.32
Grade*Time	2	174	0.93	0.40

Cognitive Flexibility

There was a statistically significant main effect of time for *cognitive flexibility*, $F(1, 174) = 20.01$, $p < .05$, though this was a weak effect ($\eta^2 = .10$). This effect tells us that if we ignore the grade level of participants, *cognitive flexibility* scores after the mindfulness intervention ($M = 2.19$) were significantly lower than before the intervention ($M = 2.43$). There was a statistically significant main effect of grade cognitive flexibility, $F(2, 174) = 4.40$, $p = .01$. This effect tells us that if we ignore all other variables, grade level ratings of *cognitive flexibility* were significantly different from each other. Descriptive statistics showed that while fourth grade participants had a bigger reduction in cognitive flexibility challenges from pretest (mean = 2.35) to posttest (mean = 2.01), the pretest responses for the third grade and fifth grade classes showed a similar pattern, a reduction, in cognitive flexibility difficulty. There was not a statistically significant interaction between the time and the grade level of the participants for cognitive flexibility, $F(2, 174) = .72$, $p = .55$. This effect tells us that time had similar effects on *cognitive flexibility* between the three grade levels. Table 4.10. shows the estimated marginal means and time for the effect of time and the grade level for *cognitive flexibility*.

Table 4. 10: Estimated marginal means and time for organization.

Effect	Num DF	Den DF	F Value	P-Value	
Grade	2	174	4.94	0.01	*
Time	1	174	20.43	<0.00	*
Grade*Time	2	174	0.61	0.55	

($p < 0.05$)

Summary

In summary, the findings of this two-way mixed ANOVA conducted by grade level for each of the six executive functions to compare students' grade level scores to each other before and after a mindfulness intervention training are presented by executive functions. There was a statistically significant main effect of time for the inhibition ($F(1, 174) = 26.79, p < .00$), emotional control ($F(1, 174) = 15.08, p < .001$), working memory ($F(1, 174) = 17.89, p < .00$), and cognitive flexibility ($F(1, 174) = 20.01, p < .05$). A statistically significant main effect of time tells us that if we ignore all other variables, grade level ratings of these executive functions were significantly different from pretest to posttest. On the other hand, there was no statistically significant main effect of time for the executive functions of sustained attention ($F(1,174) = 2.870, p = .092$) and organization ($F(1, 174) = .95, p = .33$).

There was a statistically significant main effect of grade for the executive functions emotional control ($F(2, 174) = 5.958, p = .003$), organization ($F(2,174) = 2.97, p = .03$), and cognitive flexibility ($F(2, 174) = 4.40, p = .01$). A statistically significant main effect of grade tells us that if we ignore all other variables, grade level ratings of these executive functions were significantly different from each other. On the other hand, there was no statistically significant main effect of grade in the area of inhibition ($F(2, 174) = 0.98, p = 0.38$), sustained attention ($F(2, 174) = 2.66, p = .07$), and working memory ($F(2, 174) = 2.45, p = .09$).

There was a statistically significant interaction between the time and the grade level of the participants for working memory ($F(2,174) = 3.87, p = .02$). This effect tells us that time had different effects on working memory between the three grade levels. Conversely, there was no statistically significant interaction between the time and the grade level for Inhibition ($F(2, 174) = .02, p = .99$), emotional control ($F(2,174) = 2.634, p = .075$), sustained attention ($F(2, 174) = 1.26, p = .28$), working memory ($F(2,174) = 3.87, p = .02$), organization ($F(2,174) = .90, p = .41$), and cognitive flexibility ($F(2,174) = .72, p = .55$).

Gender Comparisons

The Mann-Whitney U was used to compare the medians between two unrelated groups (i.e. gender (male (n=96) and female (n=81)) on the same continuous, dependent variables, executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) before and after a mindfulness intervention training. Results are presented by the dependent variables, the six executive functions.

Inhibition

A Mann-Whitney test indicated that the median change score for inhibition from pretest to posttest was the same for male (Mdn = -.33) and female (Mdn = -.33). This score was not statistically significant, ($U = 35, z = -1.28, p = .20, r = -0.10$). The result supports the research hypothesis that the groups are equal. This indicates that there was no difference in the median score for males and females. Figure 4. 7 shows the box diagram of difference in the scores for inhibition

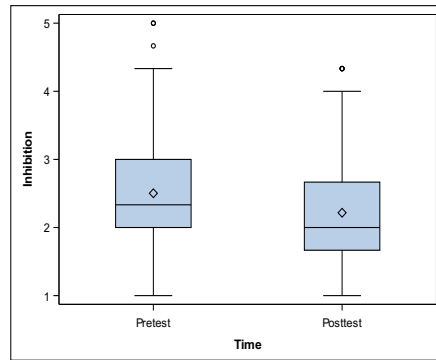


Figure 4. 7: Difference in the scores for inhibition

Emotional Control

The median change score calculated for emotional control from pretest to posttest was lower for male (Mdn = -.16) than female (Mdn = .00). A Mann-Whitney test indicated that this score was not statistically significant, $U = 38$, $z = -.27$, $p = .80$, $r = -0.02$. The result refutes the research hypothesis that the groups are equal. However, the difference is not statistically significant. This indicates that there was no statistically significant difference in the median score for males and females. Figure 4. 8: Shows the box diagram of difference in the scores for emotional control.

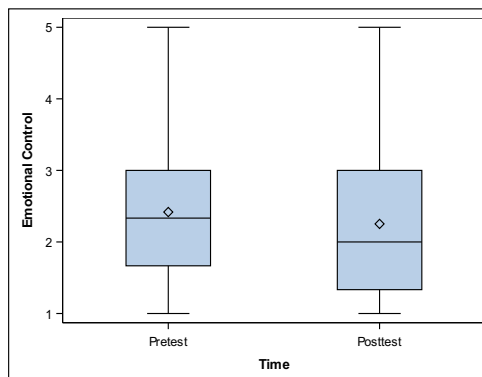


Figure 4. 8: Difference in the scores for emotional control

Sustained Attention

The median change score calculated for sustained attention from pretest to posttest was the same for male (Mdn = .00) and female (Mdn = .00). A Mann-Whitney test indicated that this score was not statistically significant, $U = 3849.5$, $z = -.16$, $p = .91$, $r = -0.01$. The result supports the research hypothesis that the groups are equal. This indicates that there was no difference in the median score for males and females. Figure 4. 9 shows the box diagram of difference in the scores for sustained attention.

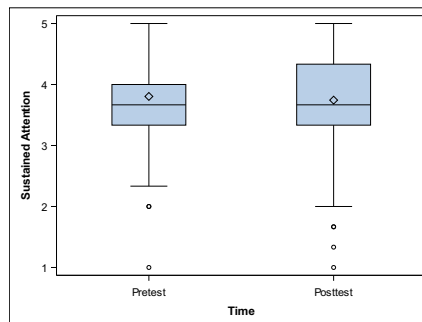


Figure 4. 9: Difference in the scores for sustained attention

Working Memory

The median change score calculated for working memory from pretest to posttest was lower for male (Mdn = -.33) than for female (Mdn = .00). A Mann-Whitney test indicated that this score was not statistically significant, $U = 3441.5$, $z = -1.33$, $p = .18$, $r = -0.10$. The result refutes the research hypothesis that the groups are equal. However, the difference is not statistically significant. This indicates that there was no statistically significant difference in the median score for males and females. Figure 4. 10 shows the box diagram of difference in the scores for working memory.

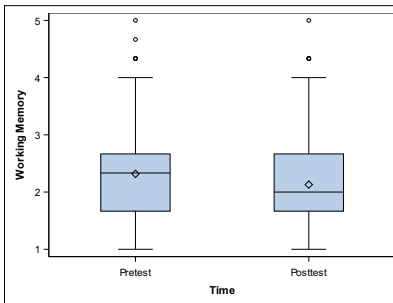


Figure 4. 10: Difference in the scores for working memory

Organization

The median change score calculated for organization from pretest to posttest was the same for male (Mdn = .00) and female (Mdn = .00). A Mann-Whitney test indicated that this score was not statistically significant, $U = 3757$, $z = -.39$, $p = .69$, $r = -0.03$. The result supports the research hypothesis that the groups are equal. This indicates that there was no difference in the median score for males and females. Figure 4. 11 shows the box diagram of difference in the scores for organization.

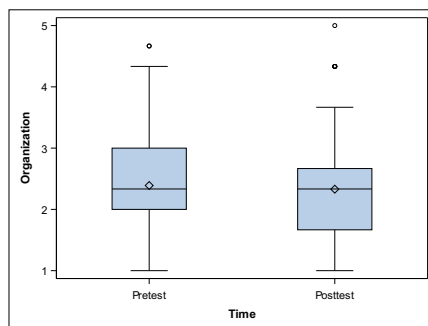


Figure 4. 11: Difference in the scores for organization

Cognitive Flexibility

The median change score calculated for cognitive flexibility from pretest to posttest was the same for male (Mdn = -.33) and female (Mdn = -.33). A Mann-Whitney test indicated that this score was not statistically significant, $U = 3849.5$, $z = -.115$, $p = .91$, $r = -0.0086$. The result supports the research hypothesis that the groups are equal. This indicates that there was no difference in the median score for males and females. Figure 4. 12 shows the box diagram of difference in the scores for cognitive flexibility.

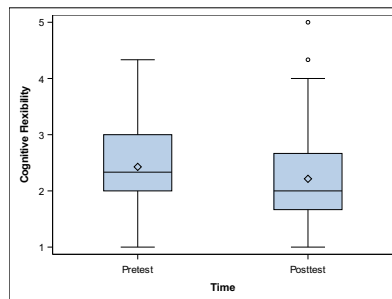


Figure 4. 12 Difference in the scores for cognitive flexibility

Comparison Between Gender Summary

In summary, analysis of the results from a Mann-Whitney U suggest that when male and female students take part in a mindfulness intervention program with specifically tailored administrative components, their level of inhibition ($U = 3461$, $z = -1.28$, $p = .20$, $r = -0.10$), sustained attention ($U = 3849.5$, $z = -.12$, $p = .91$, $r = -0.09$), organization ($U = 3757$, $z = -.39$, $p = .70$, $r = -0.03$), and cognitive flexibility ($U = 3849.5$, $z = -.12$, $p = .91$, $r = -0.01$) support the research hypothesis that the groups are equal. This indicates that there was no difference in the median score for males and females. On the other hand, for emotional control ($U = 3799$, $z = -.27$, $p = .79$, $r = -0.02$) and working memory ($U = 3441.5$, $z = -1.33$, $p = .18$, $r = -0.10$) the results refute the research hypothesis that the groups are equal but the differences are not statistically significant.

QUALITATIVE FINDINGS

Introduction

The primary purpose of this case study was to look at the administrative components (i.e., dosage, location, and instructor) of a mindfulness intervention training program for elementary school children. Particular attention was placed on students' executive functions and how specifically tailored administrative components affect these processes. The qualitative portion of this study explores students' interpretation and generalization of the mindfulness practices they engaged in during the six-week Mind Yeti intervention. "Qualitative data was collected to ensure adequate representations of participant experiences and to capture participant perspectives at each stage of the research process" (Desai, 2015). The researcher applied the consensual qualitative research (CQR) process to analyze the qualitative data. "The three steps for conducting CQR are developing and coding domains, constructing core ideas, and developing categories to describe consistencies across cases (cross-analysis)" (Hill et al., 1997). By following the CQR process, the researcher ensured that the method was credible; the results were consistent and provided an accurate representation of the sample. Additionally, to check for reliability and validity, the researchers also followed Braun and Clark's Thematic Content Analysis (2006). The following research question were developed based on the pattern of the survey questions asked to collect the qualitative data and were used to guide the qualitative aspect of the study:

RQ3: How do students who engage in mindfulness activities rank these mindfulness activities in relation to their improved executive functions (EFs)?

RQ4: How do students who engage in a mindfulness practice understand how the mindfulness activities affect their executive functions (EFs)?

RQ5: What is the experience of engaging in a mindfulness curriculum at the elementary school level?

The remainder of this introductory section begins by reviewing the participants, design, and procedures of the qualitative portion of the study. After the introductory section, the preliminary findings are presented by themes, categories, and codes. Additionally, three research questions were addressed through accompanying citations from the students.

Participants

The results of this qualitative study are based on students' responses to questions on a survey. All the students were at the same school and but from three different grade levels (3, 4, and 5 grade). There were three third-grade classes with a total of 38 students, one fourth-grade class with 27 students, and four fifth-grade classes with 85 students. A cumulative total of 150 students, which included 72 males and 78 females, participated in the qualitative portion of this study.

Emergent Design

The constructivist method emergent design was used to analyze the qualitative findings. "Emergent design refers to the ability to adapt to new ideas, concepts, or findings that arise while conducting qualitative research (Pailthorpe, 2017). It is a flexible approach that allows for the collection, analysis, and interpretation of unforeseen data. Besides, the emergent design is a somewhat conventional design that allows "for interaction between different strands of data at different points of time during the research" (Busetto et al., 2017). "This emergent design study refers to designs whose detailed frameworks emerge during the study, depending on the data and the researchers' interpretation thereof" (Busetto et al., 2017). "In this emergent design study, refers to designs whose detailed frameworks emerge during the study, depending on the data and the researchers' interpretation thereof" (Busetto et al., 2017).

The researcher came to use the emergent theory organically after the analysis of the initial plan to use grounded theory did not wholly pen out as anticipated. Although the emergent design is often "embedded within every stage from conceptualization to publication" (Pailthorpe, 2017), this was not the case in our study. The researcher arrived at the emergent design after noticing that grounded theory was not the appropriate approach from which to analyze this data. The researcher chose an emergent design since it is "especially appropriate for naturalistic or "real world" research," and we wanted to allow the data to shape the design of the study (Wright, 2009). The researcher in this study was actively engaged in the processes, continually reflecting upon the "ontological and epistemological validity, the flexibility to cross between paradigms" (Wright, 2009).

NVivo Analysis

To begin the process of analysis, the students' responses to the survey questions were saved as a Microsoft Office Word document, with the title "Student Survey Responses." A new project with the title, "Student Survey Responses", was created in the NVivo 12 software, the software system which was used to analyze the data. The Microsoft Office Word document with the title "Student Survey Responses" was uploaded as the one source folder that was used in the qualitative section of this project.

Inductive coding was conducted in order to quantify the findings. Case classifications for the demographic attributes of gender, class assignment, and grade levels were assigned. The nodes assigned during the preliminary analysis were entered into NVivo. "Nodes created in NVivo are equivalent to sticky notes that the researcher places on the document to indicate that a particular passage belongs to a certain theme or topic" (Wong L., 2008). Next, codes were assigned to the

students' responses. "A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldaña, J., 2009). "Coding involves the desegregation of textual data into segments, examining the data similarities and differences, and grouping together conceptually similar data in the respective nodes" (Wong L., 2008). Several nodes were created during the preliminary analysis and the NVIVO word frequency analysis was conducted. Matrix coding query was then used to make comparisons to compare attitudes the different Mind Yeti activities students found most beneficial. The researchers then choose the top four responses from the matrix display of coding references.

Qualitative Analysis

The qualitative procedure took multiple steps. One of the first steps undertaken by the researcher was to prepare the raw data for analysis. By this, the researcher downloaded the raw data on the google slides to excel files and organized the data by grades. The researcher then read through the raw data and made grammatical corrections including spelling, capitalization and punctuation. Next, the researcher began the coding process concurrently with, but independent of, an auditor. The auditor was well versed in analyzing and coding qualitative data. This first step in the process was focused on using thematic analysis to code the 150 transcripts. The researcher and the auditor hand coded the data by rereading the raw data and noting any patterns or repeated words the in data. "The themes were data-driven and resulted from an iterative inductive process whereby qualitative data were read and coded without interpretation" (Dariotis et al., 2016). The researchers met regularly, daily over the course of a week, to discuss and compare the patterns that emerged during the independent coding process (Dariotis et al., 2016). Particular words were

identified and used to search NVIVO for frequency. Once frequency was determined, a close look was placed on the executive functions under which these codes were developed. The researcher and auditor decoded the data to find idiosyncrasies before encoding a cumulative total of thirty preliminary *codes*.

To check for reliability, the researcher and the auditor engaged in a second cycle of coding where they discussed and revised the thirty coded data. After the researcher and the auditor reread and recoded (Dariotis et al., 2016) the data, they agreed upon the seven *codes* that they found most representative of the students' responses. "This iterative process minimized the likelihood of missed or misclassified codes" (Dariotis et al., 2016). Next, they looked at how the *codes* related to or differed from each other and generated seven *categories*. Once the *categories* were created, the researcher did another review of the patterns and grouped them into *themes*. The three major themes that emerged from the data are:

1. Preferred Mindfulness Activities
2. Mindfulness Induced State
3. Mindfulness Experience

The next section will provide a comprehensive overview of the findings by the *themes*, *categories*, and *codes* by the whole sample, grades, and gender. Additionally, numbers were included when presenting the qualitative findings. Although this is rather controversial, it is encouraged by "prominent qualitative researchers such as Howard Becker and Martyn Hammersley [who] have supported the inclusion of what Becker called "quasi-statistics": simple counts of things to make statements such as "some," "usually," and "most" more precise"

(Maxwell, 2010). Explanations as well as the meaning of the numbers will be delineated as they are presented throughout the qualitative findings.

Introduction to the Qualitative Findings

Theme one, Preferred Mindfulness Activities, answered the research question, “How do students who engage in mindfulness activities rank these mindfulness activities in relation to their improved executive functions?” Students recognized three *categories* (*breathing activities, imagining activities, and listening activities*), and two *codes* (*emotional control and working memory*) relating to their *Preferred Mindfulness Activities*. The *theme two, Mindfulness Induced Mental State*, answered the second research question, “How do students who engage in a mindfulness practice understand how the mindfulness activities affect their executive functions?” Students acknowledged three *categories* (*calm, relaxed, and focused*) and five *codes* (*inhibitory control, sustained attention, organization, cognitive flexibility, and mindfulness feedback*) linking to their *Mindfulness Induced Mental State*. The *theme three, Mindfulness Experience*, answered the third research question, “What is the experience of engaging in a mindfulness curriculum at the elementary school level?” Students identified one *category* (*Recommendation to Increase Frequency*) concerning to their *Mindfulness Experience*. Table 4.11 shows the themes, categories, and codes which will be presented in this section.

Themes	Categories	Codes	Description
Preferred Mindfulness Activities	Breathing Activities	Emotional Control	Preferred Mindfulness Activities covers the mindfulness activities students thought were most useful in regulating their executive functions.
		Working Memory	
	Imagining Activities	Emotional Control	
		Working Memory	
	Listening Activities	Emotional Control	
	Mindfulness Induced State	Calm	
Sustained Attention			
Organization			
Cognitive Flexibility			
Focused		Mindfulness Feedback	
		Inhibition	
Relaxed		Mindfulness Feedback	
		Inhibition	
Mindfulness Experience	Recommendation to Increase Frequency	Mindfulness Feedback	Mindfulness experience includes students' overall experience with the mindfulness activities introduced through the Mind Yeti curriculum.

Theme 1: Preferred Mindfulness Activities

Preferred mindfulness engagement activities showed that the *breathing, imagining, and listening activities* improved *emotional control* and *working memory*. This information generated the categories of *breathing activities, imagining activities, and listening activities*. Additionally, *emotional control* and *working memory* were identified as codes under this theme.

Category 1. Breathing Activities

The *breathing activities* included the mindfulness activities where the students were asked to focus on their breath, participate in deep belly breathing, or engage in some other activity involving the breath. Under this *category, breathing activities*, two codes, *emotional control* and

working memory, were identified, suggesting that students identified two different areas where they believed that the *breathing activities* were beneficial.

Code 1: Breathing Activities: *Emotional Control*

Students reported that the mindfulness *breathing activities* improved their *emotional control (EC)*. The data shows that of the 52 students who found the *breathing activities* to be useful in improving their *emotional control*, 15 were from third grade (#15), 14 were from fourth grade (#14), and 23 were from fifth grade (#23). Gender analysis shows that both females (#26) and males (#26) equally found that the mindfulness *breathing activities* helped to regulate their emotions. Some examples of what students said regarding how the *breathing activities* helped them to control their feelings when they were angry or sad are presented next.

- 1) “*I breathe and think about what I like to do.*” (Third grader, EC, #4).
- 2) “*I use slow breathing and close my eyes for a minute then look around the room then I just start feeling better*” (Third grader, EC, #14).
- 3) “*When I am angry or sad, I make deep breath and make calmer like Mind Yeti.*” (Fourth grader, EC, #7).
- 4) “*The breathing one because it's just like taking deep breaths and when you do that you calm down*” (Fourth grader, EC, #9).
- 5) “*If I am nervous, such as before a game, I do deep breathing activities to calm me down and prepare me for the game*” (Fifth grader, EC, #15).
- 6) “*During the times I am angry or sad, I like to use deep breathing activities. It helps me focus on what is happening and calm down to solve it.*” (Fifth grader, EC, #19).

An overwhelming number of students, approximately 33% of the qualitative sample, from all grade levels, shared that the deep *breathing activities* were the most useful mindfulness activities to help them regulate their emotions. Of the six examples presented, five examples referenced the *deep breathing activities*. This suggests that some of the students found the deep breathing activities to be one of the most *preferred mindfulness activities*. Moreover, some students referred to the instantaneous effect of changing their breathing. For example, some students

reported that they immediately began “feeling better” (Third grader, EC, #14) after engaging in the deep breathing mindfulness activities. Another take away from the data was that students who engaged in the *breathing activities* were able to reduce the effects of negative emotions. For example, one student reported that they calmed down after engaging in the deep breathing activities (Fourth grader, EC, #9). Additionally, students were able to generalize the impact of the deep breathing activities to activities outside of their regular classroom. For example, one fifth grade student reported “*If I am nervous, such as before a game, I do deep breathing activities to calm me down and prepare me for the game*” (Fifth grader, EC, #15). Overall, a large amount of third, fourth, and fifth grade students found that the mindfulness *breathing activities* helped them to control their feelings when they were angry or sad. Students not only noticed that the deep breathing mindfulness activities helped them to eventually regulate their emotions, but they also reported that the changes were instantaneous. Also, the emotional regulatory effects were generalized to different settings, minimizing the intensity of negative emotions.

Code 2: Breathing Activities: *Working Memory*

Students also reported that the mindfulness *breathing activities* improved their *working memory (WM)*. The data shows that of the 32 students who found the *breathing activities* to be useful in improving their *working memory*, 7 were from third grade (#7), 8 were from fourth grade (#8), and 17 were from fifth grade (#17). Gender analysis shows that both female (#18) and male (#14) used the *breathing activities* as a memory aide. Some examples of what students reported regarding how the mindfulness *breathing activities* helped them to remember their teachers’ instructions are presented next.

- 1) “*Deep breathing to help you focus and ignore other people talking or classmates having a chat*” (Third grader, WM, #2- Female).

- 2) “Some Mind Yeti tricks that help me remember my teacher's instructions are the ones when they teach you how to notice your breath when you're angry and the lesson where you just calm down” (Third grader, WM, #3- Female).
- 3) “I find a way that I can make deep breathing and make calmer and listen to teacher and can follow teacher's directions” (Fourth grader, WM, #7- Male).
- 4) “I can find my breath and follow it. This would help me calm down and listen more carefully” (Fourth grader, WM, #1- Female).
- 5) “When I breathe my mind clears so I can focus. In this one too, add something else if you could from what they said” (Fifth grader, WM, #3- Female).
- 6) “Definitely, deep breathing and being in the moment. I could easily focus in the instruction and then try to do the best if my abilities” (5th grader, WM, #9-Male).

In general, 21% of students who completed the qualitative survey found that the *breathing activities* were very useful in improving their *working memory*. Some students reported using the *breathing activities* to clear their minds. For example, one fifth grade student reported, “When I breathe my mind clears so I can focus. In this one too, add something else if you could from what they said” (Fifth grader, WM, #3). Similarly, some students reported that they found the *breathing activities* beneficial in blocking out external stimuli. For example, one third grade student said, “Deep breathing to help you focus and ignore other people talking or classmates having a chat” (Third grader, WM, #2). Other students reporting using the *breathing activities* to help them to pay closer attention to instruction. More specifically, one fourth grade student said, “I can find my breath and follow it. This would help me calm down and listen more carefully” (Fourth grader, WM, #1). Under *breathing activities*, students reported that the deep breathing activities were particularly effective in improving their *working memory*. For example, students reported that by engaging in the deep *breathing activities*, they became more focused and were able to pay better attention to their teachers' instruction. For example, one fifth grade student said, “I like to use deep breathing when I lose track of what my teacher is talking about. This gets me back on track to things and remember the lesson she has taught” (5th grader, WM, #9). This shows that students were able to generalize their use of the mindfulness practices from the actual practice to their

classroom lessons. More specifically, students were able to identify when a mindfulness activity helped them to understand their teacher's instruction. Another factor that was noted under this *code* was that there was a difference between genders in how they felt the breathing activities impacted their working memory. Despite the gender differences, female (#18) and male (#14), there was no distinction between what students reported. More specifically, both male and female students spoke about how the breathing activities helped them to change their behaviors to ultimately impact their engagement in class as well as their *working memory*. For example, one male fourth grader reported, "I find a way that I can make deep breathing and make calmer and listen to teacher and can follow teacher's directions" (Fourth grader, WM, #7- Male). Whereas, a female fourth grader reported that, "I can find my breath and follow it. This would help me calm down and listen more carefully" (Fourth grader, WM, #1- Female). Overall, both male and female students from third, fourth, and fifth grade reported that the *breathing activities* improved their *working memory*.

Category 2: Imagining Activities

The second *category*, *imagining activities*, included activities where the students were required to imagine to be another person (e.g., a poet), in a place (e.g., the city), or engaging in an activity (e.g., standing like a tree). The imagining techniques are also referred to as visualization. The *category* generated the *codes emotional control* and *working memory* which suggests that students identified two different areas where they believed that the *imagining activities* were beneficial.

Code 1: Imagining Activities: *Emotional Control*

Students reported that the mindfulness *imagining activities* improved their *emotional control*. The data shows that of the 9 students who found the *imagining activities* to be useful in improving their *emotional control*, 1 was from third grade (#1), 5 were from fourth grade (#5), and 3 were from fifth grade (#3). Gender analysis shows that both females (#6) and males (#3) found that the mindfulness *imagining activities* helped to regulate their emotions. Some examples of what students said regarding how the *imagining activities* helped them to control their feelings when they were angry or sad are presented next.

- 1) “*I use the lesson one where you be poet*” (third grader, EC, #1).
- 2) “*The Mind Yeti activities are calming like the one where we were taught how to notice our breath and the one where we pretended to be animals by doing stretches*” (third grader, EC, #2).
- 3) “*I think the one that helps me the best is the one where I can imagine my own world where anything happens. I love it because I'm free to be in my own world, away from others*” (fourth grader, EC, #2).
- 4) “*I like to use the ‘imagine a world’ because it feels better to be in a world of yours*” (fourth grader, EC, #3).
- 5) “*I picture my thoughts as bubbles floating through the air*” (fifth grader, EC, #2).
- 6) “*The activity where you imagine a place where you customized your own world*” (fifth grader, EC, #3).

Students in third, fourth, and fifth grade reported using the *imagining activities* to help them to control their emotions. Some students reported that the mindfulness activities where they had to imagine their own worlds were particularly helpful in improving their emotional control. For example, of the six examples shown above, two of the older students referenced the new world creating *imagining activities* as the most useful activities to improve their emotional control. For example, the fourth grader said, “I like to use the ‘imagine a world’ because it feels better to be in a world of yours” (fourth grader, EC, #3). Similarly, when asked to describe the mindfulness activities they used to control their feelings when they were angry or sad, a fifth grader reported,

“The activity where you imagine a place where you customized your own world” (fifth grader, EC, #3). Additionally, some students reported that the *imagining activities* where they were professionals, were especially helpful in improving their *emotional control*. For example, in response to describe the mindfulness activities which controlled their feelings when they were angry or sad, one third grader reported, “I use the lesson one where you be poet” (third grader, EC, #1). Other students reported that the activities where they had to pretend to be animals were very useful in helping them to control their emotions. For example, one third grader reported that “...the one where we pretended to be animals by doing stretches” (third grader, EC, #2) was particularly helpful. Also, under *imagining activities*, there was a difference between the occurrences of the genders where female (#6) responses were twice those of the male (#3) students. It seems that the activities where students had to imagine taking on other roles (e.g., poet, scientist, and or animals) were very useful in improving their *emotional control*.

Code 2: Imagining Activities: *Working Memory*

Students also reported that the mindfulness *imagining activities* improved their *working memory (WM)*. The data shows that of the 9 students who found the *imagining activities* to be useful in improving their *working memory*, 4 were from third grade (#4), 2 were from fourth grade (#2), and 3 were from fifth grade (#3). Gender analysis shows that both female (#6) and male (#3) used the *imagining activities* to aide their memory. Some examples of what students reported regarding how the mindfulness *imagining activities* helped them to remember their teachers’ instructions are presented next.

- 1) “*I close my eyes and be a poet and think*” (third grader, WM, #2).
- 2) “*Use your hands to form goggles and focus on the teacher*” (third grader, WM, #4).
- 3) “*The imagine activities help me*” (fourth grader, WM, #1).
- 4) “*I do the soup thing*” (fourth grader, WM, #2).

- 5) “*What I do is I imagine things and then I do them*” (fifth grader, WM, #2).
- 6) “*I would imagine myself back in time when the teacher told us about the instruction*” (fifth grader, WM, #3).

Selected students mentioned that the *imagining* activities helped them to improve their *working memory*. Certain students said that the *imagining activities* where they had to pretend to do something physical were some of the *imagining activities* which they used to remember their teacher’s instructions. For example, one fourth grade student referenced ‘the soup thing’ as an activity which allowed them to remember their teacher’s instruction. More specifically, when asked, to describe the mindfulness tricks used to help remember their teacher's instructions (WM), this fourth grader replied, “I do the soup thing” (fourth grader, WM, #2). Similarly, another student mentioned using the hands to “*form goggles*” (third grader, WM, #4) in order to focus on the teacher away. The student (third grader, WM, #4) used this strategy to physically dissociate from the environment. Some students also referenced using the *imagining activities* where they had to pretend being a professional to remember their teachers’ instructions. For example, one student reported, “I close my eyes and be a poet and think” (third grader, WM, #2). Other students simply stated that they just used their imagination (e.g., fourth grader, WM, #1) while others specified that they used their imagination to revisit the lesson (e.g., fifth grader, WM, #3) and ultimately to remember their teacher’s instruction. Another pattern was differences between genders where double the number of females (#6) compared to males (#3) reported that the *imagining activities* where the most helpful. Overall, certain students said that the *imagining activities* where they had to do something physical, like placing their hands over their eyes like goggles or pretend to be blowing on hot soup, as well as those where they had to pretend to be professionals, were some of the most important activities they used to remember their teacher’s instructions.

Category 3: Listening Activities: Emotional Control

Under the third *category*, *listening activities*, one code, *emotional control*, was generated. The *listening activities* required students to listen to different sounds, focusing on them and noticing when the sounds changed. Students reported that the mindfulness *listening activities* improved their *emotional control*.

Code 1: Listening Activities: *Emotional Control*

The data shows that of the 14 students who found the *listening activities* to be useful in improving their *emotional control (EC)*, 2 were from third grade (#2), 5 were from fourth grade (#5), and 7 were from fifth grade (#7). Gender analysis shows that both females (#6) and males (#8) found the that the mindfulness *listening activities* helped to regulate their emotions. Some examples of what students said regarding how the *listening activities* helped them to control their feelings when they were angry or sad are presented next.

- 1) “How you can control your feelings is by listening a calm sound” (third grader, EC, #1).
- 2) “It controls my feeling because the activities say nice words.” (third grader, EC, #2).
- 3) “The sound change helps me the best because it can just tell my mind to focus on the noise and not on anything else and also it is very relaxing so once in a while I will start to calm down and loosen up.” (fourth grader, EC, #3).
- 4) “The sounds help me best because they are peaceful sounds.” (fourth grader, EC, #4).
- 5) “When I get sad or angry, I think about breathing slowly and concentrating on certain sounds to help me calm down.” (fifth grader, EC, #5).
- 6) “The Mind Yeti sound activity helped me wake up and come back to reality after a feeling to have an emotional outburst.” (fifth grader, EC, #7).

For *imagining activities*, some students stated that the words from the activities helped them to control their emotions. For example, one third grade student said that the mindfulness activities were helpful in controlling their feeling “because the activities say nice words” (third grader, EC, #2). Similarly, students also referenced the sound of the activities as a source to control their

emotions. In particular, of the six examples given, five students mentioned that the sound of the activities were helpful in them regulating their emotions. An example of this was from one fourth grader who said, “The sound change helps me the best because it can just tell my mind to focus on the noise and not on anything else and also it is very relaxing so once in a while I will start to calm down and loosen up” (fourth grader, EC, #3). These findings show that students found that the sounds from the mindfulness activities were directly linked to their abilities to self-regulate their emotions and were useful in improving their *emotional control*. Globally, students found that both the content and overall sound of the mindfulness activities assisted them in improving their emotional control.

Theme 2: Mindfulness Induced State

Mindfulness Induced State was the *second theme* identified after encoding the data. One's *state* refers to “emotions, body feelings, or thoughts” (Oosterwijk, et al., 2012). Three groups, *calm*, *focused*, and *relaxed*, were identified as *three categories under this theme*. These three *categories* were further separated into the *codes*; *inhibition*, *sustained attention*, *organization*, *cognitive flexibility*, and *mindfulness feedback*. Based on the data which generated the *theme*, *categories*, and *codes*, it appears that the mindfulness lessons induced students states of *calm*, *focus*, and *relaxation*.

Category 1. Calm

For this category, *calm*, as defined by Merriam-Webster (2020), means “free from agitation, excitement, or disturbance.” Under the *category calm*, the *codes inhibitory control*, *sustained attention*, *organization*, *cognitive flexibility*, and *recommendation to increase frequency*, were developed.

Code 1: Calm: *Inhibition*

Students reported that they felt *calm* in the area of their *inhibitory control (IC)*. In other words, students felt *calm* instead of rushing through things. The data shows that of the 72 students who felt *calm* under *inhibitory control*, 17 were from third grade (#17), 13 were from fourth grade (#13), and 38 were from fifth grade (#38). Gender analysis shows that both females (#36) and males (#39) found that the mindfulness *activities* helped them remain calm in the area of inhibition. Some examples of what students said regarding how the mindfulness activities made them remain *calm* instead of rushing through things are presented next.

- 1) *“Mind Yeti makes you feel calm so you don't have to rush through things and if you rush through things you will get things wrong,”* (Third grader, IC, #7).
- 2) *“It helps me calm down and focus and not get distracted,”* (Third grader, IC, #9).
- 3) *“It helps you too not like panic when you're doing it and it helps you to be calm so that when you're doing something you won't just rush,”* (Fourth grader, IC, #5).
- 4) *“It helps me by making me calmer and slows me down,”* (Fourth grader, IC, #11).
- 5) *“Well, the deep breathing activities help me slow down instead of rushing through things by calming me down with each slow breath I take and making sure I remember what my goal is to do during this activity,”* (Fifth grader, IC, #2).
- 6) *“Deep breathing activities help me slow down instead of rushing through things because deep breathing calms me down,”* (Fifth grader, IC, #9).

A large number of students approximately 48% of the qualitative sample, from all grade levels, reported that the mindfulness activities helped them be *calm* which allowed them to slow down instead of rushing through things. For example, students report that the Mind Yeti activities made them so calm that they no longer felt the need to rushing through their work, especially since they did not want to make mistakes (third grader, IC, #7). This means that the mindfulness sessions deterred the students from rushing, especially to avoid making mistakes. Additionally, the patterns in students' responses under this category show that students found that the mindfulness activities made them calm so they would not rush through things, but rather focused on the goals they wanted to achieve. For example, one fifth grade student said, “Well, the deep breathing activities help me slow down instead of rushing through things by calming me down with each slow breath I take and making sure I remember what my goal is to do during this activity” (Fifth grader, IC, #2). Another observation made was that students occasionally used strong adjectives such as “distracted” (third grader, IC, #9) and “panic” (fourth grader, EC, #5) to describe the unfortunate states from which the mindfulness activities prevented them. More specifically, students reported that the Mind Yeti activities made them so calm that they were no longer distracted by environmental stimuli (Third grader, IC, #9). For example, in reference to mindfulness activities, one third grader explained, “It helps me calm down and focus and not get distracted,” (Third

grader, IC, #9). Similarly, one fourth grader reported, “It helps you to not like panic when you’re doing it and it helps you to be calm so that when you’re doing something you won’t just rush,” (Fourth grader, IC, #5). Clearly, based on the examples presented, students generally found that the mindfulness activities made them *calm* instead of rushing through things.

Code 2: Calm: *Sustained Attention*

Students reported that they felt *calm* when it came to remembering to complete daily routines. In other words, students felt *calm* in the area of their *sustained attention*. The data shows that of the 11 students who felt *calm* under *sustained attention* (SA), 3 were from third grade (#3), 2 were from fourth grade (#2), and 6 were from fifth grade (#6). Gender analysis shows that both females (#6) and males (#5) found that the mindfulness activities helped them remain calm in the area of *sustained attention*. Some examples of what students said regarding how the mindfulness activities made them remain *calm* to remember to complete daily routines are presented next.

- 1) “*Mind Yeti imagination activities help remind me to do things because it calms me down from other frustrating things so I can take time to think of better things*” (third grader, SA, #2).
- 2) “*It helps because when I get mad, I can just calm down*” (third grader, SA, #3).
- 3) “*It helps me to think calmly and not to be stressed out about my upcoming activities*” (fourth grader, SA, #1).
- 4) “*It helps because it shows how to calm down and it is peaceful like the sounds*” (fourth grader, SA, #2).
- 5) “*I can use them to calm down and think about the important things I need to do*” (fifth grader, SA, #3).
- 6) “*The Mind Yeti imagination activities tell you to focus and calm down so you can remember things more clearly*” (fifth grader, SA, #6).

In summary, when asked how the mindfulness activities helped them to focus on things, students reported that it made them *calm*. A closer look at what students said showed that some students reported that the mindfulness activities made them *calm* and freed up mental space to

think of more important things. For example, one fifth grade student declared that, “*I can use them to calm down and think about the important things I need to do*” (fifth grader, SA, #3). Students also reported that the mindfulness activities made them calm, ultimately allowing them to remember things more clearly. By the same token, a fifth-grade student replied, “The Mind Yeti imagination activities tell you to focus and calm down so you can remember things more clearly” (Fifth grader, SA, #6). Additionally, students disclosed that the mindfulness activities helped them *calm* down and reduced their levels of stress. More precisely, one fourth grade student said, “*It helps me to think calmly and not to be stressed out about my upcoming activities*” (Fourth grader, SA, #1). Another pattern identified under the category of *calm* when looking at *sustained attention*, was that students used strong adjectives, frustrating and mad, to describe states from which the mindfulness activities helped them recover. For example, one third grade student reported, “Mind Yeti imagination activities help remind me to do things because it calms me down from other frustrating things so I can take time to think of better things” (third grader, SA, #2). Unquestionably, when asked how the mindfulness activities helped them to focus on things, students reported that it made them *calm* and described specific aspects of the mindfulness activities which helped them to be to remember to complete daily routines.

Code 3: *Calm: Organization*

Students reported that they felt *calm* in the area of *organization*. In other words, students felt *calm* when required to keep their things organized. The data shows that of the 25 students who felt *calm* under *organization (Org)*, 7 were from third grade (#7), 3 were from fourth grade (#3), and 15 were from fifth grade (#15). Gender analysis shows that both females (#6) and males (#5) found the that the mindfulness activities helped to keep their things organized. Some examples of

what students said regarding how the mindfulness activities made them remain *calm* to keep their things organized are presented next.

- 1) *“I feel calm and wanted to clean my room,”* (Third grader, Org, #3).
- 2) *“When I’m calm, I can do anything,”* (Third grader, Org, #5).
- 3) *“It calms me down and organizes my thoughts so I can stay focused,”* (Fourth grader, Org, #8).
- 4) *“The Mind Yeti lessons calm me down so I don’t just throw my stuff in my desk, I will put it in nicely,”* (Fourth grader, Org, #15).
- 5) *“That helped me because it calmed me down and to focus on what I am doing at that time”* (Fifth grader, Org, #7).
- 6) *“The Mind Yeti imagination activities tell you to focus and calm down so you can remember things more clearly”* (Fifth grader, Org, #10).

In general, students reported that the mindfulness activities made them calm, which helped them to keep their things organized. Approximately 14% of the entire sample reported that the mindfulness activities made them *calm* in the area of organization. Students suggested that when they engaged in the mindfulness activities, they felt so calm that it encouraged them to initiate getting organized. To illustrate, one third grade student said, *“I feel calm and wanted to clean my room,”* (Third grader, Org, #3). Additionally, some students stipulated that the mindfulness activities were empowering in that they felt so calm, their possibilities were endless. For example, one third grade student answered that the mindfulness activity made them calm and when they are calm, they can do anything (Third grader, Org, #5). Some students also reported that the mindfulness activities made them calm which also made it more feasible to think about the tasks at hand. Case in point, one fourth grade student reported that, *“It calms me down and organizes my thoughts so I can stay focused,”* (Fourth grader, Org, #8). Whereas, one fifth grade student said, *“That helped me because it calmed me down and to focus on what I am doing at that time”* (Fifth grader, Org, #7). There were additional patterns identified under the code of organization. For example, students revealed that the mindfulness activities helped them see things more distinctly which helped them with keeping their things organized. For instance, one fourth grade student

claimed that, “The Mind Yeti lessons calm me down so I don't just throw my stuff in my desk, I will put it in nicely,” (Fourth grader, Org, #15). Clearly, the mindfulness activities helped students to keep their things organized, especially when it came to gaining perspective to initiate or keep things organized.

Code 4: Calm: *Cognitive Flexibility*

Students discovered that the mindfulness activities were useful in keeping them *calm* when they were required to bounce back from setbacks (CF). More specifically, a total of 32 students from third grade (#10), fourth grade (#8), and fifth grade (#14) reported that the mindfulness activities helped them be calm when required to bounce back from setbacks. Gender analysis shows that both female (#17) and male (#15) students found that the mindfulness activities helped them remain *calm* when required to bounce back from setbacks. Some examples of what students reported regarding how the mindfulness *activities* helped them be calm when required to bounce back from setbacks (CF) are presented next.

- 1) “*They make me breathe and calm down to settle my mind*” (third grader, CF, #2).
- 2) “*Mind Yeti makes me feel in a different way because with breathing they help us calm down like feeling in a different way*” (third grader, CF, #4).
- 3) “*The sound ones help me make my curiosity and imagination grow, and the slow and deep breathing helps me calm so I can understand another person's point of view or have empathy for other people around me*” (fourth grader, CF, #11).
- 4) “*The calming steps help me trace my steps*” (fourth grader, CF, #16).
- 5) “*The Mind Yeti lessons helped me out my flexibility skills by calming me down and thinking about something else until I am calm enough to think about the problem without getting too mad*” (fifth grader, CF, #7).
- 6) “*It helps me by calming down instead of worrying about the problem so much*” (fifth grader, CF, #10).

Approximately 20% of the entire surveyed sample of students reported that the mindfulness activities helped them to be calm, which allowed them to bounce back from setbacks. Some

students reported that the mindfulness activities helped them to remain calm in spite of making mistakes. For example, one student said, “They make me breathe and calm down to settle my mind” (third grader, CF, #2), whereas another student reported, “Mind Yeti makes me feel in a different way because with breathing they help us calm down like feeling in a different way” (third grader, CF, #4). Students also mentioned that the mindfulness activities were helpful in improving their curiosity, so they were able to address setbacks empathetically. Additionally, students reported that the mindfulness activities also helped them to improve their imagination which caused them to be more flexible with the thinking. For example, one fourth grade student reported, “The sound ones help me make my curiosity and imagination grow, and the slow and deep breathing helps me calm so I can understand another person’s point of view or have empathy for other people around me” (fourth grader, CF, #11). In particular, students not only mentioned that the mindfulness activities reminded them to think of problems in other ways, but they also taught them to regroup after emotional dysregulation. For example, one fifth grade student mentioned that the mindfulness activities reduced their likeliness to exude anger after they had made mistakes. “The Mind Yeti lessons helped me out my flexibility skills by calming me down and thinking about something else until I am calm enough to think about the problem without getting too mad” (fifth grader, CF, #7). To sum up, some students reported that the mindfulness activities helped them to remain calm in spite of making mistakes, improved their curiosity, improved their imagination, and reduced their likeliness to exude anger after they had made mistakes.

Code 5: Calm: Mindfulness Feedback

When asked to provide mindfulness feedback (MF) about their experience with mindfulness sessions, some reported that they helped them feel *calm*. Of the 32 students who

provided feedback that the mindfulness *activities* made them calm, 9 were from third grade (#9), 11 were from fourth grade (#11), and 12 were from fifth grade (#12). Gender analysis shows that both females (#20) and males (#12) found that the mindfulness activities made them *calm*. Some examples of what students said regarding how the *mindfulness activities* made them calm are presented below.

1. “*Mind Yeti helps me calm down, so my mind won't be filled with ideas that will take my mind away*” (third grader, MF, #8).
2. “*I think Mind Yeti is a good thing to help me calm down after having a fun time out there during recess. It helps me a lot. I think Mind Yeti is very helpful*” (third grader, MF, #12).
3. “*I would like to use it for calming down when I get upset or angry*” (fourth grader, MF, #1).
4. “*It is a nice way to make me stay calm and really think*” (fourth grader, MF, #2).
5. “*It is very nice and makes me better at work and makes me calm in class and listen to the teachers*” (fifth grader, MF, #15).
6. “*I think that Mind Yeti is a good video to calm little children down*” (fifth grader, MF, #17).

When providing their overall feedback of their experience with the mindfulness activities, a relatively large portion of the sample, 20%, reported that they made them *calm*. Students had different ideas of how the mindfulness activities helped them to be calm. For example, some students reported that the mindfulness activities reduced their mind wandering and improved their ability to think (Third grader, MF, #8), while others (Third grader, EC, #12) reported that the mindfulness activities were helpful to transition from un-structured play back into the classroom. More specifically, one third grade student reported, “*Mind Yeti helps me calm down, so my mind won't be filled with ideas that will take my mind away*” (Third grader, MF, #8). Similarly, a fourth-grade student reported that, “*It is a nice way to make me stay calm and really think*” (Fourth grader, MF, #2). Additionally, students reported that the mindfulness activities helped them to regulate their emotions. For example, one fourth grade student reported, “*I would like to use it for calming down when I get upset or angry*” (Fourth grader, MF, #1). Student also revealed that the mindfulness activities helped them to remain calm so that they could transition from outside

free play to their classroom learning environment. More specifically, one third grade student said, “I think Mind Yeti is a good thing to help me calm down after having a fun time out there during recess. It helps me a lot. I think Mind Yeti is very helpful” (Third grader, MF, #12). Students also identified the calming effect of the mindfulness activities to have a direct impact on their ability to engage in class. More specifically, one fifth grade student said, “It is very nice and makes me better at work and makes me calm in class and listen to the teachers” (Fifth grader, MF, #15). In summary, when providing Mindfulness Feedback (MF), students found that the mindfulness activities helped them to regulate their emotions, helped them to remain calm so that that they could transition from outside free play to their classroom learning environment, and improved their class participation.

Category 2: Focused

Focused was the second *category* identified under the *theme Mental State*. *Focused*, refers to “a state or condition permitting clear perception or understanding” (Merriam-Webster, 2020). Students reported that the mindfulness activities helped them *focus*, which led to them slowing down instead of rushing through things. The *code* inhibitory control was identified under this category.

Code 1: Focused: Inhibition

Of the 21 students who reported that the mindfulness activities helped them *focus* which led to them slowing down instead of rushing through things, 4 were from third grade (#4), 6 were from fourth grade (#6), and 25 were from fifth grade (#25). Gender analysis shows that both females (#20) and males (#15) found the that the mindfulness activities made them *focused*. Some

examples of what students said regarding how the *mindfulness activities* made them *focused* are presented next.

1. “*It can just make me focus on the breathing instead of rushing*” (third grader, IC, #1).
2. “*It helps me calm down and focus and not get distracted*” (third grader, IC, #4).
3. “*They help me slow down because I focus on the breathing for a while, so when I go to my work, I feel relaxed*” (fourth grader, IC, #2).
4. “*Deep breathing helps me pause and take a breath. Almost, like getting picked up out of the world and into a new world that is only white. It helps focus on activities*” (fourth grader, IC, #5).
5. “*It helped me stop thinking about all the commotion during school and helped me relax and focus on myself*” (fifth grader, IC, #19).
6. “*The breathing got me to stop what I was thinking about and I just focused on my breath I felt a lot calmer afterward*” (fifth grader, IC, #8).

When asked how the mindfulness activities helped them to slow down instead of rushing through things, approximately 23% of the entire sample reported that it made them *focused*. Students pointed to the challenges of the school day and mentioned that the mindfulness activities were helpful in allowing them to *focus* during these challenges. For example, one fifth grader said, “It helped me stop thinking about all the commotion during school and helped me relax and focus on myself” (fifth grader, IC, #19). Students also mentioned that the breathing activities made them focus on both school activities as well as their breaths which reduced distractions and prevented them from rushing through things. For example, one third grade student reported that, “It can just make me focus on the breathing instead of rushing” (third grader, IC, #1). Similarly, another third-grade student reported that, “It helps me calm down and focus and not get distracted” (third grader, IC, #4). Students also reported that the mindfulness activities had transformative effects which helped them to focus. For example, one fourth grade student revealed that, “Deep breathing helps me pause and take a breath. Almost, like getting picked up out of the world and into a new world that is only white. It helps focus on activities” (Fourth grader, IC, #5). Finally, in terms of numbers, there was a discrepancy between the genders. Although both groups reportedly found that the

mindfulness activities made them focus, more females (F= #20) than males (M= #15) reported this. Overall, based on the data, the mindfulness activities helped students slow down instead of rushing through things. The mindfulness activities helped them to *focus* during school challenges, reduced distractions and prevented them from rushing through things, and had transformative effects which helped them to *focus*.

Category 3: Relaxed

Relaxed was generated as the third *code* identified under the *category*, *Mental State*. *Relaxed* refers to “set or being at rest or at ease” (Merriam-Webster, 2020). Students reported in their responses that they felt *relaxed* under the executive functions of *Inhibitory Control* and *Mindfulness Feedback*. This suggests that student reported that the mindfulness activities made them *relaxed* under one of the areas of executive functions, as well as when they provided their overall feedback.

Code 1: Relaxed: Inhibition

Students reported that the mindfulness activities helped them *relax* which led them to slow down instead of rushing through things. Of the 21 students who reported that the mindfulness activities helped them *relax* which led to them slowing down instead of rushing through things, 4 were from third grade (#4), 2 were from fourth grade (#2), and 15 were from fifth grade (#15). Gender analysis shows that both females (#13) and males (#8) found the that the mindfulness activities made them *relaxed*. Some examples of what students reported regarding how the category of *relaxed* led to students slowing down instead of rushing through things are presented next.

1. *“All I got to do is close my eyes and then I can relax so that I can remember what I am supposed to do when I get home, like chores”* (third grader, IC, #5).
2. *“You could remember a lesson and try to relax and not stress out”* (third grader, IC, #7).
3. *“The sound change helps me the best because it can just tell my mind to focus on the noise and not on anything else and also it is very relaxing so once in a while I will start to calm down and loosen up”* (fourth grader, IC, #1).
4. *“They help me slow down because I focus on the breathing for a while, so when I go to my work, I feel relaxed”* (fourth grader, IC, #2).
5. *“If I am nervous, such as before a game, I do deep breathing activities to calm me down and prepare me for the game. If I’m angry, I relax and calm down and think about what I’m saying before I say it”* (fifth grader, IC, #13).
6. *“Deep breathing helps us slow down because when you do deep breathing helps us slow down because when you take deep breathes you relax and when you are relaxed you tend to take your time and try your best instead of rushing through the activity”* (fifth grader, IC, #15).

In summary, students reported that the mindfulness activities made them relaxed and not rush through things. Approximately 14% of the entire sample reported that the mindfulness activities made them *relaxed*. Students reported that the mindfulness activities helped them relax so that they could remember the tasks they needed to complete. For example, one third grade student reported that, “All I got to do is close my eyes and then I can relax so that I can remember what I am supposed to do when I get home, like chores” (Third grader, IC, #5). Similarly, students also reported that the mindfulness activities made them relaxed which reduced their stress levels. One example of this was from a third grader who said, “You could remember a lesson and try to relax and not stress out” (Third grader, IC, #7). Finally, some students reported that the mindfulness activities made them relaxed which helped them to breathe through activities to give your best instead of rushing through them. For example, a fifth-grade student reported that, “Deep breathing helps us slow down because when you do deep breathing helps us slow down because when you take deep breathes you relax and when you are relaxed you tend to take your time and try your best instead of rushing through the activity” (Fifth grader, IC, #15). Finally, more females (F= #13) than males (M= #8) reported that the mindfulness activities made them relaxed when

providing their overall perception of the activities. These examples show that students found that the mindfulness activities were relaxing, which helped them remember the tasks they needed to complete, reduced their stress levels, and helped them to breathe through activities to give your best.

Code 2: Relaxed: *Mindfulness Follow-up*

When asked about their overall perception of the mindfulness activities, students reported that they helped them *relax*. The data shows that of the 10 students who reported that the mindfulness activities helped them *relax* as their overall perception, 2 were from third grade (#2), 3 were from fourth grade (#3), and 5 were from fifth grade (#5). Gender analysis shows that both females (#6) and males (#4) found the that the mindfulness activities made them *relaxed*. Some examples of what students reported under the category of *relaxed* are presented next.

1. “*When we first started using Mind Yeti, we all thought it was funny but then when I closed my eyes, I felt relaxed*” (third grader, MF, #1).
2. “*It makes me calm and relax*” (third grader, MF, #2).
3. “*It is relaxing*” (fifth grader, MF, #5).
4. “*After P.E. it helps you relax and makes you feel very calm.*” (fifth grader, MF, #2).
5. “*I think that it is very calming and relaxing*” (fifth grader, MF, #3).
6. “*It relaxes me*” (fifth grader, MF, #5).

In summary, when asked if they wanted to report on anything else about their engagement with the mindfulness curriculum at their school, students reported that the activities made them *relaxed*. Some students reported being skeptical of the mindfulness curriculum when the program was initially introduced but had since found value in how the activities *relaxed* them. For example, one third-grade student said, “*When we first started using Mind Yeti, we all thought it was funny but then when I closed my eyes, I felt relaxed*” (third grader, MF, #1). Additionally, some students reported that the mindfulness activities were particularly relaxing after specific classes. For

example, one fifth grade student said, “After P.E. it helps you relax and makes you feel very calm” (Fifth grader, MYF, #7). In general students were initially skeptical of the mindfulness curriculum. However, after engaging in the mindfulness activities students found that they were relaxing. Additionally, after engaging in physical activities, students reported that the mindfulness activities were relaxing.

Theme 3: Mindfulness Experience

Mindfulness Experience was the *third theme* identified after encoding the data. Students made one specific recommendation after engaging in the mindfulness practices which produced the *category increased frequency*. Additionally, this *category* generated one code, *mindfulness feedback*. Based on the data, it appears that students would have liked to have more frequent mindfulness lessons.

Category 1. Increased Frequency

When providing overall feedback for the program, students reported that they would have liked to have more frequent mindfulness sessions. The following subsection details the examples of what students said under this category.

Code 1: Mindfulness Feedback

Students recommended having *more frequent mindfulness sessions* under the code mindfulness feedback. The data shows that of the 11 students who recommended having *more frequent mindfulness sessions (MF)*, 1 was from third grade (#1), 2 were from fourth grade (#2), and 8 were

from fifth grade (#8). Gender analysis shows that both females (#6) and males (#5) recommended having *more frequent mindfulness sessions*. Some examples of what students said regarding having *more frequent mindfulness sessions* are presented next.

1. *“Mind Yeti makes students calmer, so I think we should do more of Mind Yeti”* (third grader, MF, #2).
2. *“We should do more Mind Yeti at school”* (third grader, MF, #3).
3. *“I think that they should be used a bit more frequently, to stop us from talking so much”* (fourth grader, MF, #1).
4. *“Mind yeti helps me get focused and concentrate. I think it would help if we did it before a test so you can concentrate more”* (fifth grader, MF, #2).
5. *“Use it a little more on Mondays”* (fifth grader, MF, #4).
6. *“Maybe we should do it like twice a day in the morning and after lunch if it is not a short day”* (fifth grader, MF, #6).

In general, some students saw the value in the mindfulness activities and suggest that Mind Yeti should be practiced more frequently at their school. For example, without providing reasons, some students recommending having more frequent mindfulness sessions. For example, one third grade student recommended, *“We should do more Mind Yeti at school”* (Third grader, MF, #3). Similarly, one fifth grade student recommended mindfulness sessions to start the week, *“Use it a little more on Mondays”* (fifth grader, MF, #4). Other students who recommended having more frequent mindfulness sessions at the school had specific justifications. More specifically, some students recommended more frequent mindfulness sessions to regulate behaviors. For example, one third grade student revealed, *“Mind Yeti makes students calmer, so I think we should do more of Mind Yeti”* (Third grader, MF, #2). Whereas a fourth-grade student reported, *“I think that they should be used a bit more frequently, to stop us from talking so much”* (fourth grader, EC, #1). Finally, some students recommended that the mindfulness sessions should be implemented prior to assessments. For example, one student fifth grade student reported, *“Mind yeti helps me get focused and concentrate. I think it would help if we did it before a test so you can*

concentrate more” (Fifth grader, MF, #2). In general, student recommended that there should be more frequent mindfulness sessions at their school. Some students even provided specific reasons, days and activities for which they believed the mindfulness sessions could be of benefit.

Chapter 5: Discussion

INTRODUCTION

This chapter seeks to provide a discussion of the quantitative results and qualitative findings presented in Chapter 4 by interpreting and explaining the outcomes of the study in relation to previous studies. The progression of each section will include the restated research questions followed by summaries of the results and finding. There will also be the integration of other studies which are relative to support and validate our findings honoring the mixed method approach. The discussion of the results of this study will provide researchers with preliminary findings on a mindfulness curriculum that would meet the recommended administrative components.

QUANTITATIVE DISCUSSION

RQ2: What is the effectiveness of a model mindfulness-based intervention on the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties of upper elementary school students as measured by the Student Executive Function Mindfulness Questionnaire (SEFMQ)?

H02: There will be reductions in the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties, indicating improvements, of upper elementary school students as measured by the SEFMQ.

The discussion of the results of the second research question are presented next and will show that when elementary school students took part in a mindfulness intervention program with

specifically tailored administrative components, their levels of inhibition, working memory, and cognitive flexibility significantly improved from pretest to posttest. Additionally, the results are also in alignment with previous studies measuring the changes in the executive functions of elementary school students who participate in a mindfulness intervention program. The results of some studies show significant improvements in some of the executive functions (Juliano et al., 2019; Flook et al., 2010) after students participated in a mindfulness intervention program, while others did not (Leyland et al., 2018).

Inhibition

The results for the executive function of inhibition indicates that after participating in a mindfulness intervention program the entire sample, as well as 3rd and 5th grade levels, showed statistically significant improvements in the students' inhibition. Additionally, the changes in inhibition were also significant among the male students, but not for females. These results are consistent with some of the most recent studies in the literature. For example, Juliano and colleagues (2019) conducted a quasi-experimental, pretest posttest study to measure the feasibility of a school-based mindfulness program, Mindful Schools, on 27 students diagnosed with autism spectrum disorder (ASD). Their study lasted for approximately eight-weeks and had two weekly 30 minutes mindfulness sessions. The researchers of this pretest posttest quasi-experiment found that, overall, there was statistically significant improvements in the area of inhibition. Although their intervention program was different from our study, and their small sample consisted primarily of students with ASD, the statistically significant changes in inhibition, from pretest to posttest, are comparable in both studies.

Emotional Control

The area of emotional control did not show statistically significant differences from pretest to posttest for the entire sample. However, when the grade levels were analyzed, the results showed that emotional control had improved significantly from pretest to posttest for fifth graders. Our findings were in consonance with another study (Riggs et al., 2006) investigating the role of meditation on behavior and social-emotional skills in elementary school students. Riggs et al found that meditation had a positive effect on students' social-emotional regulation. Another study (de Carvalho et al, 2017) partially supported our findings. More specifically, de Carvalho et al (2017) conducted a mindfulness-based intervention using the MindUp curriculum to evaluate its effectiveness on the social emotional learning (cognitive reappraisal and expressive suppression) of 3rd and 4th grade students. Their research found that there was a statistically significant difference in suppression but none in reappraisal. These findings partially support our finding of no statistical significance for the entire sample and third graders. The MindUp program varies from Mind Yeti in that the MindUp sessions are longer and include varying exercises as students transition through each session. Nonetheless, both studies were conducted on students in the upper elementary grades and included some of the fundamental mindfulness techniques such as breathing techniques. Contrary to our findings, Flook et al., (2010) found statistically significant improvements in the areas of emotional control as was reported by parents. Needless to say, the study conducted by Flook and colleagues also included reporting from parents and teachers whereas our study was focused on students' self-reporting.

Working Memory

Our present study showed a statistically significant difference in working memory for the entire sample as well as for 5th graders. These findings are supported by Quach et al., (2016) who conducted one of the pioneering studies investigating the effectiveness of a mindfulness intervention on working memory capacity in adolescents. Their findings suggested that after the intervention, participants showed statistically significant improvements in their working memory capacity compared to the waitlist control groups. Additionally, Flook's (2010) study also had similar results in the area Working Memory. More specifically, parents' reporting indicated statistically significant improvements in the areas of Working Memory.

Cognitive Flexibility

In this study, the entire sample, as well as third and fifth grade students showed statistically significant improvements the in the area of cognitive flexibility following the Mind Yeti intervention. This was consistent with the findings of Heeren, Van Broeck, and Philippot (2009) who conducted a Mindfulness-Based Cognitive Therapy (MBCT) intervention with adults. They found that when adults practiced meditation, they displayed improved cognitive flexibility. Similarly, another study conducted by Moore and Malinowski (2009) found that mindfulness training may positively influence cognitive flexibility.

Organization

Although no statistically significant improvements were seen for organization, some patterns were noticed when grade level and gender were analyzed. More specifically fifth graders performed better in organization than third graders and males performed better compared to

females. These results are inconsistent with the results furnished in Flook's study showing that there were statistically significant improvements in Plan/Organize as was reported by the teachers. It is important to note that the significance found in Flook's study was based on teacher reporting and not students self-reporting as was the case in our present study. This difference could also be attributed to the types of activities in which the students were engaged during the mindfulness intervention. For example, Flook's study was designed in such a way that students sequenced through three different activities (greeting and interaction between students and with instructor, sitting meditation, games and activities, and modified body scan or meditation) in each session. Whereas, in the present study the organization activities were embedded in week five of the intervention where, based on the Mind Yeti Playlist, students engaged in multiple sessions which focused on them organizing their thoughts through the imagination and following the flowing of the breath.

Sustained Attention

Our study did not show statistically significant improvements in the area of sustained attention. Although these results do not support our hypothesis, our findings, in particular sustained attention, are in alignment with findings by Tarrasch (2017) who conducted a mindfulness intervention on a similar sample and did not find statistically significant differences in the area of sustained attention.

Additional Findings

An alternative explanation for some of the findings could be that students did not fully understand the questions, an argument supported by Felver et al (2017). Additionally, as was found

in similar studies (de Carvalho et al., 2016) students rated themselves very high on the pretest so there was little to no opportunity to see growth on the posttest. Moreover, the lack of multiple instruments to collect the quantitative data opens several possibilities for the explanation of the findings. Scientists often suggests using a larger battery of measures in order to more precisely measure changes in the dependent variables (Bogel et al., 2008). However, as discussed previously, at the school where the study was implemented, the curriculum was very packed and there was little to no time available to be allotted to non-curricular activities such as data collection.

Concerning the data collection instruments, although we used an adapted version of the BRIEF, it may not have been the most appropriate option for the students. Students had relatively high pretest scores since they mostly responded positively or in the middle of the scale. This could indicate that the students did not take care in responding, were not being reflective, or had not yet developed the ability to be introspective. Another possible for students mostly rating themselves neutral was that they did not fully understand the questions they were being asked. Therefore, a reason for this tool not being the best was that the vocabulary was too advanced and hence it was not developmentally appropriate for the elementary students' individual self-reporting. When other tools measuring the executive functions of elementary students were analyzed, in addition to the vocabulary being beyond the scope of elementary school students, it was also found that these assessments were time consuming. For example, the full BRIEF, which is used for assessing working memory (Leyland et al., 2018) would not have been feasible at our site. Other tests such as Conners' Continuous Performance Test II has a 14 minutes completion time but it only measures sustained attention, not all the executive functions. Similarly, the Stroop Test is time efficient and can be completed in minutes. However, the Stroop test only measures selective attention and cognitive flexibility. The emotional regulation questionnaire is a 10-item 7-point Likert-type scale

assessment designed to measure students' tendency to regulate their emotions through Cognitive Reappraisal and Expressive Suppression. Similar to the previous two assessments, it does not measure all the executive functions. Administering these assessments sequentially will result in a long administration time when explanations and preparations are considered, especially with the Stroop test. Some researchers have made accommodations to compensate for time and resources during the data collection process. However, as seen in the case of Tarrasch (2017), there could be a high level of error and thus the data would be rendered inoperable and would have to be excluded from the study. Clearly, considering the nature of our study, with the limited time allocated to data collection in the school, it was not feasible to use additional data collection instruments to measure students' executive functions. Therefore, future research should construct new valid and reliable executive functions instruments that can be implemented in the regular classroom setting in a timely manner.

Another important aspect was that there was no randomization of students which could have offered alternative reasons for our findings. However, based on our philosophy of educational equity, it was not feasible to offer the intervention to only one group of students and not the entire school. Furthermore, the mindfulness intervention was a part of the district wide wellness initiative, so although data was only collected from 3rd 4th and 5th grade students, the entire school, K-5th grade, participated in the intervention. Since it was not feasible for this current study, researchers should consider conducting randomized studies using the Mind Yeti curriculum.

Regarding the intervention program itself, Mind Yeti is good for learning how to engage in mindful moments throughout the day and with any mood. However, it is important to consider that some students may require a visual component, which is not part of the current Mind Yeti program. For example, students who are not comfortable closing their eyes, such as those with

auditory processing challenges, and even English language learners, may benefit from an additional visual aid on the screen, much like the introductory Mind Yeti video. Additionally, at the time of the intervention, Mind Yeti had not yet published a sequence of lessons. They have since added multiple playlists to their website, classified by grade levels and consisting of 15 sessions each. Nonetheless, Mind Yeti still has the potential to create longer playlists for longer interventions. Since Mind Yeti is relatively inexpensive, and it can be implemented in short dosages with little to no preparation time by the teacher, administrators should consider implementing the Mind Yeti curriculum in their schools.

In general, a closer look at the grade levels suggest that mindfulness intervention training may have a positive impact on the executive functions of elementary school students and particular in the areas of inhibition, emotional control, working memory, and cognitive flexibility. Contrary to what we expected, the findings for sustained attention and organization did not show statistically significant changes from pretest to posttest for either the global sample or the grade levels (3rd and 5th). The results suggest that when 3rd grade students take part in a mindfulness intervention program their level of inhibition and cognitive flexibility show statistically significant differences from pretest to posttest. Similarly, the findings suggest that when 5th grade students take part in a mindfulness intervention program their levels of inhibition, working memory, and cognitive flexibility were statistically significantly different from pretest to posttest. This study provides preliminary evidence that mindfulness intervention training may be effective in improving inhibition, emotional control, working memory, organization, and cognitive flexibility for upper elementary school students using the Mind Yeti curriculum.

QUALITATIVE DISCUSSION

Purpose and Significance

We implemented a specifically tailored mindfulness program with the administrative components (short dosage, classroom implementation location, online delivery method, and little to no required instructor training) seen as most essential to elementary school stakeholders and school personnel. To date, studies are usually conducted on small samples and do not ordinarily offer financially feasible options for mindfulness to be generalized to public classrooms. For example, some of the most recent qualitative studies were conducted on small samples with less than 30 students (Bannirchelvam et al, 2017). More notably, the current studies often used mindfulness programs that were different from the proposed administrative components of this study. More specifically, the mindfulness programs prevalent in the research have long durations of 10 minutes or more in one sitting (Bannirchelvam et al., 2017), and would be costly due to the extensive training of both teachers and external instructors (Flook et al., 2010; Nadler et al., 2017). With these implementation limitations and the lost educational revenue due to increased expenses and declining enrollment, administrators may be reluctant to purchase mindfulness curriculums. Currently there are no studies, that we are aware of, measuring the effectiveness of the Mind Yeti curriculum at the upper elementary level.

The results will be relevant to the current literature since there are not many studies on students' voices. Also, developers would be interested to know what types of mindfulness activities students find most beneficial. Knowing what students prefer and find beneficial could help with the integration of these techniques to increase consumption. Most essentially, this study would offer major representation of students' voices as this is missing from the literature. Therefore, the presentation of these findings represents *students' voices* and offer preliminary information on a novel mindfulness curriculum, Mind Yeti. Furthermore, the results of this study

will provide researchers with preliminary findings on how students interpreted their experience with the mindfulness curriculum chosen due to its administrative components. Hence providing adequate evaluation of the integrity of the mindfulness-based intervention treatment (Allen et al., 2006) in the elementary school setting.

The data was analyzed by first looking at the entire sample and finding the patterns. The next level of analysis was looking at the patterns at the grade level. At the grade level, discrepancies between the genders were identified and reported. Interpretation of the patterns in the individual findings reported by students was used to generate answers to the research questions.

PREFERRED MINDFULNESS ACTIVITIES

RQ3: How do students who engage in mindfulness activities rank these mindfulness activities in relation to their improved executive functions (EFs)?

Breathing Activities

The breathing activities included the mindfulness activities where the students were asked to focus on their breath, participate in deep belly breathing, or engage in some other activity involving the breath. The quantitative findings of this study show that some students reported that the breathing activities were some of the activities used to help them to demonstrate emotional control, that is to control their feelings when they were angry or sad, as well as improve their working memory which includes remembering their teacher's instructions. Students reported finding these activities beneficial since they had instantaneous effects in regulating their executive functions and these skills could be easily utilized in settings outside of the classroom. Students

also reported that the breathing activities helped them to clear their minds and blackout external stimuli so that they could engage with their teacher's instructions.

Breathing activities are key mindfulness techniques incorporated in some of the current most effective and well researched mindfulness curriculums, such as the Mindfulness-Based Stress Reduction (MBSR) and Mindfulness Oriented Meditation (MOM). Furthermore, there are numerous studies where breathing activities are incorporated as a fundamental aspect of the methodology. "A core ingredient in practicing mindfulness is focusing on the breath and what is happening in the body and mind—being a witness to one's personal experience. Breathing has been reported to regulate the autonomic nervous system, focus the mind, and increase self-awareness." (Napoli, 2004). The value of breath work is also supported by a study conducted by Dariotis et al. (2016). The researchers investigated how students applied the content and skills of a school-based mindfulness and yoga program to their daily lives and found that the students were most excited about the breathing techniques. Irrespective of the methodology of the mindfulness intervention program, students consistently found value in the breathing activities.

Imagining Activities

The imagining activities included activities where the students were required to imagine that they were another person (e.g., a poet), place (e.g., the city), or engaging in an activity (e.g., standing like a tree). Imagining techniques may also be referred to as visualization, such as imaging "the movement of the breath at the nostrils" (Goldin and Gross, 2010). The imagining activities were activities students found beneficial in regulating their emotions and working memory. It seems that the activities where students had to visualize taking on other roles (e.g., poet, scientist, and or animals) were very useful in improving their emotional control. Additionally, the activities

where students had to peer a physical action with the visualization, like placing their hands over their eyes like goggles or pretend to be blowing on hot soup, as well as those where they had to pretend to be professionals, were some of the most important activities they used to remember their teacher's instructions.

Visualization is another mindfulness technique that is common in well researched mindfulness programs, such as Mindfulness-based cognitive therapy for children (MBCT-C). MBCT-C describes visuals as essential sensory-based components of the program. Additionally, in their study Keng and colleagues (2011) affirmed the importance of visualizing by stating that "Specific exercises that are used to foster mindfulness include visualizing thoughts, feelings, and sensations as if they are clouds passing by in the sky...". Another qualitative mindfulness study conducted on "children and youth involved with child protection and/or mental health systems," found that students identified some of the mindfulness-based activities, including visualization, as "fun" (Coholic, 2011). More specifically, the researchers discovered that "This theme of "fun" encompassed and linked together the major categories including both group content and processes... [including] learning to use imagination" (Coholic, 2011). Although the study designs varied, students from this current study as well as those of Coholic, both identified the imagining activities as the ones they found most favorable.

Listening Activities

The listening activities required students to listen to different sounds, focusing on them and/or noticing when the sounds changed. Students reported that the sounds from the mindfulness activities were directly linked to their abilities to self-regulate and improve their emotional control.

Students conveyed that both the positive content and overall mollifying sounds of the mindfulness activities, made the listening activities some of their favored mindfulness activities.

Listening activities are also integral techniques embedded in well researched mindfulness curriculums. For example, the first week of the Mindfulness-Oriented Meditation includes “Listening to the sounds of the body after a run” (Crescentini, 2016). A more recent study by Juliano et al. (2020) examined the “efficacy of a school-based mindfulness program [Mindful Schools] for improving inhibition (prepotent response inhibition and interference control) and selective attention in children with [autism spectrum disorder] (ASD)”. Although this was a quantitative study and does not reflect the preference of students, it is important to note that particular program, Mindful Schools program, which is also well researched, included listening activities as key components of in building the mindfulness routines.

MINDFULNESS INDUCED STATE

RQ4: How do students who engage in a mindfulness practice understand how the mindfulness activities affect their executive functions?

The responses generated under this research question produced patterns suggesting that after engaging in the mindfulness activities, students experienced mindfulness induced states. The Mindfulness Induced State refers to “emotions, body feelings, or thoughts” (Oosterwijk, et al., 2012). The most common categories mindfulness induced state identified were calm, focused, and relaxed. In other words, the patterns identified in the data show that students experienced calm, focused and relaxed states after engaging in the mindfulness practices.

Calm

According to the qualitative findings, after engaging in the mindfulness curriculum students experienced the Mindfulness Induced State of calm. Webster Dictionary identifies calm as being “free from agitation, excitement, or disturbance.” When students identified that the mindfulness activities made them calm, they did so under four primary executive functions as well as when providing overall feedback for the program. Students reported that the mindfulness activities made them calm which dissuaded them from rushing through things. Being calm also reminded students to complete daily routines. The repetitions in the data also showed that the calming effect of the mindfulness activities helped students keep their things organized. Furthermore, being calm allowed them to reset quickly after facing setbacks. When asked to provide mindfulness feedback about their experience with mindfulness sessions, some students recounted that sessions eased them into states of calmness. Each of the four executive functions identified under calm will be discussed in detail later in the chapter.

These findings in this qualitative study are similar to others such as that of Dariotis et al., 2016. The qualitative study conducted by Dariotis et al. looks at the skills students remembered and applied after engaging in a school-based mindfulness and yoga program. The researchers found that the participants “developed keener emotional appraisal that, coupled with new and improved emotional regulation skills, helped de-escalate negative emotions, promote calm, and reduce stress” (Dariotis et al., 2016). Similarly, Sapthiang, et al., (2019) conducted a “systematic review and thematic synthesis to rigorously evaluate the qualitative evidence pertaining to students’ experiences of school-based mindfulness-based intervention.” Their systematic review identified four themes, one of which was “calming and/or relaxation” (Sapthiang, et al., 2019). Although the methods were different, both the qualitative study and the systematic review reflect

similar findings of students reporting experiencing a state of calm after engaging in a mindfulness practice.

Focused

The patterns in the qualitative data shows that student experienced a Mindfulness Induced State of focused. According to Cambridge Dictionary, focus is “giving a lot of attention to one particular thing.” Correspondingly, the Merriam-Webster Dictionary defines focus as “a state or condition permitting clear perception or understanding.” Students reported that this state of focus reduced distractions and prevented them from rushing through things. The reasons students provided for stating that the mindfulness curriculum improved their Inhibitory Control will be discussed in detail later in the chapter.

Similar to the qualitative findings of this study, the participants in another study by Whitworth and Currie (2019), also found that the mindfulness activities induced a state of calm, Whitworth and Currie conducted a pilot study determining children’s feedback of the Smiling Mind Application program. They found that calm was one of the key themes which appeared in the qualitative data. According to their findings, “The main themes to arise from the qualitative data showed that participants reported feeling heightened calmness, a more relaxed state and greater mental focus” (Whitworth and Currie, 2019). It is important to note that calm, relaxed and focused where the three recurring patterns identified under the themes of mindfulness induced state in this present study. Similarly, another mindfulness intervention study conducted on law students reported positive effects that “mindfulness training might have on their stress, focus, well-being, and academic performance” (Reuben & Sheldon, 2019).

Relaxed

The qualitative data shows that student experienced a mindfulness induced state of relaxed after they engaged in the mindfulness practice. According to the Cambridge Dictionary, relaxed is “feeling happy and comfortable because nothing is worrying you.” Students reported that the mindfulness activities helped them relax and pause before acting. The reasons students provided for stating that the mindfulness curriculum improved their inhibitory control will be discussed in detail later in the chapter.

The findings in this study are comparable to others conducted on both children and adults. For example, in a study of adult participants with mild cognitive impairment, Wells et al. (2019), identified the theme of “decreased stress reactivity and increased relaxation” after the program recipients participated in the mindfulness study. Similarly, the participants in the study by Whitworth and Currie (2019) also reported that the mindfulness activities made them relaxed.

MINDFULNESS EXPERIENCE

RQ5: What is the experience of engaging in a mindfulness curriculum at the elementary school level?

Mindfulness Experience was the third theme identified after encoding the data. The responses generated under this research question produced patterns suggesting that after engaging in the mindfulness activities students recommended an increased frequency of mindfulness sessions. More specifically, some students saw the value in the mindfulness activities and suggested that Mind Yeti should be practiced more frequently at their school. Fifth graders (#8) were more likely than 3rd graders (#1) and 4th graders (#2) to recommend having more frequent mindfulness sessions. Their justifications for the recommended increased practice included the possibility that these practices could help them improve behaviors and perform better on exams. These findings are also present in the qualitative literature. One elementary school-based mindfulness study found that “teachers were asking for additional mindfulness practices to share with students” (Rix and Bernay, 2014).

The current literature also shows that there can be discrepancies between the grade level, depending on which mindfulness intervention program is used. For example, in the mindfulness-based pilot study measuring students’ perception of Smiling Mind Application, a mindfulness intervention, Whitworth and Currie (2019) found that “the older children amongst the group did not find Mindfulness to be as acceptable and appealing as the younger participants.” This is contrary to the findings in this study and could be a direct link to the type of mindfulness intervention which the students in Whitworth and Currie’s (2019) study found juvenile.

LINKING THE QUALITATIVE AND QUANTITATIVE DISCUSSION

Only a few published studies explored the experiences of students participating in a mindfulness intervention and none have completed studies using Mind Yeti. The literature shows that there has been very little research which involved students' voices, in other words, students' perception of the experience with the mindfulness activities. Where the literature is even more sparse is in the combining of both quantitative and qualitative findings in the area of mindfulness and the executive functions. This section contributes to the literature by linking the qualitative and quantitative findings to each other (mixed methods).

Inhibition

According to the qualitative findings, students reported that after engaging in the mindfulness activities, their Inhibition improved. More specifically, students reported that they experienced three different states, calm, focused and relaxed, which contributed to improvements in their levels of Inhibition. Furthermore, students reported that being calm, focused, and relaxed helped improve their executive functions, especially since they did not want to make mistakes. Also, from the reporting in the data, it appears that the mindfulness activities made them so calm that they were no longer distracted by environmental stimuli, such as classmates talking, and were able to focus on the immediate goals they wanted to achieve. Similarly, students also reported that the mindfulness activities made them relaxed, which reduced their stress levels and the activities helped them to breathe and pause through challenges instead of rushing through them. The qualitative findings which suggest that by being calm, focused, and relaxed, students improved their level of inhibition, are similar to the quantitative data.

In terms of numbers, the qualitative results showed that approximately 85% of the students in the entire sample reported improvements in their levels of inhibition after participating in the mindfulness intervention training. The qualitative data showed that fifth grade students (~60% of the entire sample) were more likely than third (~20% of the entire sample) grade students to report that the mindfulness activities improved their inhibition. Similarly, quantitative results from both 3rd grade ($p = .01$) and 5th grade ($p < .00$) students showed statistically significant improvements from pretest to posttest under inhibition. The qualitative findings also suggest that females (55%) were more likely than males (45%) to report that the mindfulness intervention improved their level of inhibition. On the other hand, the median change score for inhibition from pretest to posttest was the same for male (Mdn = -.33) and female (Mdn = -.33). This score was not statistically significant, ($U = 35, z = -1.28, p = .20, r = -0.10$). Similar to the qualitative findings, the quantitative results showed statistically significant ($p < .00$) improvements in the area of Inhibition for the entire quantitative sample from pretest to posttest. The qualitative and quantitative findings showing that the mindfulness activities improved students' inhibition may be explained by the general structure of the mindfulness activities which require students to pay attention in a particular way.

In the general sense, mindfulness is a receptive type of meditation practice that aims to provide students with an unbiased and meaningful open awareness to the present moment (Shapiro & Walsh, 1984, p. 28). By intentionally paying attention, students become “aware of the way in which attention is being paid, that is,” they self-monitor the focus of their attention (Allen et al., 2006). Therefore, by engaging in intentionally paying attention, students learn to resist the temptations to act or change their attention, thoughts and/or behavior impulsively, students learn to slow down instead of rushing through things.

Emotional Control

The qualitative findings suggested that students' emotional control was improved by engaging in the breathing, imagining and listening activities. Students reported that the deep breathing mindfulness activities instantaneously regulated their emotions and reduced the effects of negative emotions. Additionally, students were able to generalize the impact of the deep breathing activities to activities outside of their regular classroom. The findings also show that the students were highly influenced by the imagining activities where they had to imagine taking on other roles (e.g., poet, scientist, and or animals). It was also clear from the data that some students found the content and melody of the activities to be beneficial in helping them control their emotions.

The qualitative findings which suggest that by being calm and relaxed, students improved their level of emotional control, are different to the results obtained from the quantitative data. In terms of numbers, approximately 50% of the students in the entire sample reported improvements in their levels of emotional control after participating the in the mindfulness intervention training. The qualitative data showed that fifth grade students (~44%) were more likely than third (~24%) grade students to report that the mindfulness activities improved their emotional control. In the quantitative results, both 3rd grade ($p = .17$) and 5th grade ($p = .14$) students did not show statistically significant changes from pretest to posttest. The qualitative data showed that female students (~51%) were more likely than male students (~49%) to report that the mindfulness activities improved their emotional control. On the other hand, the quantitative data showed that the students did not have statistically significant ($p = .08$) improved emotional control skills from pretest to posttest. On the quantitative assessment, the median change score calculated for emotional control from pretest to posttest was lower for male (Mdn = $-.16$) than female (Mdn = $.00$) but these scores

were not statistically significant, $U = 38$, $z = -.27$, $p = .80$, $r = -0.02$. This indicates that there was no statistically significant difference in the median score for males and females.

The positive qualitative finds are consistent with the findings in the literature. These positive findings of improved executive functions could be linked to structural changes in the brain after engaging in mindfulness practices. More specifically, engaging in mindfulness practices increases gray matter and the hippocampus, the area of the brain which is responsible for regulating emotions. As seen in the dissertation published by Bannirchelvam, et al. (2017), “Three randomized controlled trials investigating the impact of mindfulness on coping and emotional control consistently found that children who underwent a mindfulness-based intervention showed greater levels of emotional control and coping, as well as lower emotional reactivity, as measured through self or teacher report.” In the study conducted by Dariotis et al. (2016), students also reported that the breathing activities helped with controlling their emotions. “Several youths reported practicing skills and techniques outside the program to calm down, reduce anger, wake up, deal with boredom, remedy distraction, prevent impulsivity, and help with aches and pains” (Dariotis et al., 2016). In a more recent study, Reindl et al., (2020), conducted a yoga-based mindfulness intervention in 15 United States based elementary schools. The findings from this study show that students improved emotional regulation. Similar to these findings, according to the results of a large study on kindergarten students, “teachers reported improved classroom behavior of their students (i.e., paying attention, self-control, participation in activities, and caring/respect for others) that lasted up to 7 weeks post-intervention” Black and Fernando (2014).

These results are also in alignment with previous studies (Felter et al., 2017) who also found that students had improved their levels of emotional control after participating in a mindfulness intervention program. For example, these findings are in consonance with Felter et

al (2017) who conducted a study on the effectiveness of mindfulness training to regulate the off-task behaviors of a small sample of special education students between 4th and 7th grades. The researchers found that by engaging in the Soles of the Feet (SOL) mindfulness intervention, students had improved their classroom disruptive behavior. These findings are similar to our study where students reported changes in their levels of emotional control. Although the results between our study and Felver's and colleagues are similar, there were multiple differences between the methodologies. For examples, Felver's study used the SOF whereas our study used Mind Yeti. Additionally, their sample consisted of five male special education students while we had a bigger sample of 177 male and female from both special education and general education.

Sustained Attention

Students reported that they felt calm in the area of their sustained attention (SA). More specifically, students conveyed that after engaging in the mindfulness activities, they felt calm which freed up mental space and reduced their levels of stress and frustration which both reminded them to complete daily routines. In terms of numbers, approximately 7% of the students in the entire sample reported improvements in their levels of sustained attention after participating in the mindfulness intervention training. The qualitative data showed that fifth grade students (~55%) were more likely than third (~27%) grade students to report that the mindfulness activities improved their sustained attention. In the quantitative results, both 3rd grade ($p = .20$) and 5th grade ($p = .82$) students did not show statistically significant changes from pretest to posttest. The qualitative data showed that female students (~55%) were more likely than male students (~45%) to report that the mindfulness activities improved their sustained attention. On the contrary, the quantitative findings did not show statistically significant ($p = .25$) changes in the area of sustained

attention after participating in the mindfulness intervention. The quantitative findings suggested that the median change score calculated for sustained attention from pretest to posttest was the same for male (Mdn = .00) and female (Mdn = .00). These were not statistically significant, $U = 3849.5$, $z = -.16$, $p = .91$, $r = -0.01$. Having positive but not significant improvements in sustained attention after participating in a mindfulness intervention was also seen in a study conducted by Boston Charter Research Collaborative (BCRC) (Gutierrez, et al., 2019). In their study, Gutierrez and colleagues implemented the Calmer Choice mindfulness curriculum during four weekly sessions each lasting for 45 minutes. The program was implemented by instructors from the Calmer Choice program. Although the methodology differs from this present study, the findings were similar. However, there are other quantitative studies showing that mindfulness training can also have positive impacts on sustained attention (Napoli et al., 2005; Zylowska et al., 2008).

The improvements seen with the qualitative findings may be due to the general nature of mindfulness. “Paying attention on purpose and in the present moment... may provide benefits not only by encouraging the bringing of attention back to the present moment, but also by allowing the present moment experience to fill the ‘attentional workspace’ so that the tendency for attention to wander from the present moment is reduced” (Allen et al., 2006). Furthermore, the literature on the effect of mindfulness includes multiple studies with quantitative findings showing that mindfulness intervention may have a positive impact on sustained attention. For example, in an 8-weeks study conducted in a clinical setting on adolescents and their parents using the Mindfulness-Based Cognitive Therapy (MBCT), Bögels and colleagues (2008) found that both students and their parents had self-reported improved sustained attention.

Working Memory

Students reported that the breathing activities cleared their minds which helped them to remember their teacher's instructions. Based on the repetitions in the data, students' working memory was improved by engaging in the breathing and imagining activities. The patterns show that the breathing activities were beneficial in discriminating and blocking out external stimuli and noises in the classroom and focus primarily on the instruction. The imagining activities improved their working memory, especially when they pretended to be professionals or to do something physical, such as blowing on hot soup or using their hands to form goggles. Some students also referenced using their imagination to revisit and remember lessons that were initially difficult to grasp.

In terms of numbers, approximately 27% of the students in the entire sample reported improvements in their levels of working memory after participating in the mindfulness intervention training. The qualitative data showed that fifth grade students (~46%) were more likely than third (~22%) grade students to report that the mindfulness activities improved their Working Memory. In the quantitative results, although 3rd grade ($p = .68$) students did not show statistically significant changes from pretest to posttest, 5th grade ($p < .01$) students did. The qualitative data showed that female students (~59%) were more likely than male students (~41%) to report that the mindfulness activities improved their working memory.

Similarly, the quantitative data shows that the students reported statistically significant ($p < .01$) changes in their levels of working memory from pretest to posttest. On the other hand, the quantitative finding suggested that there was no statistically significant difference in the area of working memory ($U = 3441.5, z = -1.33, p = .18, r = -0.10$) for male ($Mdn = -.33$) and for female ($Mdn = .00$). The strengthened working memory reported on in the qualitative finding and which

was also found in the quantitative results may be closely related to the structure of a mindfulness practice. “Mindfulness is paying attention to the present moment on purpose and without judgment” (Kabat-Zinn, 1994). Engaging in this consistent refocusing on the breath may improve students’ measure of working memory. Additionally, according to Keng et al. (2011), “Participation in mindfulness training has also been shown to buffer against decreases in working memory capacity (WMC) during high stress periods, with changes in WMC mediating the relationship between amount of mindfulness practice and reductions in a negative effect.” Furthermore, previous mindfulness studies by Mrazek et al. (2013) and Quach et al. (2015) have found that mindfulness training improves working memory. Similarly, more recent studies have also found that mindfulness training may improve working memory.

Organization

Organization is the ability to manage current and future task demands. Students suggested that when they engaged in the mindfulness activities, they felt so calm that it encouraged them to initiate getting organized. Additionally, some students stipulated that the mindfulness activities were empowering in that they felt so calm, their possibilities were endless and that helped them see things more distinctly and keep their things organized. Clearly, the mindfulness activities helped students to keep their things organized, especially when it came to gaining perspective to initiate or keep things organized.

In terms of numbers, approximately 17% of the students in the entire sample reported improvements in their levels of organization after participating the in the mindfulness intervention training. The qualitative data showed that third grade students (~28%) were more likely than fifth (~6%) grade students to report that the mindfulness activities improved their organization. In the

quantitative results, both 3rd grade ($p = .71$) and 5th grade ($p = .09$) students did not show statistically significant changes from pretest to posttest. The qualitative data showed that female students (~56%) were more likely than male students (~44%) to report that the mindfulness activities improved their organization.

The quantitative data showed that students did not have statistically significant changes in the area of Organization ($p = .29$) skills from pretest to posttest. On the other hand, the quantitative findings suggested that the difference in organization for male (Mdn = .00) and female (Mdn = .00) was not statistically significant, $U = 3757$, $z = -.39$, $p = .69$, $r = -0.03$.

Cognitive Flexibility

Cognitive flexibility is the ability to have flexible thoughts, perspectives, and actions when dealing with complex or mundane tasks and when engaging in tasks that require problem solving. Students also reported that the mindfulness activities helped them be calm in the face of setbacks. Some students reported that the mindfulness activities helped them to remain calm in spite of making mistakes, improved their curiosity, improved their imagination, and reduced their likeliness to exude anger after they had made mistakes.

In terms of numbers, approximately 21% of the students in the entire sample reported improvements in their levels of cognitive flexibility after participating in the mindfulness intervention training. The qualitative data showed that fifth grade students (~53%) were more likely than third (~47%) grade students to report that the mindfulness activities improved their cognitive flexibility. In the quantitative results, both 3rd grade ($p = .04$) and 5th grade ($p < .00$) students showed statistically significant changes from pretest to posttest. The qualitative data

showed that female students (~53%) were more likely than male students (~47%) to report that the mindfulness activities improved their cognitive flexibility.

Similarly, the quantitative data shows that students had statistically significant differences ($p = .00$) from pretest to posttest in the area of cognitive flexibility. On the other hand, for the quantitative results, the median change score calculated for cognitive flexibility from pretest to posttest was the same for male (Mdn = -.33) and female (Mdn = -.33), but this score was not statistically significant, $U = 3849.5$, $z = -.115$, $p = .91$, $r = -0.0086$. The positive effect of mindfulness training on cognitive flexibility is also seen in the current literature. For example, Bamber et al. (2020) conducted a chronicled review of the qualitative research on college students' perceptions of mindfulness-based interventions, and had similar findings regarding learning.

Chapter 6: Conclusion

INTRODUCTION

Over the last two decades school cultures having been shifting toward wellness promotion, and due to this, schools have increasingly been implementing mindfulness curriculums, especially at the middle school and high school levels. This pretest-posttest quasi-experiment was designed to examine the effectiveness of specifically tailored administrative components of a mindfulness intervention program on the executive functions of elementary school students in a Californian public school. The aim was to test whether the students' self-reported scores on each of the executive function subscales (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) significantly changed following the 6-week Mind Yeti intervention program. The hypothesis was that the Mind Yeti program would have a positive impact on all the executive function subscales. The results partially support the hypothesis that all six of the executive functions of inhibition, working memory, and cognitive flexibility would improve from pretest to posttest for the general population of elementary school students. For gender, male and female students had similar patterns in the data. In terms of gender, the scores for male and females were generally not significantly different from each other. The results of this study will be relevant to the current literature since there are currently no studies measuring the effectiveness of the Mind Yeti curriculum at the elementary level. This study would be relevant to educators who are looking to improve students' school engagement and are seeking to do so through the implementation of mindfulness practices.

The first research question we asked was, "What are the ideal administrative components (i.e., dosage, location, and instructor) of a mindfulness intervention training program to improve the executive functions (inhibition, emotional control, sustained attention, working memory,

organization, and cognitive flexibility) difficulties of upper elementary school students?” For this research question, the literature showed that Mind Yeti was a program that fit the characteristics to be designed with the administrative components (i.e., short dosage, adaptable location, and little to no training for instructor). For the second research question we asked, “What is the effectiveness of a model mindfulness-based intervention on the executive functions (inhibition, emotional control, sustained attention, working memory, organization, and cognitive flexibility) difficulties of upper elementary school students as measured by the Student Executive Function Mindfulness Questionnaire (SEFMQ)?” The results showed that there were three executive functions (inhibition, working memory, and cognitive flexibility) that improved after students took part in the mindfulness intervention. The third research questions asked, “How do students who engage in mindfulness activities rank these mindfulness activities in relation to their improved executive functions (EFs)?” Students reported that the Breathing Activities, Imagining Activities, and Listening Activities were the Preferred Mindfulness Engagement which improved their Emotional Control and Working Memory. The fourth research questions asked, “How do students who engage in a mindfulness practice understand how the mindfulness activities affect their executive functions (EFs)?” The findings showed that mindfulness lessons induced states of calm, focus, and relaxation. The fifth research questions asked, “What is the experience of engaging in a mindfulness curriculum at the elementary school level?” Students made one specific recommendation after engaging in the mindfulness practices which was to increase the frequency of the mindfulness sessions.

LIMITATIONS

Introduction

The research on the effectiveness of mindfulness for elementary students is still in its developing stages since most of the school related mindfulness studies currently focus on adolescents. To contribute to this developing field, our study has some encouraging findings on the effects of mindfulness intervention and the executive functions of elementary school students. Nonetheless, there are several methodological limitations in our study which are worth addressing and which we hope will be addressed in future studies.

Limitation in the Treatment

Despite the positive findings, there were some limitations to the present study. Firstly, there was only one fourth grade class. As we develop clearer theories of the impact of mindfulness intervention for elementary school students, additional participants in the fourth-grade group could help further differentiate the key findings of the intervention. Secondly, some classes were discarded from the data since their teachers did not collect both the pretest and posttest data. Specifically, three classes were excluded from the study, and this reduced the sample size and our statistical leverage. This was a particular issue for the fourth grade, where only one teacher collected both pretest and posttest data, meaning that we were unable to compare all three grade levels. A third drawback was that we did not collect longer-term follow-up data. Had we followed students for a period of time after the end of the intervention, this would have allowed us to see how long the effects of the mindfulness lasted. This could aid with planning a cycle of mindfulness programs; however, school's busy daily life makes it very difficult.

Limitation in the Measure

For the qualitative study, the survey did not measure the activities which were previously used by students, before participating in the study, to regulate their emotions and working memory. This information could have been valuable. Nonetheless, data was taken from other studies with similar methodology to be used as a baseline for comparison. Which activities were previously used by students, before participating in the study, to regulate their emotions and working memory? This information could have been valuable for comparison

Data Collection Challenges

An additional short coming was that many classes were discarded from the data since the teachers of these classes did not collect both the pretest and posttest data. In fact, three classes were excluded from the study, which reduced the sample size by approximately 75 students. This was particularly important in fourth grade, where only one teacher collected both pretest and posttest. If all the teachers had collected the data, then we would have had the opportunity to conduct further statistical analysis between the three grade levels. Additionally, the overall sample would have provided more statistical leverage for our study. Another challenge was getting the pretest questionnaires to the students anonymously by their teachers via Google Classroom. This method was chosen since the initial mode, Blackboard, did not work. However, using Google Classroom was a relatively easy fix since teachers are familiar with this program.

Unexpected Circumstances

The changes in the dependent variables could have resulted from maturation of the participants from pretest to posttest. Due to the study design, there could have been a regression to the mean for students who rated their executive functions higher on the pretest and then subsequently rated themselves lower on the posttest. We grappled with challenges throughout the coding of the quantitative data since it appeared that not all students understood the questions. Students did not understand some of the vocabulary, so teachers had to explain, and this took a long time. One teacher reported that the pretest data collection process took 40 minutes instead of the 15 minutes that were anticipated. Like any research, once the test was handed out it took more time than we anticipated, which is normal as it was their first time. Not surprisingly, the post-test took less time than the pre-test, as students were familiar with the questions the second time around.

IMPLICATIONS OF FINDINGS

This study looked at a short-term mindfulness intervention program implemented as part of the general curriculum at an elementary school. The findings as they relate to the administrative components are very promising. More specifically, 3 themes were identified in the qualitative findings. These themes were *preferred mindfulness activities*, *mindfulness induced state*, and *mindfulness experience*. In relation to the administrative components when selecting a mindfulness program that is age appropriate our findings suggest that there are key techniques such as breathing activities, imagining activities and listening activities that students find particularly interesting. Additionally, when a specially designed mindfulness curriculum is implemented within the general curriculum, students can find specific *mindfulness induced states* such as calm, focus, and relax. These *mindfulness induced states* also contribute to improved executive functions. Finally, one important administrative component that was looked at in this study was duration and frequency. Based on this data students would have liked to have more frequent mindfulness sessions in their classrooms.

When the whole sample was analyzed, valid information was found that could help schools with implementing mindfulness curriculum. More specifically, schools can now have a real-life example with all the challenges and rewards that they could see if they were to implement a mindfulness intervention program at their school. This research also presents preliminary findings explaining what mindfulness means for us teachers when we implement it ourselves as part of the regular classroom curriculum.

This research presents preliminary findings comparing 3rd grade and 5th graders. On average 5th graders reported more benefits from the mindfulness activities. The exception was that for working memory and organization, third graders reported more improvements than fifth

graders. The general pattern in the data is that older children, 5th graders, appeared to find more benefit from the Mind Yeti curriculum because they consistently showed more improvement in the executive functions.

The current literature also shows that there can be discrepancies between the grade levels, depending on which mindfulness intervention program is used. For example, in the mindfulness-based pilot study measuring students' perception of Smiling Mind Application, a mindfulness intervention, Whitworth and Currie (2019) found that "the older children amongst the group did not find Mindfulness to be as acceptable and appealing as the younger participants." This is contrary to the finding in this study and could be direct link to the type of mindfulness intervention which the students in Whitworth and Currie (2019) study found juvenile.

Similarly, the findings relating to gender also present preliminary information that could be useful with the design and implementation of mindfulness curriculum. Consistently, female students reported higher improvement in various executive functions after engaging in the mindfulness activities. This trend could be further analyzed to understand the reason behind the higher reporting for females. Is it something about the program design? Or is it something about the way boys experience mindfulness?

In terms of the design of the study, both the qualitative and quantitative data showed that the mindfulness practices improved the students' metacognitive skills. Metacognition refers to the process of focusing on and observing one's thought processes and attention (Allen et al., 2006). This study with short duration had positive results. Also, students in fact wanted more mindfulness activities.

IMPLICATION FOR FUTURE RESEARCH

In summary, we recommend that future studies consider the limitations of our study and conduct additional research addressing these limitations. By addressing these important topics, we will deepen our understanding of mindfulness and develop programs that are the most beneficial for our students and will develop theories from which educators can make more informed decisions.

Implication for Research

There is a need for more classroom friendly tools to measure the executive functions of elementary school students. The current EF measures are too time consuming and the vocabulary is too advanced. Further research should be conducted on the different types of meditative practices that are most beneficial for students. Further research is needed to define the executive functions, since many current studies define them differently. Future research should seek to replicate the findings in our study and to conduct similar studies with even younger elementary school students. Further research can be conducted on how the Mindfulness intervention affected the teachers since they are in the classroom while the sessions are being played.

Implication for Practice

One student anecdotally wrote that they preferred practicing Mind Yeti at home, and another wrote that Mind Yeti was helpful in when they needed to focus on chores at home, suggesting that Mind Yeti may generalize to other contexts. Mind Yeti should have a visual component for those who are not comfortable closing their eyes and may benefit from an additional visual aid. Students learning English may also find that additional visual aids would assist their learning. For future study, in order to promote subject retention, participants should have an opportunity to receive

small class prizes if they adhered to listening to at least 3 Mind Yeti session times per week for the six-week period. Since Mind Yeti is relatively inexpensive and can be implemented in short dosages with little to no preparation time by the teacher, administrators should consider implementing the Mind Yeti curriculum in their schools.

THE CONTRIBUTION TO RESEARCH

This was a pretest-posttest quasi-experiment to examine the effectiveness of defined administrative components of a mindfulness intervention program on the executive functions of elementary school students in a school a public elementary school in California, and to gauge student and teacher perception on the intervention using a mixed method methodological design. Elementary school students' participation in a mindfulness-based intervention program was associated with improvements in their level of inhibition, emotional control, working memory, and cognitive flexibility. Overall, this real-world implementation revealed meaningful improvements in students' executive functions in the general education setting. The literature on mindfulness intervention and the executive function of inhibition has a lot of data showing that teachers and parents think that mindfulness intervention has had a positive impact on students' executive functions. However, students' voices in how they interpret the use of different mindfulness practices to help them improve their executive functions was still missing. By conducting this research, students' voices in how they interpret the use of different mindfulness practices to help them improve their executive functions have been added. More precisely, data showing the mindfulness activities students prefer most was contributed. Additionally, we have shown that mindfulness makes students calm, relaxed, and focused. One major contribution was data showing that students enjoy engaging in mindfulness practice in the school setting and would like to do so frequently.

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Appendices

PRETEST QUESTIONNAIRE

Mind Yeti #: _____ Grade: _____ Gender: _____ Pretest

Directions: Read each item and mark the appropriate number that most closely identifies you.

| 1 Strongly Disagree | 2 Disagree | 3 Neutral | 4 Agree | 5 Strongly Agree |

- | | | | | | |
|---------------------------------------|---|---|---|---|---|
| 1. I rush through things. | 1 | 2 | 3 | 4 | 5 |
| 2. I have problems waiting my turn. | 1 | 2 | 3 | 4 | 5 |
| 3. People say I am easily distracted. | 1 | 2 | 3 | 4 | 5 |

1. Inhibition (Recognizing the need to stop your own behavior and resist impulses)

- | | | | | | |
|--|---|---|---|---|---|
| 4. I have emotional outbursts for little reason. | 1 | 2 | 3 | 4 | 5 |
| 5. My mood changes frequently. | 1 | 2 | 3 | 4 | 5 |
| 6. I get emotionally upset easily. | 1 | 2 | 3 | 4 | 5 |

2. Emotional Control (Modulating your emotional response)

- | | | | | | |
|--|---|---|---|---|---|
| 7. I can remember and carry out a 2- to 3-step routines. | 1 | 2 | 3 | 4 | 5 |
| 8. I can complete a short task within time limits set by an adult. | 1 | 2 | 3 | 4 | 5 |
| 9. I can start homework at an established time, with one reminder. | 1 | 2 | 3 | 4 | 5 |

3. Sustained Attention (Awareness of the impact of your behavior on others)

- | | | | | | |
|---|---|---|---|---|---|
| 10. I forget instructions easily. | 1 | 2 | 3 | 4 | 5 |
| 11. I have a short attention span. | 1 | 2 | 3 | 4 | 5 |
| 12. I forget what I am doing in the middle of things. | 1 | 2 | 3 | 4 | 5 |

4. Working Memory (Holding information to solve a problem or carry out a task)

- | | | | | | |
|--|---|---|---|---|---|
| 13. I have trouble prioritizing activities. | 1 | 2 | 3 | 4 | 5 |
| 14. I don't plan ahead for future activities. | 1 | 2 | 3 | 4 | 5 |
| 15. I have trouble finding my things in my desk or in my room. | 1 | 2 | 3 | 4 | 5 |

5. Organization (Managing current and future task demands)

- | | | | | | |
|---|---|---|---|---|---|
| 16. After having a problem, I don't get over it easily. | 1 | 2 | 3 | 4 | 5 |
| 17. I am bothered by having to deal with changes. | 1 | 2 | 3 | 4 | 5 |
| 18. I have trouble changing from one activity to another. | 1 | 2 | 3 | 4 | 5 |

6. Cognitive Flexibility (the ability to switch between thinking about different concepts)

POSTTEST & FOLLOW-UP QUESTIONNAIRE

Mind Yeti #: _____ Gender: _____ Grade: _____ Posttest

Directions: Read each item and mark the appropriate number that most closely identifies you.

| 1 Strongly Disagree | 2 Disagree | 3 Neutral | 4 Agree | 5 Strongly Agree |

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| <p>19. I (ALWAYS) rush through things.</p> <p>20. I (ALWAYS) have problems waiting my turn.</p> <p>21. People (ALWAYS) say I am easily distracted.</p> <p>1. Inhibition (Recognizing the need to stop your own behavior and resist impulses)</p> <p>22. I have emotional outbursts (get angry) for little reason.</p> <p>23. My mood (feeling) changes frequently.</p> <p>24. I get emotionally upset (angry) easily.</p> <p>2. Emotional Control (Modulating your emotional response)</p> <p>25. I can remember and carry out a 2- to 3-step routines (daily activities).</p> <p>26. I can (ALWAYS) complete a short task within time limits set by an adult.</p> <p>27. I can (ALWAYS) start homework at an established time, with one reminder.</p> <p>3. Sustained Attention (Awareness of the impact of your behavior on others)</p> <p>28. I (ALWAYS) forget instructions easily.</p> <p>29. I have a short attention span.
(I become distracted after working on an activity for a short period of time.)</p> <p>30. I (ALWAYS) forget what I am doing in the middle of things.</p> <p>4. Working Memory (Holding information to solve a problem or carry out a task)</p> <p>31. I have trouble prioritizing activities (doing important activities first).</p> <p>32. I don't plan ahead for future activities.</p> <p>33. I (ALWAYS) have trouble finding my things in my desk or in my room.</p> <p>5. Organization (Managing current and future task demands)</p> <p>34. After having a problem, I (OFTEN) don't get over it easily.</p> <p>35. I am (ALWAYS) bothered by having to deal with changes.</p> <p>36. I (ALWAYS) have trouble changing from one activity to another.</p> <p>6. Cognitive Flexibility (the ability to switch between thinking about different concepts)</p> | <table border="0"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td colspan="5" style="border: 1px solid black; height: 15px;"></td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td colspan="5" style="border: 1px solid black; height: 15px;"></td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td colspan="5" style="border: 1px solid black; height: 15px;"></td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td colspan="5" style="border: 1px solid black; height: 15px;"></td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr><td colspan="5" style="border: 1px solid black; height: 15px;"></td></tr> </table> | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | | | | | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | | | | | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | | | | | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | | | | | | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | | | | | |
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Mind Yeti Playlist

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	Inhibition (Recognizing the need to stop your own behavior and resist impulses)				
Morning	<p>Welcome to Mind Yeti (1.39)</p> <p>Mind Yeti Powers – Breathe Hello Breath (3.32) Say hello to your body’s calming superpower, your breath.</p> <p><u>Activity:</u> Notice the breath and redirect the attention to the breath.</p>	<p>Mind Yeti Powers- Breath Hello Hubbubbles Meet your Hubbubbles: your thoughts, feelings, & sensations.</p> <p><u>Activity:</u> Focus attention and notice the breath.</p>	<p>Mind Yeti Powers- Breath Slow Breathing Learn a special breathing technique to settle the Hubbub.</p> <p><u>Activity:</u> Inhale through the mouth and out through the nose while imagining inhaling and blowing to cool soup.</p>	<p>Mind Yeti Powers- Body Hello, Body (5:03) Boost your focus by paying attention to your body.</p> <p><u>Activity:</u> Focus attention on body (different body parts as well as the breath).</p>	<p>Mind Yeti Powers- Senses One Sound Sharpen your focus by concentrating on a single sound.</p> <p><u>Activity:</u> Focus attention on one sound.</p>
Afternoon	<p>Mind Yeti Moments - Reset I am Here Now 1 A trusty tool to help you be present no matter where you are.</p> <p><u>Activity:</u> Focus on noticing what is happening in the moment, deep breathing, refocus the mind to the breath.</p>	<p>Mind Yeti Moments-Reset I am here now 2 In a rush? Try this short refresher for quick transitions.</p> <p><u>Activity:</u> Focus on the here and now, take deep breaths.</p>	<p>Mind Yeti Moments-Reset Checking In & Notice A quick check-in to get you ready for what's next.</p> <p><u>Activity:</u> Focus on the here and now, take deep breaths, notice the sensation of the body, feel the body, wiggle body parts and notice the feeling.</p>	<p>Mind Yeti Moments - Focus Notice the Moment Can you notice when the unfamiliar sound becomes familiar? (4.43)</p> <p><u>Activity:</u> Focus the mind & pay attention to identify a familiar sound.</p>	<p>Mind Yeti Moments- Calm Down Slow Breathing 2 Imagine smelling a warm bowl of soup to settle strong emotions.</p> <p><u>Activity:</u> Focus on the Breath.</p>

	Emotional Control (Modulating your emotional response)				
Morning	<p>Mind Yeti Powers - Thoughts Hello Thoughts Notice thought Hubbubbles, then learn to let them float away. (4.21)</p> <p><u>Activity:</u> Focus deep breathing, notice your thoughts and imagine them floating away like bubbles.</p>	<p>Mind Yeti Powers - Thoughts Mind Like a puppy Minds are like busy puppies. But you can help the puppy focus.</p> <p><u>Activity:</u> Deep breathing, think of the mind like a puppy, focus the mind on breathing.</p>	<p>Mind Yeti Powers - Thoughts Come Back Mind Mind wandering like a puppy? Learn how to call it back.</p> <p><u>Activity:</u> Deep breathing, notice the mind wandering and call it back to the breath saying “comeback mind”.</p>	<p>Mind Yeti - Focus Sound Change Listen for unexpected similarities between familiar sounds. (6:00)</p> <p><u>Activity:</u> Take slow breaths, focus attention on one sound.</p>	<p>Mind Yeti Moments - Focus Hello Feet Build concentration by focusing on your feet. (4:26)</p> <p><u>Activity:</u> Notice the breath moving in and out of the body.</p>
Afternoon	<p>Mind Yeti - Focus Bear in Winter Build focus by moving like a bear getting ready for winter. (6.45)</p> <p><u>Activity:</u> Deep breathing, imagine being a big bear.</p>	<p>Mind Yeti - Focus Animal Moves Tiptoe like an elephant in this fun movement session. (6.18)</p> <p><u>Activity:</u> Imagine being animals around the world and use movements and gestures to imitate them.</p>	<p>Mind Yeti Powers – Body Body Scan (7:49) Scan your body to help build body awareness.</p> <p><u>Activity:</u> Notice different body parts with curiosity.</p>	<p>Mind Yeti Powers – Body Freeze and Thaw (7:08) Boost body awareness by freezing and thawing your muscles.</p> <p><u>Activity:</u> Focusing on the body and noticing the difference between feeling tense and relaxed.</p>	<p>Mind Yeti Powers – Body Tree in the City Calm your body and focus attention with this movement session. (5:09)</p> <p><u>Activity:</u> Stand and imagine to be a tree in a city, notice the feeling of being a tree, redirect the attention to the breath.</p>

Week 3	Sustain Attention (Awareness of the impact of your behavior on others)				
Morning	<p>Mind Yeti – Powers Body Moving in Slow Mo Hone your focus and balance with some slow-motion stepping.</p> <p><u>Activity</u> Stand and notice the feeling of the feet on the ground, deep breaths, imagine standing in honey and moving body parts slowly because of the thickness of the honey.</p>	<p>Mind Yeti – Moments Calm Down Sticky Hubbubbles Have a thought that just won't unstick? Try this!</p> <p><u>Activity</u> Imagine thoughts are bubbles floating by, deep breaths.</p>	<p>Mind Yeti – Moments Create Space Visitor Practice divergent thinking by seeing the world as brand new</p> <p><u>Activity</u> Deep breathing, imagine being an alien coming to earth and using the senses to curiously explore it.</p>	<p>Mind Yeti- Moments Create Sound Scientist Be a curious scientist by wondering about unusual sounds.</p> <p><u>Activity</u> Deep breathing, imagine being a scientist and developing curiosity about different sounds.</p>	<p>Mind Yeti- Moments Create Imagine a World Exercise your imagination by creating your own limitless world.</p> <p><u>Activity</u> Think about a door and imagine a world you have created behind this door.</p>
Afternoon	<p>Mind Yeti- Breath Hello Breath 2 Practice using your breath power to settle the Hubbub.</p> <p><u>Activity</u> Notice the breath and redirect the attention to the breath. Notice the sensation of the body while breathing.</p>	<p>Mind Yeti- Breath Hello Breath 3 Practice using your breath power to settle the Hubbub.</p> <p><u>Activity</u> Notice the breath and redirect the attention to the breath. Notice the sensation of the body while breathing.</p>	<p>Mind Yeti- Breath Counting Breaths Counting breaths is an easy way to calm down.</p> <p><u>Activity</u> Notice the breath and redirect the attention to the breath. Notice the sensation of the body while breathing. Count while breathing in through nose and out through mouth.</p>	<p>Mind Yeti- Breath Counting Breaths 2 Counting breaths is an easy way to calm down.</p> <p><u>Activity</u> Notice the breath and redirect the attention to the breath. Notice the sensation of the body while breathing. Count 5 deep breaths- in through nose and out through mouth.</p>	<p>Mind Yeti Powers - Breath Slow Breathing 3 Building your Breath Power? Practice your Slow Breathing!</p> <p><u>Activity:</u> Slow breaths. Redirect the attention to the breath.</p>

Week 4	Working Memory (Holding information to solve a problem or carry out a task)				
	<p>Mind Yeti Powers – Breathe Hello Breath (3.32) Say hello to your body's calming superpower, your breath.</p> <p><u>Activity:</u> Notice the breath and redirect the attention to the breath.</p>	<p>Mind Yeti- Breath Hello Breath 2 Practice using your breath power to settle the Hubbub.</p> <p><u>Activity</u> Notice the breath and redirect the attention to the breath. Notice the sensation of the body while breathing.</p>	<p>Mind Yeti- Breath Hello Breath 3 Practice using your breath power to settle the Hubbub. (7.02)</p> <p><u>Activity</u> Notice the breath and redirect the attention to the breath. Notice the sensation of the body while breathing.</p>	<p>Mind Yeti Powers- Breath Hello Hubbubbles Meet your Hubbubbles: your thoughts, feelings, & sensations.</p> <p><u>Activity:</u> Focus attention and notice the breath.</p>	<p>Mind Yeti - Focus Animal Moves Tiptoe like an elephant in this fun movement session. (6.18)</p> <p><u>Activity:</u> Imagine being animals around the world and use movements and gestures to imitate them.</p>
	<p>Mind Yeti Moments- Reset I am here now 2 In a rush? Try this short refresher for quick transitions.</p> <p><u>Activity:</u> Focus on the here and now, take deep breaths.</p>	<p>Mind Yeti – Moments Calm Down Sticky Hubbubbles Have a thought that just won't unstick? Try this!</p> <p><u>Activity</u> Imagine thoughts are bubbles floating by, deep breaths.</p>	<p>Mind Yeti Moments- Reset Checking In & Notice A quick check-in to get you ready for what's next.</p> <p><u>Activity:</u> Focus on the here and now, take deep breaths, notice the sensation of the body, wiggle body parts and notice the feeling.</p>	<p>Mind Yeti- Moments Create Sound Scientist Be a curious scientist by wondering about unusual sounds.</p> <p><u>Activity</u> Deep breathing, imagine being a scientist and developing curiosity about different sounds.</p>	<p>Mind Yeti Moments- Reset Seasons of Change Try these simple movements to stay grounded in times of change.</p> <p><u>Activity:</u> Stand and imagine being a tree and remaining and connected to the grounded even when things change.</p>

Week 5	Organization (Managing current and future task demands)				
Morning	<p>Mind Yeti - Focus Candle Can Do Feeling nervous about what comes next? Give this a try!</p> <p><u>Activity</u> Take a deep breath and let go. Remembering how it felt being nervous. Deep breathing and blowing on a candle to make it flicker but not go out. Imagine breathe out stress and nervousness.</p>	<p>Mind Yeti Moments- Reset Seasons of Change Try these simple movements to stay grounded in times of change.</p> <p><u>Activity:</u> Stand and imagine being a tree and remaining and connected to the grounded even when things change.</p>	<p>Mind Yeti Powers- Senses One Sound Sharpen your focus by concentrating on a single sound.</p> <p><u>Activity:</u> Focus attention on one sound</p>	<p>Mind Yeti- Moments Create Sound Scientist Be a curious scientist by wondering about unusual sounds.</p> <p><u>Activity</u> Deep breathing, imagine being a scientist and developing curiosity about different sounds.</p>	<p>Mind Yeti Powers – Body Tree in the City Calm your body and focus attention with this movement session. (5:09)</p> <p><u>Activity</u> Stand and imagine to be a tree in a city, notice the feeling of being a tree, and redirect the attention to the breath.</p>
Afternoon	<p>Mind Yeti Powers- Breath Slow Breathing Learn a special breathing technique to settle the Hubbub.</p> <p><u>Activity:</u> Inhale through the mouth and out through the nose while imagining inhaling and blowing to cool soup.</p>	<p>Mind Yeti Moments- Calm Down Slow Breathing 2 Imagine smelling a warm bowl of soup to settle strong emotions.</p> <p><u>Activity:</u> Focus on the Breath.</p>	<p>Mind Yeti Powers - Breath Slow Breathing 3 Building your Breath Power? Practice your Slow Breathing!</p> <p><u>Activity:</u> Slow breaths. Redirect the attention to the breath.</p>	<p>Mind Yeti Powers - Breath Slow Breathing 4 Building your Breath Power? Practice your Slow Breathing!</p> <p><u>Activity:</u> Slow breaths. Redirect the attention to the breath.</p>	<p>Mind Yeti- Moments Create Imagine a World Exercise your imagination by creating your own limitless world.</p> <p><u>Activity</u> Think about a door and imagine a world you have created behind this door.</p>

Week 5	Organization (Managing current and future task demands)				
Morning	<p>Mind Yeti - Focus Candle Can Do Feeling nervous about what comes next? Give this a try!</p> <p><u>Activity</u> Take a deep breath and let go. Remembering how it felt being nervous. Deep breathing and blowing on a candle to make it flicker but not go out. Imagine breathe out stress and nervousness.</p>	<p>Mind Yeti Moments- Reset Seasons of Change Try these simple movements to stay grounded in times of change.</p> <p><u>Activity:</u> Stand and imagine being a tree and remaining and connected to the grounded even when things change.</p>	<p>Mind Yeti Powers- Senses One Sound Sharpen your focus by concentrating on a single sound.</p> <p><u>Activity:</u> Focus attention on one sound</p>	<p>Mind Yeti- Moments Create Sound Scientist Be a curious scientist by wondering about unusual sounds.</p> <p><u>Activity</u> Deep breathing, imagine being a scientist and developing curiosity about different sounds.</p>	<p>Mind Yeti Powers – Body Tree in the City Calm your body and focus attention with this movement session. (5:09)</p> <p><u>Activity</u> Stand and imagine to be a tree in a city, notice the feeling of being a tree, and redirect the attention to the breath.</p>
Afternoon	<p>Mind Yeti Powers- Breath Slow Breathing Learn a special breathing technique to settle the Hubbub.</p> <p><u>Activity:</u> Inhale through the mouth and out through the nose while imagining inhaling and blowing to cool soup.</p>	<p>Mind Yeti Moments- Calm Down Slow Breathing 2 Imagine smelling a warm bowl of soup to settle strong emotions.</p> <p><u>Activity:</u> Focus on the Breath.</p>	<p>Mind Yeti Powers - Breath Slow Breathing 3 Building your Breath Power? Practice your Slow Breathing!</p> <p><u>Activity:</u> Slow breaths. Redirect the attention to the breath.</p>	<p>Mind Yeti Powers - Breath Slow Breathing 4 Building your Breath Power? Practice your Slow Breathing!</p> <p><u>Activity:</u> Slow breaths. Redirect the attention to the breath.</p>	<p>Mind Yeti- Moments Create Imagine a World Exercise your imagination by creating your own limitless world.</p> <p><u>Activity</u> Think about a door and imagine a world you have created behind this door.</p>

Results Tables

DESCRIPTIVE STATISTICS TABLES

Table 4. 12: *Descriptive Statistics for the Whole Sample*

	N	Mean Difference	Std. Deviation
Inhibition Difference	177	-.28	.65
Emotional Control Difference	177	-.16	.69
Sustained Attention Difference	177	-.06	.69
Working Memory Difference	177	-.18	.69
Organization Difference	177	-.06	.75
Cognitive Flexibility Difference	177	-.21	.62

Table 4. 13: *Descriptive Statistics for 3rd Grade*

	N	Mean	Std. Deviation
Inhibition Difference	64	-.13	.74
Emotional Control Difference	64	-.10	.63
Sustained Attention Difference	64	-.03	.69
Working Memory Difference	64	.04	.89
Organization Difference	64	-.18	.69

Table 4. 14: *Descriptive Statistics for 4th Grade*

	N	Mean	Std. Deviation
Inhibition Difference	27	-.30	.47
Emotional Control Difference	27	-.44	.61
Sustained Attention Difference	27	-.20	.47
Working Memory Difference	27	-.49	.66
Organization Difference	27	-.11	.66
Cognitive Flexibility Difference	27	-.33	.47

Table 4. 15: *Descriptive Statistics for 5th Grade*

	N	Mean	Std. Deviation
Inhibition Difference	86	-.29	.56
Emotional Control Difference	86	-.10	.65
Sustained Attention Difference	86	.01	.77
Working Memory Difference	86	-.20	.68
Organization Difference	86	-.12	.65
Cognitive Flexibility Difference	86	-.19	.60

Findings Figures

NVIVO FREQUENCY QUERIES

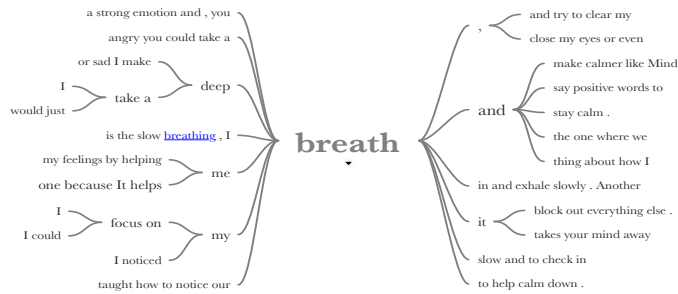


Figure 4. 13: The code breathing for emotional control.

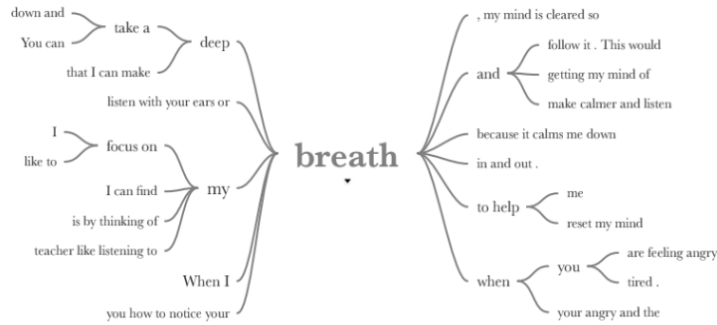


Figure 4. 14: The code breathing for working memory



Figure 4. 15: The code imagining for emotional control



Figure 4. 16: The code imagining for working memory



Figure 4. 17: The code listening for emotional control

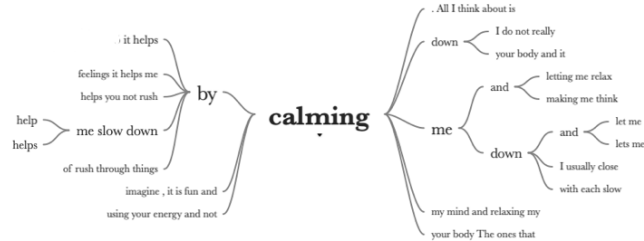


Figure 4. 18: The code calm for inhibitory control

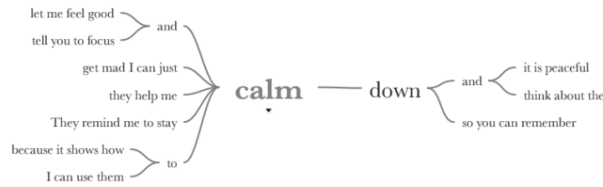


Figure 4. 19: The code for sustained attention

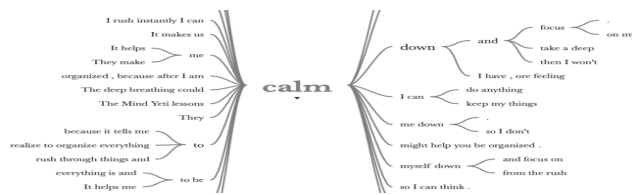


Figure 4. 20: The code calm for organization

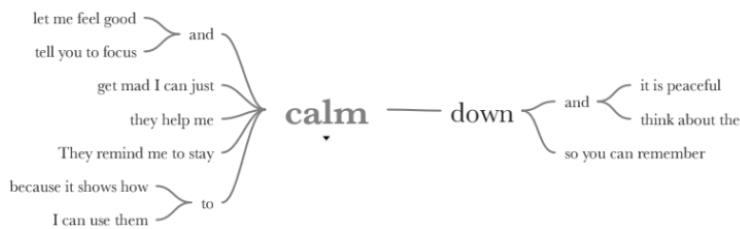


Figure 4. 21: The code calm for cognitive flexibility

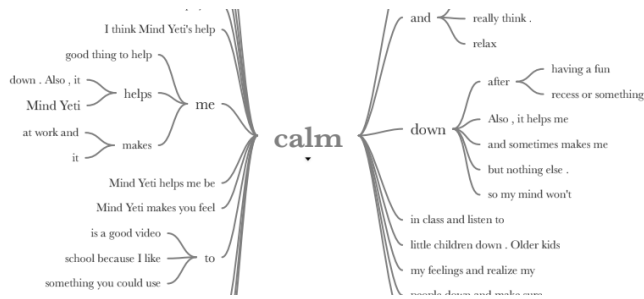


Figure 4. 22: The code calm for mindfulness feedback

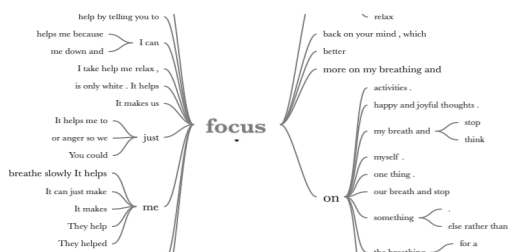


Figure 4. 23: The code focused for inhibitory control

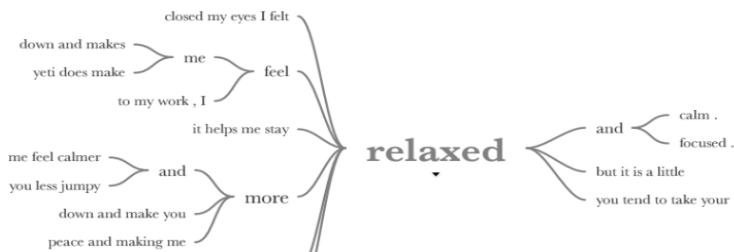


Figure 4. 24: The code relaxed for inhibitory control



Figure 4. 25: The code relaxed for emotional control

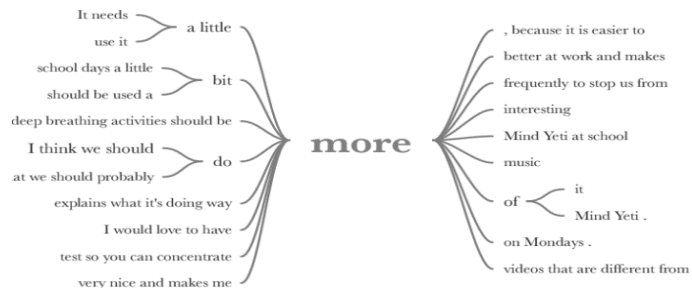


Figure 4. 26: The code increased frequency of mindfulness sessions