Children's Perceptions of Mindfulness Apps for Enhanced Learning

by

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The above committee determined that the thesis is acceptable in form and content and that a satisfactory knowledge of the field covered by the thesis was demonstrated by the candidate during an oral examination. A signed copy of the Certificate of Approval is available from the School of Graduate and Postdoctoral Studies.

ABSTRACT

Mindfulness, a practice that focuses on controlling breathing and the flight or fight response, has been used in schools to support students. This study explored student and teacher perceptions of a mindfulness app, *Smiling Mind*, used in a grade four ESL classroom over 16 weeks to develop emotional regulation to support learning. A mixed-method approach was used to answer the research questions: (1) did the students enjoy the mindfulness app and (2) did they perceive any influences from the app on their behaviour or learning? The results indicate that the students enjoyed and felt calmer using the app. Improvements in on-task behaviour and emotional regulation were also observed.

Keywords: mindfulness; apps; classroom; regulation; *Smiling Mind*

AUTHOR'S DECLARATION

I hereby declare that this thesis consists of original work of which I have authored. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Gillian Eadie

STATEMENT OF CONTRIBUTIONS

    I hereby certify that I am the sole author of this thesis and that no part of this thesis has been published or submitted for publication. I have used standard referencing practices to acknowledge ideas, research techniques, or other materials that belong to others. Furthermore, I hereby certify that I am the sole source of the creative works and/or inventive knowledge described in this thesis.

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1. Introduction

1.1. Overview

The Canadian Mental Health Association (CMHA) has found that one in five children and youth have mental health difficulties (CMHA, 2020). These problems include depression, anxiety, and stress, which can have a negative impact on student success and relationships in schools (Britton et al., 2014; Mental Health Commission of Canada, 2013; Zhu et al., 2019). Newcomers and children with limited English proficiency are at greater risk of academic hardships or failure in schools which can lead to mental health problems (Lopez & Tashakkori, 2004; Johnston et al., 2013; Regier et al., 2005; Santor et al., 2018). English as a second language (ESL) students may also face additional stressors like acculturation difficulties and/or experience bullying, which may negatively impact their mental health (Goforth et al., 2015; Litman et al., 2015).

The stress and anxiety that students, especially new immigrants or ESL students, experience can negatively impact their learning and performance. Anxiety can impair attention, concentration, and memory and disrupt a student's problem-solving skills (Moran, 2016; Semple et al., 2010). Anxiety can also cause students to withdraw from school in an attempt to avoid the stressor (Huberty, 2012). Unfortunately, many children are unable to receive treatment for mental health problems such as anxiety due to access issues, availability of resources, or the social stigma often associated with mental health (Children's Mental Health Ontario, 2020; MHASEF Research Team, 2015; MHCC, 2013).

Evidence-based methods of supporting children and youth so they can be successful are of the utmost importance. An ideal environment for implementing universal interventions for positive mental health is in schools, as most children spend a significant portion of their

childhoods attending schools (Barrett et al., 2017; Meyer & Eklund, 2020). Evidence has shown that school-based interventions are an effective and innovative approach to supporting well-being of youths (Meyer & Eklund, 2020). A more recent and rapidly growing intervention in schools is the practice of Mindfulness (Chadwick & Gelbar, 2016).

The practice of mindfulness and Mindfulness-based stress reduction (MBSRs) were developed by Jon Kabat-Zinn (Chadwick & Gelbar, 2016; Raes et al., 2013). Mindfulness teaches individuals how to pay attention to one's internal processes (thoughts and bodily sensations) with patience, acceptance, and non-judgment, and to be mindful and appreciative of the current moments in which they live (Kabat-Zinn, 2003; Altschuler et al., 2012; Black & Fernando, 2014). Mindfulness teaches individuals how to develop an awareness of their breathing and practice gentle, full-body exercises designed to release muscular tension (Altschuler et al., 2012). Mindfulness has been used to improve the lives of children and adults who are suffering from a variety of mental and physical health issues, including pain, depression, anxiety, or stress (Bauer et al., 2019; Garland et al., 2019; Johns et al., 2014; Morone et al., 2016; Schoultz et al., 2016; Song & Lindquist, 2015). Research suggests that mindfulness can be an effective treatment for children and youth in clinical settings, as it has been shown to improve stress, internalizing and attention problems (Bauer et al., 2019; Felver et al., 2017; Samaneh et al., 2021; Waelde et al., 2017). However, it is important to understand the impacts of mindfulness for children beyond clinical settings and beyond children with mental health problems severe enough to need treatment (Britton et al., 2014).

Schools can play an important role in promoting mental health by integrating mindfulness for children and youth (MHCC, 2013). School-based intervention programs have already begun to use mindfulness in both K-12 schools and higher education to improve the mental health of all students (Bernay et al., 2016; Britton et al., 2014; Schonert-Reichl et al., 2015; Viafora et al., 2015). Multiple mindfulness-based programs have been developed and used in schools, the majority of which use elements of mindfulness-based cognitive therapy (MBCT) or mindfulness-based stress reduction (MBSR) (Britton et al., 2014; Chadwick & Gelbar, 2016; Felver et al., 2014). Some of the mindfulness programs used in North American schools

include Learning to BREATHE (Metz et al., 2013), Soles of the Feet (Felver et al., 2014) and Mindful Schools (Black & Fernando, 2014).

Researchers are beginning to explore the effects mindfulness has on student behaviour and learning (Bernay et al., 2016; Kasson & Wilson, 2017; Meyer & Eklund, 2020; Quach et al., 2016; Schonert-Reichl et al., 2015; Thierry et al., 2018; Viafora et al., 2015). Mindfulness can decrease stress and improve well-being, including greater emotional well-being, in students (Bernay et al., 2016; Schonert-Reichl et al., 2015; Viafora et al., 2015). Mindfulness can also improve the executive functions (EFs) of students, including working memory, inhibitory control, and the ability to focus attention (Quach et al., 2016; Schonert-Reichl et al., 2015; Thierry et al., 2018).

Unfortunately, several barriers to using mindfulness in schools have been reported in the existing literature. Mindfulness is often led by an independent instructor, who is hired externally or by staff trained specifically in mindfulness with children (Britton et al., 2014; Zelazo & Lyons, 2012). Being able to find and afford qualified instructors or training staff can be difficult. In addition, finding the time on busy school days can be a barrier to the sustainability of a school-based mindfulness program (Wigelsworth & Quinn, 2020). Teachers report that mindfulness interventions can be difficult to schedule, and unless they are part of the curriculum, they would be unlikely to make it a priority (Wigelsworth & Quinn, 2020). Teachers are also concerned about their lack of understanding and lack of training or time to be trained (Wigelsworth & Quinn, 2020). Continued research in mindfulness in schools is needed. Exploring students at higher risk of mental health problems or academic difficulties, such as ESL learners or new immigrants, is lacking in the existing research (Stol et al., 2015) but beneficial to explore. Exploring affordable and effective ways of delivering mindfulness in schools is also needed, as most teacher-led mindfulness instruction requires training that can impinge on a teacher's personal time (Wigelsworth & Quinn, 2020).

A possible solution to these barriers is using technology, specifically apps, to provide mindfulness sessions for students in the classroom. Nunes et al. (2020) found an exponential growth of mindfulness apps available to the general public. Mani et al. (2015) reviewed 23 mindfulness training apps and found that they had an acceptable level of effectiveness based

on a mobile app rating scale (MARS). Some of these apps included Headspace, Smiling Mind, iMindfulness and Stop, Breathe & Think.

Mindfulness apps may be easier to implement and use as well as cost-saving within the school setting (Nunes et al., 2020). Apps would require fewer resources, such as an independent instructor, to operate (Nunes et al., 2020). Unfortunately, there is only minimal research on mindfulness apps with children (Nunes et al., 2020; Tunney et al., 2017). Nunes et al. (2020) examined different mindfulness apps available to children and found that of the 36 free apps available for children, only five were rated as "good" for children. Tunney et al. (2017) found that implementing mindfulness using technology (programs) with 10–12-year-old children provided a similar relaxation experience and focus to mindfulness training when taught by an independent instructor. Unfortunately, these studies did not directly explore mindfulness apps' impact on learning and wellness of students. More research is needed to determine the efficacy and usability of different mindfulness apps and their impact on a child's well-being, especially in the classroom setting (Mani et al., 2015; Nunes et al., 2020; Tunney et al., 2017).

1.2. Research Problem

English as Second Language (ESL) students are at higher risk of experiencing mental health problems and learning barriers (Clifford et al., 2013; Regier et al., 2005; Strand et al., 2015). Therefore, exploring affective interventions to support them is of utmost importance. Although recent research is beginning to explore mindfulness in the classroom setting and examine its effects on learning, there are a number of limitations in the research (Kasson & Wilson, 2017; Meyer & Eklund, 2020; Thierry et al., 2018). Most of the current research explores mindfulness-based on self-reporting data only and not a combination of student and teacher perceptions (Kasson & Wilson, 2017; Quach et al., 2016; Schonert-Reichl et al., 2015). Exploring and comparing teacher and student views together can provide depth to our understanding of mindfulness as an intervention. Data often focuses on the after-effects of mindfulness and does not explore the in-the-moment effects (Bernay et al., 2016; Quach et al., 2016; Thierry et al., 2018). Lastly, there is little research on the use of mindfulness apps with students. Barriers to delivering mindfulness to students such as lack of professional resources, time, and costs (Bogels et al., 2008; Britton et al., 2014; Haydicky et al., 2012; Wigelsworth &

Quinn, 2020) were identified in previous research. Therefore, exploring mindfulness apps that may mitigate these barriers is valuable to educational research. More research is needed to understand how a mindfulness app could support students in the classroom setting, especially in their learning.

1.3. Research Goal

This qualitative study aimed to expand on research on mindfulness in schools by examining the perceptions and impacts of app-based mindfulness sessions for children in schools. To explore the main goal of the study, I used the mindfulness app, Smiling Mind, with my students. The specific research questions for this study were:

1. Did ESL students enjoy using the mindfulness app Smiling Mind?
2. What impacts on behaviours/emotions/cognitions did the ESL students perceive while using the app Smiling Mind?
3. What impacts on student behaviours/emotions/cognitions did the teacher perceive from them using the app Smiling Mind?
4. What additional themes emerged in the analysis of the use of the mindfulness app Smiling Mind?

2. Literature Review

2.1. Child Well-being in Schools

A recent report from the Canadian Mental Health Association (CMHA) found that approximately one in five children and youth in Ontario have a mental health difficulty (CMHA, 2020). Many mental health struggles start early in life. Kessler et al. (2005) found that mental health difficulties often emerge before the age of 24, and 50% of these can appear before the age of 14. Mental health difficulties can negatively influence school relationships and success, including preventing students from regularly attending classes (MHCC, 2013). Data from the Ontario Child Health Study (OCHS), which surveyed students (4 to 16 years old) and/or parents, suggests that child mental health disorders negatively impact the individual quality of life, "marked by concurrent distress and impairment as well as long-term functional loss" (Boyle & Georgiades, 2010, p. 210). Students with emotional disorders are more likely to have social or school impairment than children with chronic health problems (Boyle & Georgiades, 2010).

Anxiety is one of the most significant health issues amongst children in schools in Canada (Beattie, 2017). Anxiety disorders, one of the most common mental health problems for children, may begin early at 7-14 years old (Kessler et al., 2007). Too much anxiety can be detrimental to children's well-being and success in school. Research has shown that anxiety impairs attention, concentration, memory, and problem-solving skills (Moran, 2016; Semple et al., 2010). A 2017 online survey with parents in Ontario indicated half the parents (n=804) had concerns about their child's level of anxiety and that one-third said their child had missed school due to issues related to anxiety (Ipsos Public Affairs, 2017). One-quarter of those parents had missed work themselves to help their child deal with the anxiety issues they were experiencing (Ipsos Public Affairs, 2017). Similar results have been found in other Canadian surveys. According to the 2015 Ontario Student Drug Use and Health Survey (OSDUHS) of 10,426 students in grades 7 to 12, 34% reported moderate-to-severe levels of psychological distress, including symptoms of anxiety and depression, while 14% indicated they had serious levels of psychological distress (Boak et al., 2016). The New Brunswick Student Wellness Survey

found that youth reports of anxiety symptoms had increased from 33% in 2015-16 to 38% in 2018-19 (New Brunswick Health Council, 2018-2019).

The school setting can present additional risk factors and potential stressors (Semple et al., 2010) for mental health problems. The more exposure to risk factors a student faces, the greater chance they will experience one or more mental health problems impacting their learning and success (Connolly et al., 2014; Semple et al., 2010). These risk factors may include test anxiety, bullying or victimization, socio-economic status, lack of engagement, or poor teacher relationships (Connolly et al., 2014; Jackson, 2010; Putwain, 2011). Bullying and/or victimization by peers has negative psychological outcomes on children and adolescents, including the development of depression, generalized anxiety, social anxiety, global self-esteem, and social self-esteem problems (Espelage & Swearer, 2003; Litman et al., 2015; Nordhagen et al., 2005). Standardized tests or other high-stakes examinations can be an additional stressor for students. Various studies have shown that test anxiety is a prominent stressor in the lives of students of all ages (Jackson, 2010; Putwain, 2011; Putwain et al., 2014). ESL students may face additional stressors that other students do not have to consider.

2.1.2. Mental Health and ESL Students

Canada has a high percentage of students whose language spoken at home is something other than English or French, and these students may face additional mental health challenges (Mills, 2014; Statistics Canada, 2016). For example, in 2014, more than 50% of the Toronto District School Board students spoke a language other than English at home (Mills, 2014). The Ministry of Education in Ontario defines English language learners (ELL) as students whose first language is a language other than English or is a variety of English that is significantly different from the one used for instruction in Ontario's schools (Ministry of Education, 2007). English as a second language (ESL) refers to the type of support program an ELL student may receive. Students in ESL programs receive education in mainstream classrooms and are withdrawn for English language instruction in either small groups or integrated with children in other grades (Quezada et al., 2016). The Ontario provincial government is responsible for providing funding for ESL programs in schools, however, the school board is responsible for developing those programs (Geva et al., 2009; Ministry of Education, 2007). These programs and all others in

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schools often must support students experiencing multiple risk factors for their academic success.

ESL students face unique challenges in their regular and school lives. Some students come from countries with varying educational standards, and many students have gaps in their education (Clifford et al., 2013; Regier et al., 2005). Additionally, many students have low literacy levels in their language and experience educational continuity problems as they often change schools (Clifford et al., 2013; Regier et al., 2005). They are often a higher risk for academic failure (Lopez & Tashakkori, 2004; Johnston et al., 2013). ESL students may also face the additional challenge of having a learning disability on top of learning English. However, a students' ESL status makes it difficult to determine the prevalence of any learning difficulties (LDs) that might be affecting the students' success at school (Duquette & Land, 2014). According to Morgan and Farkas (2016), national estimates show that ESL children are underrepresented overall in special education programs. All too often, ESL learners are inappropriately diagnosed, overlooked, or not provided appropriate interventions (Kormos, 2017; Swanson et al., 2020).

In addition, ESL students experience poverty at a higher rate than native-born Canadians (Regier et al., 2005; Johnston et al., 2013), leading to added school stressors (McMullen, 2004). According to a 2013 report from the Government of Canada, there are rising low-income rates among recent immigrants (Crossman, 2013). Campaign 2000, a cross-Canada network of 120 national, provincial and community partner organizations, found in 2019 that 35% of recent immigrants to Canada lived below the poverty line (Campaign 2000, 2019). Parents may work long hours or take additional jobs, experience language barriers and struggle with an unfamiliar school system and its different expectations and/or terminology, which might decrease an immigrant parent's ability to be effectively involved in their child's education (Geva et al., 2009). Poverty, language barriers, bullying, test anxiety are just some factors ESL students may face on a regular basis contributing to their mental health. Unfortunately, when mental health declines, so do learning and academic success.

2.1.3. Mental Health Effects on Learning

ESL students that experience mental health problems will in turn, experience learning difficulties. Research suggests both anxiety and depression can be linked to negative outcomes such as increased likelihood of high school non-completion and poor academic performance (Hinchliffe & Campbell, 2015; Zhu et al., 2019). Poor academic performance exists because stress, anxiety, and depression can interfere with key learning processes such as memory, concentration, motivation, problem-solving, and information processing (Huberty, 2012; Semple et al., 2010).

There are two types of anxiety, state anxiety which is in response to danger or fear of a particular situation and trait anxiety which is a general level of stress in individuals who are easily stressed or anxious (Gonzalez-Castro et al., 2015). Both types of anxiety create cognitive deficiencies due to activation of the flight or fight response activated by the limbic system (Besson, 2017). During this time, children are prevented from accessing their prefrontal cortex, the area of the brain that governs emotional regulation and executive function skills (Besson, 2017). Executive function skills, like mental flexibility, self-monitoring of behaviours, organized thinking and working memory are critical for performing many different classroom tasks (Besson, 2017; Moran, 2016). Research by Butcher et al. (2020) found that children with high degrees of both state and trait anxiety learn more slowly than their less anxious peers and were less able to initially recall the new vocabulary. However, extra opportunities allowed them to catch up with their peers (Butcher et al., 2020).

Other research has shown that the two types of anxiety have different impacts on performative tasks (Gonzalez-Castro et al., 2015). For example, an increase in trait anxiety in children (ages 9-12) was associated with lower performance in executive tasks, as it imposed a major distraction to children, while an increase in state anxiety resulted in a better performance (Gonzalez-Castro et al., 2015). Academic problems such as these can lead children to develop negative self-judgements and low self-efficacy, leading to increased anxiety levels; thus, creating a vicious cycle between mental health and learning (Huberty, 2012).

Depression can also impede learning. Depression can be characterized by cognitive distortions and worry, a loss of motivation and energy, and feelings of worthlessness and

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helplessness (Huberty, 2012; MHCC, 2014). These symptoms can also impair a person's learning processes such as attention, concentration, and memory (Currie & Stabile, 2006). A lack of interest, a common symptom of depression, can impede a student's interest in studying, collaborating with others, and performing well (Asarnow et al., 2019; Huberty, 2012). Children may also lose interest in attending school and miss school days and important assessments.

2.2. Mental Health Supports for Children

With so many children experiencing mental health problems that affect their learning, it is important to explore and find adequate support. However, a significant concern for educators and policymakers is that children and adolescents are not receiving the mental health care they need to support their learning (Barrett et al., 2017; Carlisle et al., 2012; Kessler et al., 2007; MHASEF Research Team, 2015). In Ontario, fewer than one in six children and adolescents receive the specialized treatment they need (MHASEF Research Team, 2015). According to the CMHO report on waitlists and wait times, an estimated 200,000 children and youth with mental illness do not receive any service in Ontario (Children's Mental Health Ontario, 2020). Wait times to see mental health specialists was very long, particularly in rural areas (MHASEF Research Team, 2015). Children and adolescents living in the lower-income neighbourhoods who were refugees or new immigrants had the highest rates of using acute care for mental health services (MHASEF Research Team, 2015). A significant portion of those individuals who do receive mental health support do so in acute care units like the emergency department (ED) or through hospitalizations and not through specialized treatment programs (Newton et al., 2012). Anxiety-related disorders are the most common reason for ED visits (Gandhi et al., 2016).

The needs of students are not going unnoticed. The Mental Health Commission of Canada's (2013) national School-Based Mental Health and Substance Abuse (SBMHSA) Survey reported that 85% of the respondents, who were either educators or worked in the school boards, were concerned or very concerned about student mental health with 80% saying that there are unmet student mental health and/or substance use needs in their board or school. Problems with attention, learning, substance use, anxiety, depression, and bullying/social relationships were the most common issues of respondents (MHCC, 2013). Respondents noted

that the boards focus more on intervention services for high-needs students and less on mental health promotion and prevention (MHCC, 2013). Current research shows that of the one-third of children that need mental health support, 70% will receive the support in the school setting (Barrett et al., 2017).

This support can be in the form of counselling, lunch time or after school programs, educators as protective factors, and classroom practices. School curriculums can provide mental health support. The new Health and Physical Education curriculum provides a comprehensive mental health approach for all grades (Ontario Ministry of Education, 2019). Most boards indicate that using evidence-based therapy or counselling provided by a trained mental health professional was not as prevalent as special programs and individual/group counselling delivered by an educator (MHCC, 2013). Educators may run sessions focused on self-esteem, SEL, or coping skills. Some of the challenges to implementing mental health interventions such as these in schools include insufficient funding for services and staff, limited parental awareness and engagement, the need for more professional development, and issues with stigma (MHCC, 2013). A scan by the Mental Health Commission of Canada found several barriers to mental health programs in schools which included 1) most programs are designed for grades 9-12 and not lower grades, 2) these programs focused on risk behaviour prevention (50%), 3) there was a lack of funding, buy-in from parents and students and other financial barriers, 4) had limited youth and parent involvement, and 5) there was a lack of time and capacity for education staff (MHCC, 2013). With so many students needing mental health supports, other methods are needed beyond expensive or complicated programs.

2.3. Mindfulness Practice

One alternative approach to providing mental health support in schools is mindfulness. Mindfulness-based interventions (MBIs) teach individuals how to practice patience, acceptance, non-judgment, and to be mindful and appreciative of the current moments in which they live (Altschuler et al., 2012; Black & Fernando, 2014; Kabat-Zinn, 2003). MBIs include a series of different programs, including Mindfulness-based stress reduction (MBSR), Mindfulness-based cognitive therapy (MBCT), dialectic-based therapy (DBT) and acceptance and commitment

therapy (ACT). The overall goal of Mindfulness is to achieve a state of alert, focused relaxation by paying attention to thoughts and sensations without judgment (Benefits of Mindfulness, n.d.). This allows the mind to focus on the present moment. Mindfulness aims to provide a sense of comfort to an individual and help them focus and accept what is happening in the present rather than worrying about the uncertainties of the past or future (Bauer-Wu et al., 2008).

One of the most used MBI is the MBSR, which was developed by Jon Kabat-Zinn in 1979 (Chadwick & Gelbar, 2016; Raes et al., 2013). Kabat-Zinn created MBSR as an eight-week course for individuals experiencing a range of issues, including chronic pain (Chadwick & Gelbar, 2016). The courses involved a series of mindfulness meditation practices that are based on Buddhist texts, however, MBSR is not linked to any religious or philosophical tradition (Chadwick & Gelbar, 2016). While MBSR was initially developed to reduce chronic pain and stress, it has been used frequently to treat other ailments and unhealthy behaviours (Alsubaie et al., 2017). An alternative intervention, MBCT, was initially developed to prevent depression relapse and uses regular meditation practices to develop mindfulness similar to MBSR (Chadwick & Gelbar, 2016; Haydicky et al., 2012). DBT teaches mindfulness as a specific version of meditation (Chadwick & Gelbar, 2016). Finally, ACT uses the non-meditative aspects of mindfulness to train attention by sustaining focus on a single object (Chadwick & Gelbar, 2016). The ACT approach teaches a person to focus on building empathy and compassion, which can become incorporated into a person's neural circuitry that can automatically regulate behaviour (Chadwick & Gelbar, 2016).

In mindfulness, individuals focus on developing an awareness of their breathing and practice gentle, full-body exercise designed to release muscular tension (Altschuler et al., 2012), which can be performed through sitting meditations (Black et al., 2009), walking meditations or lying down (Galantino et al., 2008). There are various mindfulness programs, but they all share the same focus in sharpening focus and attention, building emotional regulation skills and managing stress (Chadwick & Gelbar, 2016). There are several different mindfulness techniques that can be used to teach focus and attention in the present. For example, one technique is called the "three breaths break" where one stops to take three breaths when noticing tension

or stress (Sibinga et al., 2011). Other mindfulness techniques that can be taught include mindful listening, mindful movement, mindful eating, and the whole-body scan (Black & Fernando, 2013; Viafora et al., 2015). Mindful listening involves listening to the sound of a musical instrument such as a tone bar or bell until the sound stops or carefully listening to the ambient sounds of the classroom (Black & Fernando, 2013; Viafora et al., 2015). Mindful movement teaches students how to focus their attention on their bodily sensations while standing, sitting, walking, or stretching (Black & Fernando, 2013; Viafora et al., 2015). Like mindful listening, mindful eating encourages attention on sensory perceptions such as olfactory, taste, touch, or sight (Viafora et al., 2015). Finally, the whole-body scan teaches students how to focus on each part of the body and notice the sensations in each part, usually starting from the bottom of the feet and moving upwards towards the head (Bernay et al., 2016).

Mindfulness is also linked to executive function skills as it requires attention, focus and active awareness (Geronimi et al., 2020). In a state of mindfulness, individuals intentionally focus their attention on the present moment and use their inhibitory control to inhibit irrelevant thoughts, emotions and behaviours (Holas & Jankowski, 2012). Inhibitory control is the ability to "control one's attention, behaviour, thoughts and/or emotions to override a strong internal predisposition or external lure, and instead do what's appropriate or needed" (Diamond, 2013, p. 137). One aspect of inhibitory control is controlling one's attention and selectively focusing on what one chooses while ignoring other stimuli (Diamond, 2013). For example: listening to the teacher instead of a classmate (Diamond, 2013). Another part of inhibitory control is resisting unwanted thoughts or memories, which can aid another executive function, working memory (Diamond, 2013). Finally, self-control, another aspect of inhibitory control, involves controlling one's behaviour and emotions, including the ability to stay on task despite distractions and completing tasks without giving up or moving on (Diamond, 2013).

Mindfulness has been used in a variety of settings and different situations. Mindfulness has been used in clinical settings to help patients, including children, cope with a range of medical issues, including cancer, chronic pain, inflammatory bowel disease and bereavement (Garland et al., 2019; Huang et al., 2020; Johns et al., 2014; Samaneh et al., 2021; Schoultz et al., 2016). Mindfulness has also been used with students from kindergarten to high school to

help their well-being and improve their emotional and behavioural regulation skills (Barnes et al., 2008; Bauer et al., 2019; Schonert-Reichl et al., 2015; Thierry et al., 2018; Viglas & Perlman, 2018). Viafora et al. (2015) examined the impact of mindfulness on students facing homelessness from two middle schools.

Mindfulness intervention programs, including MBCT and MBSR, have been shown to have a positive impact on the physical and mental health of individuals (Garland et al., 2019; Huang et al., 2020; Jinich-Diamant et al., 2020; Johns et al., 2014; Morone et al., 2016; Schoultz et al., 2016; Song & Lindquist, 2015). MBSR was shown to improve cancer-related fatigue and related symptoms like depression, anxiety, and sleep disturbance of 35 cancer survivors (Johns et al., 2014). While Huang et al. (2020) showed that MBCT improved emotional regulation among 19 bereaved individuals and alleviated emotional entanglements. Children also experienced the benefits of mindfulness. Various clinical studies have shown promising results in using mindfulness to address stress, internalizing problems (anxiety and depression) and attention and behavioural problems in children (Bauer et al., 2019; Chadi et al., 2016; Felver et al., 2017; Samaneh et al., 2021; Waelde et al., 2017). Of particular interest for this study is the correlation between mindfulness and children's mental health.

2.3.1. Mindfulness and Child and Adolescent Well-being

Mindfulness practices have been introduced to children over the past 10 years in school settings, from primary school to high school across many countries (Kasson & Wilson, 2017; Schonert-Reichl et al., 2015; Viafora et al., 2015). Specifically, these interventions have been used to improve students' well-being and behaviours to enhance learning and academic success (Bernay et al., 2016; Kasson & Wilson, 2017; Quach et al., 2016; Schonert-Reichl et al., 2015; Thierry et al., 2018; Viafora et al., 2015). For example, in 2007, the United Kingdom education system introduced a series of fixed lesson plans based on mindfulness (Chadwick & Gelbar, 2016). Recognizing the success of mindfulness in schools, the U.K. has continued to expand programs and research. In 2016 Oxford University announced a large-scale, seven-year, $10 million study into the use of mindfulness in the classroom (Chadwick & Gelbar, 2016).

Other countries have recognized the impact of mindfulness in their schools. In Canada, one of the earliest implementations of mindfulness in schools was the MindUp program

developed by The Hawn Foundation and implemented in Vancouver schools in 2010 (Campbell, 2013; Schonert-Reichl & Lawlor, 2010). This program was initially called the Mindfulness Education (ME) program but underwent revisions to its curriculum and was renamed the MindUP program (Schonert-Reichl & Lawlor, 2010). The MindUP program consists of 15 sequential lessons taught once per week over a school year, taught by MindUP trained teachers and early childhood educators (Crooks et al., 2020). In 2013, the Mindfulness Ambassador Council was used to train facilitators to deliver mindfulness programs in the Toronto Catholic District School Board (Campbell, 2013). An analysis of mindfulness in schools by Felver et al. (2016) found several different programs used in schools across Canada and the United States, which included (1) Breathing Awareness Meditation with elements from MBSR (Wright et al., 2011), (2) Mindful Schools (Black & Fernando, 2014), (3) Learning to BREATHE (Metz et al., 2013), (4) Move-Into-Learning that incorporates mindfulness and yoga practices (Klatt et al., 2013), and (5) Soles of the Feet (Felver et al., 2014).

Current research suggests that mindfulness practices can positively impact students' well-being and reduce stress and depressive symptoms (Bernay et al., 2016; Schonert-Reichl et al., 2015; Viafora et al., 2015). Bernay et al. (2016) found that elementary school children experienced improved well-being (positive disposition, satisfaction, happiness, and good mental and physical health) after an 8-week mindfulness program. Similarly, Viafora et al. (2015) found that after receiving an 8-week mindfulness course, middle school students facing homelessness reported greater emotional well-being and were more likely to use mindfulness in interpersonal situations and deal with anger and other difficult emotions. The students reported that mindfulness helped them feel less stress, more relaxed, more alert, and able to concentrate better (Viafora et al., 2015).

Schonert-Reichl et al. (2015) examined the effects of a 12-week mindfulness-based education program (MindUP) in Canadian schools with grade 4 and grade 5 students. They found that mindfulness helped reduce stress and improved well-being, including decreased depressive symptoms, improved prosocial behaviour, and executive functions. Additionally, the researchers examined the impact of the MindUp program on stress physiology via measuring salivary cortisol-elevated cortisol levels in the morning associated with increased stress

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(Schonert-Reichl et al., 2015). These measures indicated that the MindUP children demonstrated a healthier cortisol level pattern, where cortisol is high in the morning and gradually decreases throughout the day (Schonert-Reichl et al., 2015). These results were similar to an earlier study by Barnes et al. (2008), who investigated the use of a three-month Breathing Awareness Meditation (BAM) program with a group of 30 African American adolescents in high school with high-normal systolic blood pressure (SBP) levels due to stress. They found that after the BAM intervention, the participants saw a decrease in SBP and heart rate during school, decreased SBP during nighttime, and decreased urine sodium excretion overnight (Barnes et al., 2008). Bauer et al. (2019) sought to examine the impact of mindfulness training on stress and the associated brain plasticity in 40 middle-school children who received mindfulness training for eight weeks. Researchers measured the self-perceived stress and right amygdala activation through a functional MRI when viewing fearful, happy, and neutral facial expressions (Bauer et al., 2019). Results found that children who received the mindfulness training showed reduced right amygdala activation to fearful faces associated with their reports of lower stress (Bauer et al., 2019).

Mindfulness practice can also improve executive functioning skills, including emotional regulation and inhibitory control for children in schools. Lower levels of executive functioning, including inhibitory control, working memory, and shifting or adapting to change, are associated with behavioural problems and excessive worry (Geronimi et al., 2020). Research has shown that children are less likely to experience difficulties with inhibition, working memory and shifting when practicing mindfulness (Geronimi et al., 2020). Samaneh et al. (2021) used MBCT-C to enhance self-management of attention, emotional self-regulation, and social-emotional resilience in 40 children (ages 11-13) diagnosed with cancer. After 20 sessions over 4 weeks, the children who received MBCT-C showed significant reductions in internalizing and attention problems (Samaneh et al., 2021). Felver et al. (2017) also found that a mindfulness-based intervention, called the Mindful Family Stress Reduction, had a positive impact on attentional self-regulation, or the ability to process certain information and exclude others, of 47 children (mean age 11 years old). The participants received the intervention once a week for 90 minutes for 8 weeks (Felver et al., 2017). Thierry et al. (2018) also found

improvements in executive functions such as working memory, inhibiting distractors and flexibility focusing attention with 4-year-old prekindergarten students who experienced a mindfulness curriculum for a school year. A mindfulness meditation intervention was shown to significantly improve working memory capacity (Quach et al., 2016). The researchers suggested mindfulness improved working memory because it practices sustained attention while simultaneously redirecting attention back to current experience, which is related to a function of working memory (Quach et al., 2016). Finally, current research on the MindUP program, a mindfulness-based SEL intervention was found to improve executive functioning, reduce behavioural symptoms and internalizing and externalizing behaviour problems (Crooks et al., 2020). In particular, the strongest impact the program had was on the executive functioning of the participants, including their ability to initiate, plan/organize work, monitor their progress and shift their attention, as well as improvements in their working memory and emotional control (Crooks et al., 2020). The study examined the impact of the MindUP program on 23 kindergarten classrooms in Ontario over a period of 15 lessons, taught approximately once per week (Crooks et al., 2020).

Mindfulness can have a beneficial impact on the whole classroom, including improving positive perceptions of the classroom and improving on-task behaviours and self-regulation (Kasson & Wilson, 2017; Meyer & Eklund, 2020; Viglas & Perlman, 2018). A study by Meyer and Eklund (2020) examined the impact of 10-week teacher-led mindfulness intervention in seven elementary school classrooms (grades 4-5). Researchers examined how mindfulness could affect change in the classroom, including self-reports of mindfulness, peer relationships, satisfaction, competition, cohesiveness and reading fluency (Meyer & Eklund, 2020). Results show that students and teachers perceived improvements in satisfaction and cohesion in the classroom and saw increases in reading fluency (Meyer & Eklund, 2020). Viglas and Perlman (2018) examined the effects of a 6-week mindfulness-based program on eight kindergarten classrooms. Researchers found the children showed improvements in self-regulation, were more prosocial and less hyperactive when compared to the control group (Viglas & Perlman, 2018). Kasson and Wilson (2017) also found that mindfulness had a positive impact on classroom behaviours. Researchers used a classroom behaviour management treatment

package (CBM) and then CBM with mindfulness for grade 3 students in the Midwest United States. Results showed that when mindfulness was added to behaviour analytic techniques, students increased and sustained high rates of on-task behaviour, which was defined as being within 1 ft of their desk and interacting with materials provided by the classroom activity (Kasson & Wilson, 2017). These results were consistent with earlier research (Wilson & Dixon, 2010, Felver et al., 2014).

Although research suggests mindfulness can positively impact students, there are barriers to using this practice in schools. These barriers include getting staff buy-in, turnover issues, cost of resources, perceptions of mindfulness and difficulty implementing the program (Wigelsworth & Quinn, 2020; Wilde et al., 2019). Mindfulness programs in schools have often come under the leadership of one or more key individuals who have received mindfulness training and promote a mindfulness program throughout the school (Wilde et al., 2019). Possible turnover of staff or admin members, including those key individuals, could make it difficult to sustain a mindfulness program from year to year and result in a loss of enthusiasm for the program (Wilde et al., 2019). Difficulties can also arise from getting the entire staff to buy-in to the program, particularly if the mindfulness program does not remain consistent from year to year due to staff or admin turnover (Wilde et al., 2019). An additional concern is the time and cost it would take to train teachers to teach mindfulness and would they be able to receive enough training to provide quality mindfulness instruction (Wilde et al., 2019). Teachers are concerned that they would lack the necessary understanding and training to effectively teach mindfulness (Wigelsworth & Quinn, 2020). While mindfulness is generally supported within schools, some concern was raised over how it might be perceived as either a niche activity or part of the regular curriculum (Wilde et al., 2019). Teachers reported being concerned that mindfulness would not be viewed as a legitimate use of school time when they should instead be using that time teaching the academic subjects (Wilde et al., 2019). Finally, concerns have been raised over how to implement mindfulness, either as a distinct subject or as part of the regular curriculum (Wilde et al., 2019). Finding time and space to teach mindfulness can be difficult for teachers (Wigelsworth & Quinn, 2020; Wilde et al., 2019). A

possible solution to these barriers is the integration of mindfulness by teachers and the use of apps.

2.4. Technology-based Mindfulness

Technology has opened new delivery methods for the practice of mindfulness. This alternative medium includes online educational programs, tutorial videos, and downloadable apps. Technology-based delivery provides greater access and reduces barriers such as cost and stigma (Nunes et al., 2020). Some of the online mindfulness tutorial programs available now have been investigated for effectiveness. The web-based intervention called Mindful Mood Balance (MMB) was examined for participants' experiences with the program. Based on qualitative data from exit interviews, participants reported positive impacts from completing the mindfulness practices (Boggs et al., 2014). Reid (2013) also reported positive changes in 15 graduate school students who participated in an 8-week online mindfulness course. The study was designed to teach mindfulness to occupational therapy graduate students through an online curriculum that included guided recorded meditations, informational readings, and informal practice exercises (Reid, 2013). Results revealed statistically significant positive changes in mindfulness-awareness based on data from the self-reported MAAS, suggesting that mindfulness can be taught using an online approach (Reid, 2013). A more recent application of mindfulness training is the use of apps.

Mani et al. (2015) found approximately 700 different apps that use the word "mindfulness" in the iTunes and Google Apps Marketplace. An evaluation of 23 available mindfulness apps was performed using the Mobile Application Rating Scale (MARS) (Mani et al., 2015). The highest-rated app based on MARS was called Headspace, with Smiling Mind ranked second (Mani et al., 2015). All the apps examined by Mani et al. (2015) had guided meditations and mindfulness education programs that taught users about mindfulness. Most of the apps had at least two of the following nine features: (1) breathing awareness meditation, where the user is taught to become aware of their in and out breathes, (2) body scan meditation that focuses the user's attention on body parts, (3) sitting meditation, (4) walking meditation, (5) loving-kindness meditation that practices acceptance, love and showing kindness to oneself and others, (6) thoughts and emotions acknowledgements where the user acknowledges their

thoughts and emotions non-judgmentally as they come and go, (7) Mountain meditation, a guided imagery practice where the user imagines being on a mountain, (8) Lake meditation, a guided imagery practice where the user imagines being as a lake and (9) three-minute breathing space where the user becomes aware in the first minute, focuses attention in the second minute and expands their attention in the third minute (Mani et al., 2015). The results from this study showed that the 23 apps had an overall acceptable level of quality, however, low median engagement and aesthetics highlights an area of improvement for the apps (Mani et al., 2015). Additionally, the MARS cannot provide a user-centred assessment of design or experience with the apps (Mani et al., 2015).

Research on mindfulness apps is still evolving and has focused primarily on adult experiences (Nunes et al., 2020). Chitarro and Vianello (2016) found that the mindfulness app elicited positive feelings such as relaxation and improved well-being in adult participants. Howells et al. (2016) examined the effectiveness of the app Headspace, and reported positive results, including a reduction in depressive symptoms of adult participants. Finally, mindfulness training provided by the Calm mindfulness app was examined in a study by Bhayee et al. (2016). Participants saw an improvement in attention and reduced somatic symptoms, however, depression and anxiety symptoms did not show significant changes (Bhayee et al., 2016).

Research on mindfulness apps with children is very limited as apps are still in their infancy. A recent study by Nunes et al. (2020) sought to identify and evaluate 36 free mindfulness apps for children using MARS. The apps were scored on a 5-point scale, and only five obtained a rating of "good" in terms of overall quality (Nunes et al., 2020). However, this study did not investigate the impacts of the apps on children's learning or wellness. If mindfulness apps are an effective way to reach participants, more research should explore mindfulness apps with children, especially in the school setting.

2.5. Limitations in Previous Research

Although existing research on mindfulness shows promising results, there is more to learn. In schools, mindfulness programs were often delivered to a select group who would receive the treatment (Foret et al., 2012; Mendelson et al., 2010; Metz et al., 2013) and not the whole class. Additionally, an external instructor often taught the mindfulness sessions, which

required additional resources (Black & Fernando, 2014; Broderick & Metz, 2009; Felver et al., 2014; Flook et al., 2010; Klatt et al., 2013; Meyer & Eklund, 2020). Often past studies relied on self-described data from students or instructors. Less rare was an exploration of both the students and the teacher's perspectives (Beauchemin et al. 2008; Boggs et al., 2014; Flook et al., 2005). Data was also collected after the person engaged in mindfulness sessions and not during the session (Schonert-Reichl et al., 2015; Wilson & Dixon, 2010). Understanding how children respond to mindfulness sessions in the moment, a comparison of experiences, teacher's perspectives, and the impacts of teacher lead training is important to learn for the continued use of mindfulness in schools.

This literature review identified two important gaps in the research which this study aims to address. The first gap in research related to the use of mindfulness apps with children in classrooms. While there is a growing field of using mobile devices in healthcare (Mani et al., 2015), using technology-supported mindfulness is still a new field. Research related to mindfulness apps and children is scarce (Nunes et al., 2020). Most of the research conducted to date is with adult populations (Bhayee, 2016; Chitarro & Vianello, 2016; Howells et al., 2016). Little is known about the possible learning and mental health effects of using mindfulness apps in the classroom setting as part of the regular curriculum.

In addition to this gap is the lack of studies exploring mindfulness with ESL students at higher risk of academic struggles and mental health issues. The literature review identified mindfulness programs (not apps) being used with other at- risk students such as homeless youth (Viafora et al., 2015), students with high blood pressure (Barnes et al., 2008), students from low-income minority households (Quach et al., 2016), and students with behavioural issues (Kasson & Wilson, 2016).

To address these limitations in existing research, this study was designed to explore the use of a mindfulness app, Smiling Mind, in the classroom setting with ESL students. Through the design of the study, other limitations were addressed as well. The mindfulness sessions in this study were teacher-led and not instructor-led sessions. The study collected both self-reported data and observational data from the teacher for comparison. Finally, the data analysis included an exploration of perceptions of the app during and after the session.

3. Methodology

3.1. Research Design

The purpose of this study was to examine teacher and student perceptions of mindfulness lessons with the app, Smiling Mind, to determine how the app can impact developing children. The specific research questions in this study were:

1. Did the ESL students enjoy using the mindfulness app Smiling Mind?
2. What impacts on behaviours/emotions/cognitions did the ESL students perceive while using the app Smiling Mind?
3. What impacts on student behaviours/emotions/cognitions did the teacher perceive from them using the app Smiling Mind?
4. What additional themes emerged in the analysis of the use of the mindfulness app Smiling Mind?

To answer these questions, a qualitative study was conducted with my grade four ESL class. Since the goal of this study was for insight and discovery, not hypothesis testing, a qualitative methodology was better suited than a quantitative methodology (Yin, 2011). Qualitative data in the form of student interviews, student feedback forms, and teacher observation notes allow for rich descriptions of participant experiences (Merriam, 2009; Yin, 2011).

Researchers (Fletcher & Plakoyiannaki, 2010; Yin, 2011) suggested that sample size should be based on the type of research questions and epistemological assumptions of a study. Since this study's epistemological assumption was that well-being and learning are personal experiences, a small number of participants were appropriate to explore personal realities in-depth (Berg & Lune, 2011). A small number of cases also allowed for extensive observation to develop patterns of meanings that might be lost with large sample sizes (Fletcher & Plakoyiannaki, 2010). Although generalizability of study results is often questioned when the sample size is small, there is support in the scholarly literature that a small participant group can permit analytical and theoretical generalizations, identification of further research needs, theoretical development in the areas of empowerment, and transferability of findings (Stake 2010; Yin, 2011). Analytical generalizations can be developed from this study by elaborating or

modifying previous generalizations related to well-being and learning by indicating similarities and differences of experience (Stake, 2010).

3.1.1. Participants

The participants of this study were from an elementary school in the central east area of Toronto. There were approximately 1400 students in the school from grade 1-5. Many children in this school are new immigrants or recent refugees or identified as English as Second Language Learners (ESLL). In 2017, the percentage of students whose primary language was not English was 96% (1377 out of 1427 students). Students at the school speak a wide range of languages, including Arabic, Urdu, Pashto, Slovak, and Dari. The school also hosts a large special education program, including MID (mildly intellectually delayed) and DD (developmentally delayed) classes.

The participants for this study are part of a convenience sample since the participants were students in my classroom. A convenience sample is a non-probability sampling taken from a group of people readily available (Waterfield, 2018). The participants were part of an ESL class to receive support, half a day, every day. These students were all immigrants, refugees, or children of immigrants from various countries, including Saudi Arabia, Syria, Afghanistan, Pakistan, and Slovakia. All the students spoke another language at home - three-spoke Arabic, one spoke Slovak, one spoke Pashto, and two spoke Urdu. Most of the students had one or two parents who did not speak any English. All the students were Muslim except for one girl from Slovakia. Most students had disrupted or interrupted education, with a boy from Afghanistan not starting school until grade two or one of the boys from Pakistan missing an entire school year. Many of the students had behavioural, mental health, and academic issues. Students had difficulties interacting with one another and regulating emotions and behaviours. This was greatly affecting their learning and academic success. Strategies were needed to improve the classroom environment and help students manage their emotions.

The convenience sample for this study includes seven students. Although there were ten students in the class, only seven returned permission forms and could be included in the study. These seven ranged in age from 9 to 10 years old and included five boys and two girls. Each of

the students struggled with performance and needed support in their learning journey. Table 1 highlights each participant's characteristics and learning needs identified by me as the teacher.

Table 1: Description of Participants

Participant	Gender	Age	Background	Learning Needs
1	M	9	Refugee from Syria, bullied by other students	Dealing with stress
2	M	10	From Pakistan, arrived in Canada recently	Concentration and focus
3	M	9	From Afghanistan, started school late, possible learning difficulty	Concentration and focus, behavioural and emotional regulation
4	M	10	From Pakistan, interrupted schooling, missed one full year	Concentration and focus, behavioural and emotional regulation
5	F	10	From Saudi Arabia, Disrupted schooling, different schools every year, possible learning difficulty	Concentration and focus, behavioural and emotional regulation
6	F	10	From Slovakia, frequent absences from school	Dealing with stress
7	M	10	Refugee from Syria, frequent absences from school, possible learning difficulty	Dealing with stress, concentration, and focus

3.1.2. App-Based Mindfulness Sessions

As the classroom teacher, I introduced mindfulness as a classroom management strategy and part of the regular curriculum in the Fall of 2018 with my grade four ESL class. The hope was that by implementing mindfulness in the classroom, the students would gain self-regulation in their behaviours and interpersonal relationships. With these improvements, the classroom environment could become a place where all the students felt safe and comfortable,

and therefore more likely to focus on academics. Several mindfulness apps were introduced to the students initially, and they could select which app they wanted to continue with for the term.

The students selected the Smiling Mind app after reviewing several other apps, including Headspace, MyLife Meditation, and Stop, Breathe, & Think Kids. They enjoyed the visualization element provided by the Smiling Mind app, particularly where they had to imagine a bubble expanding inside themselves, and they all enjoyed the ringing bell that signalled the end of the mindfulness session. Smiling Mind was founded by Jane Martino and James Tutton and provides a variety of mindfulness exercises for children of different ages. Hundreds of themed guided sessions address sleep, stress, focus, and anxiety. The sessions can be anywhere from 3 to 15 minutes. It does not require any subscription; all sessions are free of charge. The design of the Smiling Mind app supports a user-friendly interaction. The main page highlights your guided meditation history, with the option to view all programs available through the top right button. Figure 1 shows the Youth Programs available to the user, organized by age range.

Figure 1: Youth Program - for children and youths, aged 3-18

I selected the age range of 7-9 since most of the students were still 9 years old at the class sessions. There were 56 available guided meditations available for the selected age range (Figure 2). However, I only used The Bubble Journey, Belly Breathing, and the Daily Mindfulness Guide. At the time of the sessions, my goal was to help the students regulate their emotions and calm themselves down when they got upset. Some of the 56 different guided meditations explored areas that did not address calmness, so they were not used. The Bubble Journey was popular with the students and was used frequently. This guided meditation asked the users to picture a Bubble expanding inside themselves, along with their breath. This visualization was designed to help users focus on their breathing and their bodies.

Figure 2: Guided Meditations for 7-9 years old
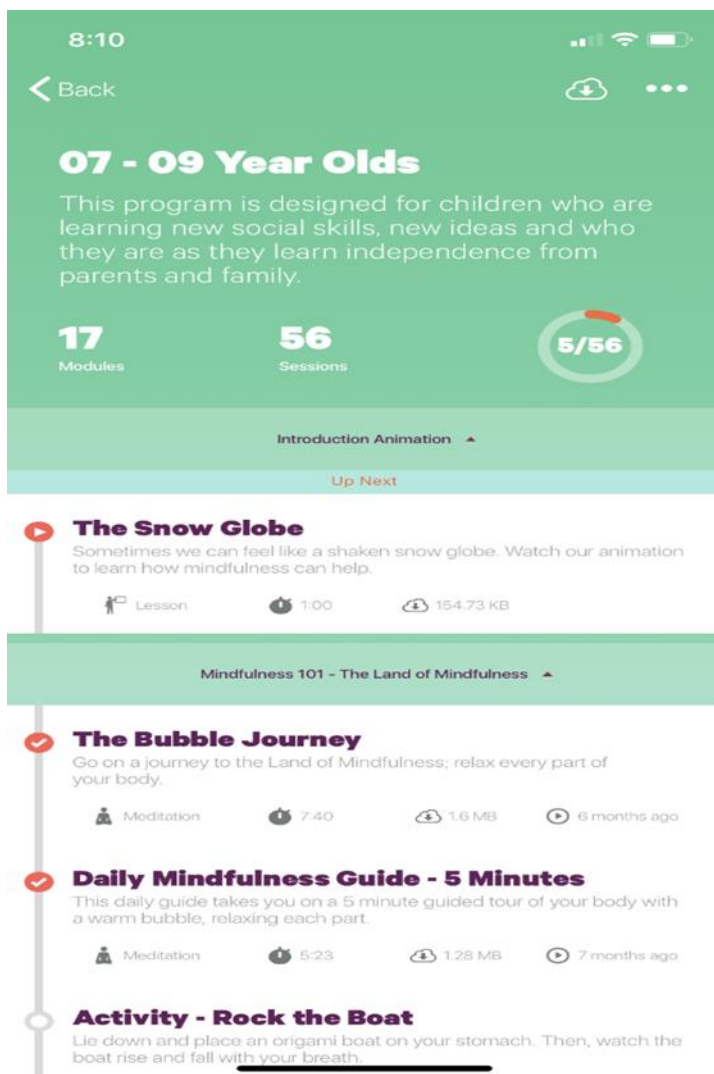
Once the students picked Smiling Mind, and we began sessions. The sessions ran during the 2018-19 school year for four months, beginning in November. When students returned from recess in the afternoon, they completed a quick check-in of how they were feeling. They were then instructed to sit or lie down on the carpet and get ready for the mindfulness session. I then play the guided mindfulness meditation from my cell phone with a speaker. I would select one of three mindfulness sessions, The Bubble Journey, Belly Breathing, and the Daily Mindfulness Guide. The mindfulness sessions ranged in time from three to five minutes. Once the students were done, they each completed a check-in again to see how they now felt. I had a debrief with the class on how the session went for them. After this, students went back to work on other subjects.

3.1.3. Teacher as Researcher

The researcher of this study was also the classroom teacher. I am a licensed teacher in Ontario, with two years of teaching experience, primarily as a supply teacher prior to the beginning of the study. I frequently taught at this elementary school in different grades and various subjects. I was assigned as the ESL teacher for this class from November 2018 until June 2019. As a student at Ontario Tech University in the Master of Education program, I requested research approval to use this data for my Master of Education thesis. REB approval was granted from the school board and Ontario Tech University. A consent form was created and sent home with the students to be returned. Parents and students were informed that participation was voluntary and had no impact on grades or academic evaluations. Of the ten students, seven returned the signed permission form to use the data collected (See Appendix C for permission form). Consent was also obtained from the school principal to use the data collected after the mindfulness intervention ended. The data collected was stored in a locked file cabinet in the locked classroom, and only I had access to the file cabinet.

Steps were taken to mitigate possible concerns about the teacher as the researcher. To deal with reliability issues due to researcher bias, I implemented a second review of the data to ensure higher inter-rater reliability. Inter-rater reliability (IRR) involves the degree of agreement between two or more raters assessing the same subjects (Hove et al., 2018). My thesis advisor, Dr. Jennifer Laffier, reviewed all the data collected and performed her analysis of the themes

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that emerged to ensure reliability. To remove any conflict of interest, I had the students choose from a variety of different mindfulness apps. Students were able to try out several different apps, and as a group, they decided which app they preferred to use. Additionally, I took a divergent approach at the beginning of the analysis, where I did not look for themes in accordance with hypotheses. I was open to all possibilities regarding the students' experiences with the app. Finally, to reduce the possible influence on the students, they were informed that they, along with their parents, could not have their information included in the study.

3.2. Data Tools and Collection

The mindfulness sessions occurred twice a week, for 16 weeks, for a total of 32 sessions as part of my classroom management strategy. To integrate reflective teaching practice, I collected feedback from the students and recorded notes on their reactions to the sessions and possible impacts on cognitions, emotions, and behaviours. This study's three data tools were student feedback forms, teacher observations, and student interviews. These data tools are summarized in Table 2 and described further.

Table 2: Summary of Data Collection tools

Data tool	Brief description	Collection method
Student Feedback Form	Includes four questions to determine students' emotions before and after the mindfulness sessions	• Students answered the first two questions before every mindfulness session • Students answered the second two questions after every mindfulness session
Teacher Observations	Recorded observations of students' behaviours during and after every mindfulness session, including the students' on-task behaviour after the mindfulness sessions ended	• Teacher recorded observations of students behaviour during every mindfulness session • Teacher recorded observations of students' on-task

		behaviours after every mindfulness session
Student Interviews	A series of ten open ended questions, designed to examine in more detail the students' experience with the mindfulness app	● Students were asked ten open ended questions after the 32 mindfulness sessions ended ● Teacher scribed their verbal answers word-for-word

3.2.1. Student Feedback Forms

Students provided feedback before and after each lesson on a feedback form (Appendix A). Before the session started, they answered two questions: 1) How do you feel before you start mindfulness? and 2) Do you know why? They were handed a form with the questions and would write their answers in the spaces provided. After the session, they were asked to reflect on another two questions 1) How do you feel after mindfulness? and 2) How did mindfulness make you feel? These questions were also designed to help the students recognize their feelings and how they might have changed. The students' English writing skills' limited ability restricted the number of questions I could ask of the students. Due to their young age in recognizing emotions, a feelings chart and session were held prior to the sessions starting. Recognizing emotions was part of the social-emotional learning curriculum goals. Students recorded their responses on the student feedback forms, which I collected after every mindfulness session.

3.2.2. Teacher Observation Notes

After each mindfulness session, I wrote detailed notes in my teaching journal of the student's behaviours and performance during and after the mindfulness sessions. I would record how quickly the students joined the mindfulness practice. I would also record whether the students got distracted by one another or by objects in the classroom. During the sessions, there was a focus on recording the students' behaviour, including whether they sat or lay down if they had their eyes closed or took deep breaths during the mindfulness session. After the

mindfulness session ended, I led a class discussion, asking the students what they did or did not think of during the mindfulness practice, how they felt and if they joined the mindfulness session right away. Once the mindfulness session ended, the class returned to regular class activities. I made observations on if and for how long the students could remain on-task and focused on the class activities. The process of recording observations in my notes is described in Table 3.

Table 3: Teacher Observation Template

Session #	Behaviour during mindfulness	Thoughts after mindfulness	On-Task Behaviour after mindfulness
Participant 1			
Participant 2			
Participant 3			
Participant 4			
Participant 5			
Participant 6			
Participant 7			

3.2.3. Student Interviews

At the end of the 16 weeks, I had a one-on-one interview with each student, asking them ten open-ended questions. Questions included what they did and did not like about the mindfulness training, what they may have learned if it helped them be more aware of the present moment or helped them deal with their feelings (Appendix B). These questions included:

1. What did you like about mindfulness training?
2. What didn't you like about mindfulness training?
3. What did you learn, or did you learn from the training?
4. Do you think this mindfulness training taught you how to be more aware?

5. Have you used anything you learned outside the classroom? If so, where did you use it? And was it effective?

6. Did the training help you deal with any of your emotions? If so, which ones?

7. Did the training have any impact on your behaviour? If so, what was it?

8. Would you continue your mindfulness training if it were offered to you?

9. Were there any problems you had with the mindfulness training? If so, what were they?

10. How would you improve the mindfulness training you were given?

The interview questions were used to gather more in-depth information about the students' perceptions of the mindfulness app. Due to limited English writing skills, I would transcript the answers from each student. Structured interviews can be used in qualitative research to test prior hypotheses or unstructured/semi-structured interviews to explore participants' meanings and perceptions (DiCicco-Bloom & Crabtree, 2006). As this study is more of an exploration into using a mindfulness app, the student interviews were unstructured and open-ended questions were used to get participants to expand on their responses. Open-ended questions tend to produce richer data than closed-ended questions (Ogden & Cornwell, 2010).

3.3. Data Analysis

Qualitative content analysis was used to analyze the data to answer the four research questions of this study:

1. Did ESL students enjoy using the mindfulness app Smiling Mind?

2. What impacts on behaviours/emotions/cognitions did the ESL students perceive while using the app Smiling Mind?

3. What impacts on student behaviours/emotions/cognitions did the teacher perceive from them using the app Smiling Mind?

4. What additional themes emerged in the analysis of the use of the mindfulness app Smiling Mind?

Content analysis is a qualitative data reduction method that attempts to identify core consistencies and meanings from text or images was used as it provided the opportunity to understand social reality in a subjective, but scientific manner (Zhang & Wildemuth, 2009). It

involves analyzing different texts systematically in a way that addresses content, themes, and core ideas. This method was ideal to assess the themes of student experiences with the mindfulness training.

A step-by-step model is used to perform content analysis (Drisko & Maschi, 2015). This model is briefly explained before describing how it was applied for each data source in this study. Step one involved collecting and sorting the data. This approach was performed for the three different data sources which was separated according to each participant. Step two involved identifying the units of analysis. Units of analysis for this study are words or phrases that relate to the research questions and help identify student and teacher perceptions of the mindfulness sessions with the Smiling Mind App. These units are coded in step three, which involves the development of codes based on the research questions (Zhang & Wildemuth, 2009). When reviewing the data sources, any units expressing themes related to those questions were coded as such on an analysis spreadsheet. Dates were also recorded next to each coded unit of analysis. Step four involved checking for coding consistency by constantly reviewing the data and having an inter-rater review as well (Zhang & Wildemuth, 2009). Step five involved drawing conclusions from the data by relating the research questions. These steps are explained in further detail for each of the three data sources. Afterwards, the process of data triangulation and summarization between the three data sources is explained.

3.4.1. Student Feedback Forms

The student feedback forms helped answer research questions 1) Did ESL students enjoy using the mindfulness app Smiling Mind? 2) What impacts on behaviours/emotions/cognitions did the ESL students perceive while using the app Smiling Mind? and 4) What additional themes emerged in the analysis of the use of the mindfulness app. The student feedback forms were put into chronological order and separate by student. Each entry was reviewed, and key words or phrases of experience were highlighted and written down on a chart with session/dates. This list was then reviewed and coded according to key themes of experience. Upon a third round of coding, similar units of analysis were condensed into 'emotion categories', which included (1) happy (excited, joy), (2) calm (peaceful, relaxed), (3) sad (hurt, upset, crying, (4) anger (frustration, mad), and (5) Don't know/Did not participate. Before and after responses

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(emotions) were noted for each session then compared and analyzed to determine a) if students' emotions changed before and after, b) how students felt about the individual sessions, and c) whether students' perceptions changed over time. Students' attendance was recorded and considered (calculated as a percentage) as a possible moderating variable for views on the mindfulness sessions. For example, inconsistent attendance might impact views and experience with the sessions.

3.4.2. Teacher Observations

To analyze the teacher observation notes, I first separated entries and comments according to each student and chronological order. I went through each note and coded the units of analysis that helped answer questions 1) Did ESL students enjoy using the mindfulness app Smiling Mind?, 3) What impacts on student behaviours/emotions/cognitions did the teacher perceive from them using the app Smiling Mind? and 4) What additional themes emerged in the analysis of the use of the mindfulness app Smiling Mind? I did this first for each student. I then reviewed and coded the session notes to identify common behaviours, emotions or expressed thoughts between the students. As the coding progressed, repeated words and phrases were identified as key themes of experience for the students. These themes included:

a. Sitting up or lying down, taking deep breaths, with eyes closed

b. Lying down, without taking deep breaths, appear to be sleeping

c. Sitting up or lying down, eyes open, looking around, talking to others, or fidgeting

d. Not participating, sitting away from the others, sitting at their desk

The teacher observation notes also identified impacts on the students after the mindfulness sessions were done, specifically in relation to their attention, focus, and ability to stay on task. Their behaviours and expressed emotions or thoughts were coded from the notes. A second review and coding identified key themes of on-task and off-task behaviour. This information was condensed and coded as follows:

a. On-task behaviour for 10 minutes after mindfulness

b. On-task behaviour for 20 minutes after mindfulness

c. On-task behaviour for 30 minutes after mindfulness

    d.   Off-task behaviour after mindfulness

The coding of all observation notes was repeated three times to ensure consistency. Any new and emerging themes that were also recorded. Again, students' attendance was recorded and considered (calculated as a percentage). These post impacts of the 32 sessions were compared between students and sessions.

3.4.3. Student Interviews

The transcribed interview notes were organized to perform content analysis. They were put into chronological order first. As I reviewed the notes, I coded student experiences according to each of the 10 questions. I noted the dates and student names. I then reviewed the notes a second time to determine the overlap between the students' responses. I highlighted these different colours and entered them into the spreadsheet. A third review condensed the information into key themes of experience with the mindfulness sessions with Smiling Mind.

3.4.4. Data triangulation and consistency

Triangulation of data is where the researcher collects and then compares data from multiple sources (Jentoft & Olsen, 2019). Triangulation can help strengthen research as it allows for a better and broader understanding of the issue under investigation (Jentoft & Olsen, 2019). When all data sources were coded their results were logged and recorded under the appropriate research questions. The results of the three sources were then compared to determine similarity and differences between students and students and teacher experiences. For example, the data was reviewed to determine if the teacher's views aligned with the student's views. The final student interviews were also compared to the weekly student feedback to check for consistency or discrepancies. Data comparison also helped answer research question four: What additional themes emerged in the analysis of the use of the mindfulness app Smiling Mind? To ensure greater reliability of the data analysis, my thesis advisor reviewed the data

4. Results

4.1. Overview

Content analysis of the data, student feedback forms, teacher observations, and student interviews produced a rich triangulation of findings. The overall results indicate that the students enjoyed the mindfulness sessions and identified several positive effects on their moods, behaviours, and learning. I also observed that the mindfulness sessions positively impacted the students' learning and behaviours. However, some student issues were identified and are described in this review. The results are organized according to each research question. First questions 1-3 are presented. Next case study descriptions for each participant are presented to highlight those results. Finally, a cross-case comparison of the seven participants is presented to highlight question four.

Q1: Did the students enjoy using the mindfulness app?

To answer this question, student interview responses (completed at the end of the training) were reviewed. These questions included:

Q1 (What did you like about the mindfulness training?)

Q2 (What didn't you like about the mindfulness training?)

Q7 (Would you continue your mindfulness training if it were offered to you)

Q8 (Were there any problems you had with the mindfulness training)

Q9 (How would you improve the mindfulness training app you were shown)

Overall, the results of the student interviews suggest that the students enjoyed the mindfulness training sessions (Table 5). Each of the seven students commented that the program helped them feel calmer, relaxed, or more peaceful and they enjoyed this aspect of the training. Two of the students commented that they really enjoyed the visualization element of the Bubble Journey session. Six of the students commented that they really enjoyed the bell that rang at the end of the Bubble Journey session because it let them know that the session was over. Six of the students indicated they would continue to use the app if they could.

However, each of the students had one thing they did not like about the mindfulness sessions with the app (table 4). The most cited dislike was having to sit still and be quiet. Only

two of the students had suggestions for improving the app: making it free and having different voices.

Table 4: Summary of students' impression of the mindfulness app and training

Questions	Responses
Q1 (What did you like about the mindfulness training?)	Students comments on what they liked about the mindfulness training: - Two students felt it made them feel calmer - One student found it helped him relax - One student found it made him feel more peaceful - Two students enjoyed the visualization of the "Bubble Journey" - Five of the students enjoyed listening to the bell that rang out to identify the end of the mindfulness session.
Q2 (What didn't you like about the mindfulness training?)	Students reported what they did not like about the mindfulness training: - One student felt that it made them sleepy. - Three students did not like sitting down and being quiet - One student found it uncomfortable to sit still for too long - One student found it too hard to follow because they struggled to understand some of the words. - One student found that it was too long.
Q8 (Would you continue your mindfulness training if it were offered to you)	Six out of seven said they would like to continue the mindfulness training with the app: - One student was not sure if they would continue the mindfulness training.
Q8 (Were there any problems you had with the mindfulness training)	Four students recorded a problem: - Two found it difficult to sit still because they found it uncomfortable. - One student had trouble taking deep breaths. - One student found it difficult to close their eyes because they wanted to know what was going on

Q9 (How would you improve the mindfulness training app you were shown)	Two students provided improvement ideas for the mindfulness training app:
	- One wanted all the mindfulness sessions to be free on every app
	- One wanted a different voice for the mindfulness sessions
	- Two did not know if they had any suggestions
	- Three did not think it needed to be improved

Q2: What impacts on behaviours/emotions/cognitions did the students experience while using the app Smiling Mind?

To answer this question, daily feedback forms and final student interview responses (questions 3-7) were reviewed. These questions included:

Q3 (What did you learn, or did you learn from the training?)

Q4 (Do you think this mindfulness training taught you how to be more aware?)

Q5 (Have you used anything you learned outside the classroom? If so, where did you use it? Was it effective?)

Q6 (Did the training help you deal with any of your emotions? If so, which ones?)

Q7 (Did the training have any impact on your behaviours? If so, which ones?)

The results of the final survey suggest that each of the children felt the mindfulness sessions provided some form of positive impact on their emotions, cognitions, or behaviors. All seven commented that they learned something new and helpful. The most common mentioned impacts were that mindfulness 1) taught them how to calm themselves down and focus in order to learn and pay attention (n=5), 2) helped them deal with negative emotions like anger and sadness (n =5), and 3) how to be more aware (n=4). Four of the seven children said they used what they learned in the classroom mindfulness sessions at home or at recess. The following chart (Table 5) summarizes the students' responses to the final survey.

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Table 5: Students' perceptions of impacts of the Smiling Mind app and mindfulness on their learning and mental health

Questions	Responses:
Q3 (What did you learn from the training?)	Seven out of seven responded they learned something: - Two students learned that counting their breathing could help them, but they did not explain how. - Five students identified that mindfulness helped them and others "calm down".
Q4 (Do you think mindfulness taught you how to be more aware?)	Students commented on if they thought mindfulness taught them how to be more aware. - Four out of seven responded that it did help them. However, none of the students could explain why. - Two out of seven responded that it did not help them. However, neither of the students could explain why. - One out of seven responded that they were not sure if the mindfulness helped them be more aware.
Q5 (Have you used anything you learned outside the classroom? If so, where did you use it? Was it effective?)	Students commented on if they used mindfulness or anything, they learned outside the classroom - Two students answered that they had not used it outside the classroom. - Two indicated that they had used it at home where they counted their breathing while trying to sleep or lying down. - Two indicated that they had used it at recess to help calm me down - One student did not know if they had used it outside the classroom.

Q6 (Did the training help you deal with any of your emotions? If so, which ones?)	Students answered if they thought the training had helped them deal with their emotions.
	- One indicated that it helped them when they were feeling bad.
	- Two indicated that it helped them deal with their anger
	- Two indicated that it helped them deal with their sadness
	- Two did not think it helped them with any emotions
Q7 (Did the training have any impact on your behaviours? If so, which ones?)	Students answered if they thought the training had helped them deal with any of their behaviours.
	- Four believed that the mindfulness training calmed them down and they did not need to move around as much
	- One thought the mindfulness training made them less silly
	- One believed that it stopped him from turning his sadness into anger that he would take out on other students.
	- One did not think mindfulness had any impact on their behaviours

The student feedback forms were used every session to provide insight on impacts from the app the student experienced. The forms asked each student how they were feeling before and after every mindfulness session began. Question 1 on the student feedback form asked them to fill out how they felt before the mindfulness session and if they knew why, and afterward, Question 2 asked how they felt after practicing mindfulness and if they knew why. The coded results from Questions 1 and 2 of the student feedback form are presented in Tables 6 and 7. The percentages shown in the charts indicate how often the students reported experiencing a particular emotion, either before or after the mindfulness session. The results suggest that most students (n= 5, participants 1, 2, 5, 6, and 7) felt happy after the sessions. Two students (Participants 3 and 4) experienced a wider range of feelings after mindfulness, including anger and sadness. Participant 3 struggled with identifying his emotions or refused to

participate in the mindfulness sessions for 34% of the time. The results also showed that most students (n= 5, participants 1, 2, 4, 6, and 7) indicated that they felt calm after the mindfulness session ended. Participant 3 had difficulty recognizing his emotions or refused to participate 62% of the time. Participant 5 experienced a wider range of emotions after mindfulness, including happy (33%), calm (41%), and sadness (15%).

Table 6: Results from Question 1: How do you feel before mindfulness?

	Happy	Calm	Sad	Angry	Don't Know/No participation
Participant 1	64%	4%	11%	21%	0%
Participant 2	71%	0%	7%	18%	4%
Participant 3	38%	0%	0%	24%	34%
Participant 4	52%	0%	14%	24%	10%
Participant 5	63%	0%	15%	22%	0%
Participant 6	65%	25%	5%	5%	0%
Participant 7	82%	0%	0%	14%	5%

Note: The percentage is calculated by taking the number of types a student reported an emotion before mindfulness and dividing it by the total number of sessions the student attended.

Table 7: Results from Question 2: How do you feel after mindfulness?

	Happy	Calm	Sad	Angry	Don't Know/No participation
Participant 1	32%	64%	4%	0%	0%
Participant 2	40%	61%	0%	0%	0%
Participant 3	7%	31%	0%	0%	62%

Participant 4	14%	66%	3%	0%	17%
Participant 5	33%	41%	15%	4%	7%
Participant 6	30%	55%	10%	0%	5%
Participant 7	32%	55%	5%	0%	9%

Note: The percentage is calculated by taking number of types a student reported an emotion after mindfulness and dividing it by the total number of sessions the student attended.

Q3: What impacts on student behaviours/emotions/cognitions did the teacher perceive from the use of the app Smiling Minds?

Teacher observation notes were taken during and after every mindfulness session. These notes provided insight on possible impacts of the mindfulness app Smiling Mind during and after the sessions, from the teacher's perspective. Results indicate that most students received positive impacts from the app-based mindfulness sessions. There were two students who appeared to struggle or receive no benefit from the sessions. These results are described next.

While the sessions occurred, the teacher noted who appeared to be following the mindfulness sessions, was distracted, engaged, having difficulties, or appeared to be sleeping. The results for behavior during the sessions are outlined in Table 8. The results indicate that most students (four of seven; participants 1,2,4,7) were engaged and interested in the app session. The results also suggest that three students were not as engaged during the sessions experiencing distraction or not participating (Participants 3,5,6). Triangulation of participant data indicates that these three students were experiencing a greater number of learning difficulties and more absences.

Table 8: Teacher Observations on student behaviour during Mindfulness sessions

	Engaged- Sitting/lying down, eyes	Lying down, appears to be sleeping	Eyes open, fidgeting, appears distracted	Not participating, sitting away from others

	closed, deep breathing			
Participant 1	93%	4%	4%	0
Participant 2	64%	18%	18%	0
Participant 3	31%	14%	3%	52%
Participant 4	79%	3%	7%	10%
Participant 5	30%	19%	52%	0
Participant 6	50%	10%	40%	0
Participant 7	82%	0	14%	5%

In addition to the students' responses during the session, I recorded observations of their behaviours after the session to understand the impacts between their feelings and their ability to focus afterward. Table 9 outlines the results of the observations of students' on-task behaviour after the mindfulness sessions ended. The results suggest that most of the students (participants 1, 2, 4, 6, 7) could sustain on-task behaviour for at least 20 minutes after the mindfulness session ended. Two students (participants 3 and 5) struggled to maintain on-task behaviours for more than 10 minutes. Those two students also demonstrated off-task behaviours sometimes immediately after the mindfulness sessions ended. Most of the students had some success sustaining their attention for more than 30 minutes, however, it was not the most common result.

Table 9: Teacher observations of students' on-task behaviour after mindfulness

	On task behaviour for 10 minutes after mindfulness	On task behaviour for 20 minutes after mindfulness	On task behaviour for 30 minutes after mindfulness or more	Off task behaviour after mindfulness
Participant 1	18%	46%	29%	7%
Participant 2	21%	32%	39%	7%
Participant 3	38%	28%	14%	21%
Participant 4	28%	45%	14%	14%
Participant 5	41%	22%	7%	30%
Participant 6	15%	45%	30%	10%
Participant 7	23%	45%	18%	14%

4.2. Case Studies

A brief case study has been written for each student to highlight their feedback and my observations and insights from student interviews.

4.2.1. Participant 1

Participant 1, male and age 9, was the first student to fully embrace the mindfulness sessions. From the beginning, he was committed to following the instructions of the guided mindfulness sessions. The data suggests he enjoyed the mindfulness sessions and saw a positive impact from the training. He preferred the mindfulness session called "Bubble Journey" where he had to imagine a bubble expanding inside him. He learned and enjoyed counting his deep breathing. Prior to the mindfulness sessions, participant 1 reported being happy 64% of the time, and he usually felt calm (64%) after the mindfulness sessions. He did mention feeling

angry 21% of the time before the mindfulness sessions, which may be due to bullying he received during recess, as he noted in his comments. He did not always enjoy having to sit down and be quiet during the mindfulness sessions. Participant 1 could not identify any problems he had with the mindfulness training, nor did he have any suggestions for improvement.

I perceived several positive impacts on participant 1's behaviour, emotions and cognition during and after the mindfulness sessions. My observations notes showed that he frequently embraced the deep breathing technique and tried to practice it during every mindfulness session. Participant 1 attempted to follow along with the mindfulness recording 93% of the time. In this case, mindfulness meant that he was either sitting or lying down and was observed to be taking deep breaths along with the mindfulness recording. He was rarely observed to be fidgeting or distracted (4%), nor did he appear to be completely sleeping (4%). After the mindfulness sessions concluded and I began the class lessons, participant 1 was generally able to remain focused and on-task with the class activities for a significant amount of time. Over 46% of the time, he remained focused and on-task for around 20 minutes and 29% of the time he remained focused for around 30 minutes. He rarely displayed off-task behaviours right after the mindfulness session concluded and participated in the regular class activities.

4.2.2. Participant 2

Participant two, male and age 10, enjoyed the mindfulness sessions. He indicated that he would continue mindfulness if it were offered and that he found it helped him at recess when there were problems with other students. For example, he stated, *"A friend was being bullied at recess and a little bit of breathing helped me calm down."* Participant 2 perceived some benefits to participating in the mindfulness session, including feeling calmer and helping him deal with his sadness. Participant 2 indicated that he felt happy 71% of the time before the mindfulness sessions and usually felt calm (61%) after the mindfulness session. He also found that mindfulness kept him from feeling like he needed to walk or run around. Participant 2 thought sometimes the mindfulness sessions were too long. Additionally, he would have preferred hearing a different voice in the mindfulness recordings although he could not explain what he did not like about the current voice.

I noted several positive impacts from the mindfulness session on participant 2. He followed the guidance of the mindfulness recordings 64% of the time, with his deep breathing and closed eyes. However, he was more prone to getting distracted or falling asleep completely. My observations noted that he was distracted 18% of the time by either looking at other students in the class, giggling, or looking around the room. He was also observed to be sleeping almost 20% of the time, which meant he was lying down on his side and did not appear to be taking deep breaths along with the mindfulness recording. Like participant 1, participant 2 remained focused and on-task when the mindfulness sessions concluded and the regular class lessons began. Almost 40% of the time he remained focused and on task for approximately 30 minutes, and 32% of the time he remained focused for around 20 minutes. He rarely displayed off-task behaviours and was able to participate in the regular class lessons once the mindfulness sessions ended.

4.2.3. Participant 3

Participant 3, male and age 9, was another one of the participants who preferred the "Bubble Journey" mindfulness session. He thought that mindfulness helped him deal with his anger and kept him from needing to walk or run around. He learned that breathing could help him calm down, particularly when people were fighting him at recess. For example, he stated, *"(I) learned how to calm down if someone was fighting me."* He did indicate that he had used mindfulness outside the classroom, both at recess and home. He mentioned he tried to take deep breaths when he was lying down at home and watching TV. Participant 3 struggled to identify the emotions he was feeling. The only feelings he was able to recognize were happiness (38%) and anger (24%). These results are not much of a surprise as participant 3 had some health concerns, which had resulted in a lot of frustration and confusion for him. After the mindfulness sessions, he was unable to express his feelings or refused to answer 62% of the time. However, he did indicate that he felt calm 31% of the time after mindfulness. This finding does indicate that mindfulness had some impact on his emotional state. Participant 3 did find it challenging to sit still at times. His suggestion for improving the mindfulness app was that every session should end with a bell sound (like the Bubble Journey).

Participant 3 was very reluctant to participate in the mindfulness sessions. My observations showed that he avoided the sessions 52% of the time by remaining at his desk instead of joining the other students on the carpet. He was often observed to be playing with his fidget toys on the desk. Despite his initial reluctance to participate, I did perceive that the student benefited from the mindfulness sessions. Participant 3 did eventually start participating in the mindfulness sessions as they became part of the classroom routine. Over 32 sessions, he was observed to be attempting to follow along with the mindfulness sessions 31% of the time. Participant 3's inability to regulate his behaviour and emotions was one of the main reasons mindfulness was taught in the classroom. He was never forced to join the other students during the mindfulness sessions and instead was able to make the choice himself when he wanted to join. It should be noted that when participant 3 chose not to join the others on the carpet, he would sit quietly at his desk, and that quiet time in the classroom might have helped him calm down. Participant 3 had a more difficult time focusing and being on-task with classroom activities once the mindfulness sessions ended. Around 21% of the time, he displayed off-task behaviour right after the mindfulness sessions, 38% of the time he was on-task for around 10 minutes, 28% of the time he was on-task for around 20 minutes. He was rarely able to remain focused and on-task with class activities for 30 minutes or more.

4.2.4. Participant 4

Participant 4, male and age 10, like some of the other participants, preferred the "Bubble Journey" mindfulness session over other sessions because the visualization helped him with his anger and helped him calm down. *"I like the quiet because it helps my head relax. When it's loud, my head is telling me to do lots of things."* He thought that the "Bubble Journey" helped him manage his sadness and not take out his hurt feelings on other people. Participant 4 revealed that he also used mindfulness outside the classroom, both during recess and at home when he was trying to fall asleep. Before the mindfulness sessions, participant 4 primarily identified feeling happy (52%) and angry (24%) when coming in from recess. Like participant 3, participant 4 had difficulty regulating his emotions. He would often come into conflict with other students at recess and was responsible for some of the bullying that had occurred in the class. Participant 4 recognized sadness 14% of the time as an emotion he was feeling after

recess. When conflict occurred at recess, this student would often feel hurt and would respond with anger. It took him a long time to recognize his behaviour, but with teacher guidance, he started identifying when he was feeling hurt, which he would describe as sadness. As the mindfulness sessions progressed, participant 4 was observed to take a lot of enjoyment in the sessions. He identified feeling calm 66% of the time after the mindfulness sessions ended. He would often ask if it was time for mindfulness. Participant 4 mentioned sometimes that he felt uncomfortable sitting or lying down for the whole mindfulness session and he sometimes thought that it might be too long. Participant 4 said that he would continue his mindfulness training if offered, and he wanted other teachers to use mindfulness to help calm their classes. *"You (the researcher) tell the other teachers to do it to help the class concentrate if it's too loud."* The only suggestion he had to improve mindfulness apps was that he thought they should be free, not just the Smiling Minds app used in the classroom.

I perceived several benefits of the mindfulness sessions on participant 4. Participant 4 had an initial reluctance to participate in the mindfulness sessions, however, after a couple of sessions he began to participate fully. Over the 32 sessions, participant 4 was observed to be following the mindfulness instructions 79% of the time. He was rarely observed getting distracted by other students (7%) or sleeping (3%). After the mindfulness sessions ended and the regular class lessons began, participant 4 demonstrated some ability to remain focused and on-task with the class activities for a sustained period. He displayed off-task behaviours right after mindfulness 14% of the time. He was most successful with focusing and remaining on task for at least 20 minutes (45% of the time). He showed limited ability to remain focused for 30 minutes or more, at only 14% of the time.

4.2.5. Participant 5

Participant 5, female and age 10, also enjoyed the "Bubble Journey" mindfulness sessions. She indicated that she preferred the "Bubble Journey" because the visualization helped her with her anger after recess. She did perceive that the mindfulness sessions had a positive benefit on her behaviour and emotions, including learning that breathing can calm her down and help her deal with her anger. *"Sometimes when I get angry my body wants to hit someone*

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but when I breathe it calms me down." Before beginning the mindfulness sessions, participant 5 identified happiness (63%) and anger (22%) as the emotions she felt coming in from recess. Like participants 3 and 4, participant 5 had a lot of difficulty regulating her emotions. She would often come into conflict with students at recess, and she struggled to understand how her actions were affecting others. After the mindfulness sessions, she identified feeling calm 41% of the time. Participant 5 did find mindfulness difficult at times because she did not like closing her eyes and wanted to know what was going on. She said she would continue the mindfulness training if it were offered and that she liked the mindfulness app the way it was and did not offer any suggestions for improvement.

I had difficulty perceiving a positive impact of the mindfulness session on participant 5. She had the most difficulty following along with the mindfulness sessions. My observations showed that she was observed to be distracted 52% of the time. She was only viewed to be following the mindfulness sessions 30% of the time and was viewed to be sleeping 16% of the time. Upon discussions with participant 5, she revealed that she had a lot of difficulty clearing her mind and not worrying about future events. *"It's difficult to close my eyes, because I want to know what is going on."* It is unclear how much mindfulness might have benefited participant 5. She continued to struggle with regulating her emotions and behaviour, even after the mindfulness sessions had concluded. Additionally, participant 5 showed some difficulty remaining focused and on-task during the regular class activities. Almost 30% of the time, she displayed off-task behaviours right after the mindfulness sessions ended, and 41% of the time she managed to focus and demonstrate on-task behaviours for at least 10 minutes. She demonstrated a limited ability to remain focused and on-task for 30 minutes or more (7% of the time).

4.2.6. Participant 6

Participant 6, female and age 10, was one of the students who missed a significant number of mindfulness sessions (12 out of 32). Participant 6 did not seem to enjoy the mindfulness sessions as much as the other participants. She preferred the "Bubble Journey" mindfulness session compared to other mindfulness sessions. Participant 6 did believe that mindfulness taught her breathing could help her calm down. Before the beginning of the

mindfulness sessions, participant 6 indicated that she felt happy 65% and calm 25% of the time. Participant 6 was the student who had the best social skills in the class. While she frequently missed school days, she had a solid group of friends and good social skills to interact well with other students. As a result, she occasionally identified sadness and anger as emotions she felt, but it was not as frequent. It is worth noting that she might have tailored her answers to what she thought she should be feeling. From my observation notes, participant 6, did at times, demonstrate frustration and anger at the other students who were lacking the social skills to avoid conflicts with one another. Participant 6's feelings after the mindfulness sessions continue the same pattern as most of the students. The most prevalent emotion she felt after mindfulness was calm (55%). Participant 6 had some difficulties with the mindfulness training, including thinking that the sessions were too long. She had difficulty taking deep breaths, but it was unclear why that was a problem. She was also the only participant to mention having some difficulty understanding the words spoken in the recordings. Participant 6 did indicate that she would continue the mindfulness training if offered and did not have any suggestions for improving the app.

Since participant 6 missed so many sessions, I had difficulty determining how much she benefited from the sessions. Based on my observations, she was often observed following the mindfulness instructions (50%) and being distracted (40%). She was also occasionally observed to be sleeping 10% of the time. After the mindfulness sessions concluded, participant 6 demonstrated some ability to remain focused and on-task with the regular class activities. She was able to remain focused for at least 20 minutes 45% of the time, and 30% of the time she was able to focus for at least 30 minutes or more. She rarely demonstrated being off task when the mindfulness sessions ended (10% of the time). Participant 6's absences may have affected her comfort with the mindfulness sessions. Often when she was not following the mindfulness instructions, she was observed to be sitting quietly at the back of the carpet, observing the others in the room. Another possibility is that she may have been benefiting from having all the other students be quiet in the classroom. Participant 6 was able to regulate her behaviour and emotions most of the time, but she could get frustrated with the other students when they could not regulate themselves.

4.2.7. Participant 7

Participant 7, male and age 10, enjoyed counting his breath and found that the mindfulness sessions calmed him down. He did not believe that the mindfulness session had an impact on his emotions or behaviours, despite indicating it made him feel calm. Before the mindfulness sessions, participant 7 demonstrated a similar pattern to most of the other students. The most prevalent emotion he identified before the mindfulness sessions was happiness (82%). Like most students, he usually felt calm after the mindfulness sessions (55%). Participant 7 did not like having to sit down and be quiet for long periods. He did not use mindfulness outside the classroom but said he would continue his mindfulness training if it were offered. Participant 7 did not identify any problems he had with the mindfulness training, nor did he have any suggestions for improving the mindfulness app.

Participant 7 was another student who missed a significant number of mindfulness sessions. (10 out of 32). Like with participant 6, it was difficult for me to determine the benefits of mindfulness on participant 7. Based on my observations, he did appear to enjoy the mindfulness sessions and 82% of the time was observed following the mindfulness instructions. He was distracted by other students 14% of the time. Participant 7 did not participate in some of the sessions (5%), instead choosing to sit at his desk quietly working. Like the other participants, participant 7 was not forced to join the other students on the carpet for the mindfulness training. After the mindfulness sessions ended, participant 7 demonstrated some ability to remain focused and on-task with regular class activities. He was normally able to focus for at least 20 minutes (45%) and could focus for 30 minutes or more 18% of the time.

4.3. Additional Themes

A cross-case comparison was completed for all the participants using all three data sources to answer question four: What additional themes emerged in the analysis of the use of the mindfulness app Smiling Mind? Each of the data sources were reviewed to determine themes that emerged about the mindfulness sessions and impacts on students. Units of analysis were coded and separated into a theme chart. The data sources and theme chart were reviewed several times to reach saturation (Yin, 2011). Four underlying themes emerged: (1) the most common reason for liking the mindfulness session was calmness, (2) Several benefits

to using an app for mindfulness instead of an instructor, (3) students with learning exceptionalities or difficulties struggled with the app, and (4) attendance may have impacted how the students felt about mindfulness.

Theme 1: Most common reason for liking the mindfulness sessions was calmness

The most common reason the students liked the mindfulness session was how it made them feel calm afterward. Four of the seven students indicated in the student interviews that mindfulness made them feel calm, relaxed, or peaceful. Two of the students enjoyed the Bubble Journey's visualization element, and five students enjoyed the bell that rang at the end of the session to indicate the end.

Theme 2: Several benefits to using an app for mindfulness instead of an instructor

There were several benefits to using the app for mindfulness instead of the teacher as the instructor. Consistent use of the same three mindfulness sessions meant that students had an easier time understanding the words and instructions. Notes from my teacher observations indicated that most of the students found the instructions simple and easy to follow. Only one student (participant 6) indicated that she had difficulty understanding some of the words. Additionally, most of the students enjoyed the "Bubble Journey" mindfulness session because they enjoyed the visualization element. Multiple students (participants 1, 4, and 5) mentioned that they enjoyed imagining the bubble expanding inside themselves. Students also enjoyed the bell sound that rang at the end of the session to let them know it was over. The bell sound was one of the main reasons the students picked Smiling Mind as the app they wanted to use. Participant 3 thought all mindfulness sessions should end in a bell sound. The mindfulness app was easy to set up and simple to use as all I had to do was press the play button once the students were sitting on the carpet.

Theme 3: Students with learning exceptionalities or difficulties struggled with the app.

All the students in the class had academic difficulties, and most struggled with social interactions and behavioural regulation, particularly participants 3, 4, and 5. Participant 4 embraced the mindfulness sessions and believed that it positively impacted his behaviour and

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emotions. My observations of the student showed that he demonstrated some improvement in regulating his behaviours after the mindfulness sessions concluded. Participants 3 and 5, however, struggled with participating in the mindfulness session. It took many sessions before participant 3 was willing to even participate with the rest of the class. However, participant 3 did feel some of the benefits of mindfulness once he started participating. He was one of two students who tried to use it at home to help him fall asleep. He demonstrated some improvement in his ability to regulate his behaviours after the mindfulness sessions concluded. Participant 5 struggled the most and did not experience many of the benefits of mindfulness. Like participants 3 and 4, participant 5 struggled to regulate her emotions and behaviours, and, unlike the other two participants, the struggles continued after the mindfulness sessions concluded. She was frequently observed to be distracted during the mindfulness sessions and demonstrated a limited ability to sustain on-task behaviours for more than 10 minutes.

Theme 4: Attendance may have impacted how the students felt about mindfulness.

Two participants (6 and 7) were frequently absent for class and the mindfulness sessions. Neither of them felt that mindfulness had much of a positive impact on changing their emotions or behaviours. It is possible that their absences impacted their comfort with the mindfulness sessions. Additionally, participant 6 struggled to understand the mindfulness sessions, which could have influenced her view of mindfulness's benefits.

5. Discussion

This study explored how app-based mindfulness sessions would impact elementary students in a grade 4 ESL classroom. These students struggled with attention and social-emotional skills while at school. Mindfulness was integrated to support their learning because prior research suggested mindfulness benefited children in the classroom, especially focus and attention, building emotional regulation skills, and managing stress (Chadwick & Gelbar, 2016). Effective emotional regulation skills are linked to well-being, academic performance, and positive adjustment throughout the lifespan (Eisenberg et al., 2010). Content analysis was performed on data sources collected throughout the integration of the mindfulness program. The results of the data analysis suggest that app-based mindfulness training was enjoyed by students and benefited their wellbeing and learning. The study aimed to expand on research on mindfulness training with children, mindfulness training with apps, and mindfulness training with ESL students. A summary for each of the study's research questions is now presented.

5.1.1. Research Question 1: Did ESL students enjoy using the mindfulness app Smiling Mind?

The first research question asked if the ESL students enjoyed using the mindfulness app Smiling Mind. The results of this study demonstrated that most students in a grade 4 ESL class enjoyed app-based mindfulness sessions (five out of seven). The students enjoyed the mindfulness app because it taught them how to calm themselves down by counting their deep breaths. Calmness was one of the most noted benefits by the students and the teacher. Calmness is a primary goal of mindfulness practice; to teach individuals how to develop awareness of their breathing and practice exercises to release tension (Altschuler et al., 2012). Mindfulness teaches individuals how to focus their attention on the present moment and inhibit irrelevant thoughts, including worries of future or past events (Holas & Jankowski, 2012). Research has shown that mindfulness-based interventions alter neural activity to improve stress reactions (Davidson et al., 2012). The students in this class appreciated the app in guiding them through breathing techniques, focusing their attention and feeling calm. These results are similar to those reported by Chitarro and Vianello (2016), who found that the mindfulness app elicited positive feelings such as relaxation and improved well-being in adult participants. This study's results also support previous research that showed mindfulness helped children calm

down and reduce stress that they appreciated (Barnes et al., 2019; Viafora et al., 2015; Schonert-Reichl et al., 2015). The students especially enjoyed the mindfulness sessions led by the Smiling Mind app. The app allowed features the teacher could not do, such as varied voices, sounds, and paced timing. These electronic features may be a bonus for individuals using apps. Students may significantly benefit from apps that are different from classes led by their teachers. They hear their teachers all the time and may be desensitized to instructions from the teacher. Having a different voice to lead them through sessions may be an effective moderation in the classroom setting. The students also indicated it was easy to follow, which may be to the app's clear voice and timed pacing. This research supports the use of apps in mindfulness sessions, especially in a school setting.

5.1.2. Research Question 2: What impacts on behaviours/emotions/cognitions did the ESL students perceive while using the app Smiling Mind?

The second research question examined the Smiling Mind app's impact on students' perceptions of their behaviour/emotions/cognition. Most of the students (four out of seven) felt that mindfulness positively impacted their emotions (anger and sadness) and behaviours in the classroom. These findings are in line with results from previous research. Mindfulness has been shown to improve inhibitory control, including a person's ability to inhibit irrelevant emotions and behaviours (Holas & Jankowski, 2012). Participants in a study examining the effectiveness of the mindfulness education course reported a greater emotional well-being and were more likely to use mindfulness to deal with anger and other difficult emotions (Viafora et al., 2015).

Interestingly, in this study, four students indicated that they were starting to use mindfulness outside the classroom, either during recess to help deal with their anger or at home when they were trying to fall asleep. This transferability of skills is particularly important for children and can help them be successful over the long term (Klatt et., 2013). Investigating the long-term effects of mindfulness training, including those that are app-based, should be a continued goal for research on this topic (Britton et al., 2014).

Exploring individual impacts of the app-based mindfulness sessions revealed important insights for education and learning. Dealing with negative emotions had a very positive impact on the behaviour of participants 3 and 4. In particular, participant 4 was able to deal with his negative emotion of sadness and anger, which helped prevent his outbursts to other students. Participant 4's emotional control positively impacted the whole classroom, with less emotional outbursts from the other students and a more relaxed and safe learning environment. Participant 3 also demonstrated some improvements in regulating his anger and improved interactions with his peers after the mindfulness sessions ended. This improvement in prosocial skills and self-regulation ability is similar to the results found in current research (Kasson & Wilson, 2017; Meyer & Eklund, 2020; Viglas & Perlman, 2018). There was one exception to improvements in emotional and behavioural regulation. Participant 5 did not demonstrate an improvement in emotional and behavioural regulation based on my observations. She continued to struggle with her interactions with other students in the class after the 32-mindfulness sessions concluded. This struggle may have been due to several factors such as learning difficulties and language barriers. Overall, students perceived some benefits to mindfulness on their emotions, including anger and sadness, and that mindfulness taught them how to calm themselves.

5.1.3. Research Question 3: What impacts on student behaviours/emotions/cognitions did the teacher perceive from them using the app Smiling Mind?

The third research question asked how I (the teacher) perceived the impact of the Smiling Mind app on the behaviour/emotions/cognition of the students. My observations noted several improvements in the behaviour, emotion and cognition of the students. Most of the students were able to remain calm and focused during the mindfulness sessions. Additionally, students demonstrated an improved ability to remain on task after the mindfulness sessions ended. Of the three students who had difficulty regulating their behaviour, two (participants 3 and 4) saw some improvements in the classroom behaviours and emotional regulation and an ability to remain on-task after the mindfulness sessions ended. Participant 5 was the student who improved the least and still struggled with her emotions after the mindfulness sessions concluded. The results from previous research supported these findings. Mindfulness has been

shown to improve inhibitory control, including an individual's ability to control what to focus on and ignore other stimuli (Diamond, 2013; Holas & Jankowski, 2012). Kasson & Wilson (2017) found that the mindfulness-based behaviour management program increased on-task behaviours of elementary school students. Samaneh et al. (2021) found that children who received mindfulness training showed reductions in attention problems. Crooks et al. (2020) showed that mindfulness improved a child's ability to initiate, plan and organize their work while being about to monitor their progress and sustain their attention on the task at hand. Being able to stay on task is important for effective learning (Klatt et al., 2013). All the students in the class had varying degrees of academic difficulty. Many of the students had gaps in their education and/or experienced some educational continuity problems as is common for ESL students (Regier, 2006). As a result, not only were they struggling academically, most of them did not display the on-task behaviours necessary for success in the classroom. However, after the mindfulness sessions, most of the students were able to sustain on-task behaviours, defined as focusing on the lesson and completing their classwork, for at least 20 minutes or more. An improvement in engagement and attention in the classroom can lead to improved student academic success, as attention skills are consistently linked to academic achievement (Duncan, et al., 2007).

Finally, several prominent issues led to the creation of the study. I chose to implement mindfulness to help students regulate their behaviours and emotions and improve some of the students' social interactions. Prior to beginning the mindfulness sessions, disruptions in the classroom were common, including conflict between students and incidents of bullying. Participant 1 was the subject of bullying from some of the other students. Bullying by peers can negatively impact the mental health of children, including the development of depression, anxiety, or self-esteem problems (Espelage & Swearer, 2003; Nordhagen et al., 2005). A detailed assessment of the impact of bullying on participant 1 was not possible within the scale of this study, but it is reasonable to assume that the student did not feel particularly safe in the classroom. After the mindfulness sessions concluded, I was able to observe improvements in student behavioural and emotional regulation. In particular, the primary bully of the class, participant 4, demonstrated less anger and frustration. Concurrently there was a reduction in

bullying incidents between participant 1 and participant 4. Overall, I perceived that the mindfulness sessions positively impacted the students' ability to regulate emotions like anger and sadness and were able to engage in on-task behaviours after the mindfulness sessions ended.

5.1.4. Research Question 4: What additional themes emerged in the analysis of the use of the mindfulness app Smiling Mind?

Research question 4 examined any additional themes that emerged from the analysis of the use of the mindfulness app, Smiling Mind. The themes that emerged were (1) most participants enjoyed the mindfulness sessions, (2) the most common reason for liking the mindfulness session was calmness, (3) there were more benefits to using an app than barriers, (4) the most common positive impact on students was their daily mental health, (5) students with learning exceptionalities or difficulties struggled with the app, and (6) attendance may have impacted how the students felt about mindfulness. Themes 1, 2, 3, and 4 were already addressed in the previous research questions. Themes 5 and 6 will be addressed in this section.

Some significant findings from this study centre on moderating variables; influencing variables can strengthen or weaken the relationship between two factors (Yin, 2011). The data from this study suggests a few moderating variables, such as the timing and attendance of mindfulness sessions and the impacts of learning disabilities on the satisfaction and effectiveness of the app-based sessions. Theme 5 suggested that students with learning exceptionalities or difficulties struggled with the app. Learning difficulties can impair one's ability to use the app appropriately. Participant 6 struggled with understanding the recordings, while participant 5 had difficulty calming herself and saw limited improvements to her emotional and behavioural regulation. Theme 6 suggested that attendance may have had an impact on the students' perception of mindfulness. Both participants 6 and 7 missed a significant number of mindfulness sessions. Neither of the students appeared to enjoy the app as much, nor did they believe that the app had a positive impact on their behaviour or emotions. Their attendance issues may have contributed to their comfort and enjoyment of the mindfulness sessions.

5.2. Limitations

Qualitative data were used in this study which can have its own set of limitations. These include (1) the meaning of words or phrases that could be misinterpreted by researchers (Yin, 2011); (2) participants recorded incorrectly (Yin, 2011) or (3) the contextual nature of statements may not be understood (Stake, 2010). The possibility that researchers could misinterpret the meaning of words or phrases is a real concern for this research. The participants in this study were only 9 to 10 years old and had some limitations in their English abilities. Therefore, it was difficult for them to articulate their thoughts on the mindfulness meditations all the time. Due to their lack of a large English vocabulary, their young age and limited life experiences, it was difficult for them to draw any conclusions from the different mindfulness exercises. They answered simple questions, including if they felt calm or liked an element for a guided meditation, but acquiring more in-depth thinking was challenging. To address this limitation, student feedback was double-checked for understanding. Students were asked the questions in several different ways and asked to clarify and summarize the questions at the end to ensure understanding. Additionally, I also relied on behavioural observations throughout the 32 sessions to see if they agreed with the students' oral responses. Did they appear interested in participating in the guided meditations? Did they try to follow along with the guided instructions while they were listening? Or did they avoid joining in and remain apart from the group?

Another limitation of this study is the length of the study and the sample size. While the study occurred over 16 weeks, the mindfulness sessions only occurred twice a week. It is possible that more sessions during the week could have had a greater impact on students' emotional and behaviour regulation. As stated earlier, not all the participants saw the same level of positive impact. More mindfulness sessions, either more frequent or for a longer period, may have improved all students' positive impacts. The small sample size can also be a limitation of this study. A smaller sample size makes it hard to generalize the results to other samples.

The reality of completing research in the classroom makes it difficult to ascertain the true extent of the impact of the mindfulness app on student behaviours, emotions, or cognition. Teaching about emotional and behavioural regulation continued to occur outside the mindfulness sessions. The mindfulness sessions provided support and practice for the lessons taught about emotional and behavioural regulation that regularly occurred in the classroom.

5.3. Future Research

This study indicates that a mindfulness app can improve emotional/behavioural regulations and on-task behaviours in the classroom for students. Previous barriers to teaching mindfulness to students were cost and lack of professional resources (Britton et al., 2014). As demonstrated in this study, using an app can be cost-effective and an easy way to integrate mindfulness lessons. To integrate apps into the classroom, the following recommendations are suggested: (1) choose evidence-based apps that have been researched, (2) train teachers in mindfulness and the use of the app first, and (3) consider moderating variables that influence the success of the app. The cross-case comparison in this study determined several possible influencing factors. The students' behaviour was different after recess with heightened emotions and energy. It was more challenging for the students to pay attention at that time. The cross-case analysis also revealed that the students with learning exceptionalities found this problematic, so specific accommodations such as extra time, practice, or peer support during mindfulness sessions might be beneficial.

Research with a larger sample size and with quantitative data is recommended to determine the large-scale effectiveness of mindfulness apps on students in the classroom. Finally, this study only examined the impact of one mindfulness app. At least 23 available apps provide mindfulness training and education that could be examined (Mani et al., 2015). Future research should investigate the different apps to determine what apps work well in the classroom.

5.4. Conclusion

In conclusion, the use of the mindfulness app, Smiling Mind, in this study showed a positive impact on most of the participants' well-being and learning. Results showed that most

of the students enjoyed using the app and were engaged in the sessions. Some participants had difficulties following along with the app's instructions or found it difficult sitting still. I also noted that most of the students were able to calm themselves when practicing mindfulness. Additionally, I observed improvements in students' on-task behaviours and behavioural and emotional regulation after the mindfulness sessions concluded. While this study relied on qualitative data collection, making its generalizability to a larger population more difficult, the data collected demonstrated that the Smiling Mind app has some potential for improving students' emotional and behavioural regulation in a classroom.

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Student Feedback Form

1. How do you feel before you start mindfulness? Do you know why?

2. How do you feel after mindfulness? How did mindfulness make you feel?

Appendix B

Student Interviews: The researcher will ask each student a series of 10 open-ended questions and will record their responses.

1. What did you like about mindfulness training?

2. What didn't you like about mindfulness training?

3. What did you learn, or did you learn from the training?

4. Do you think this mindfulness training taught you how to be more aware?

5. Have you used anything you learned outside the classroom? If so, where did you use it? And was it effective?

6. Did the training help you deal with any of your emotions? If so, which ones?

7. Did the training have any impact on your behaviour? If so, what was it?

8. Would you continue your mindfulness training if it were offered to you?

9. Were there any problems you had with the mindfulness training? If so, what were they?

10. How would you improve the mindfulness training you were given?

Appendix C

Consent from Parents/Guardians

Toronto District School Board

Thorncliffe Park Public School
80 Thorncliffe Park Drive, Toronto, Ontario M4H 1K3
Tel: (416) 396-2460 . Fax: (416) 396-2286

J. Crane, Principal
M. Wolf, K. Sanchez-Kandankery Vice-Principals

June 18, 2019

Student Feedback

Dear Parents/Guardians,

I have been teaching your children since November. One of the tools I used during my teaching was two different mindfulness apps that are designed to help students calm down and focus to help their learning.

I have also been at school myself, learning how to improve my teaching and how to use different technologies to improve learning in the classroom. Part of my work involves getting feedback from students that I can share with other educators in a research paper.

With your permission, I'd like to use the feedback your children gave me on the mindfulness apps (Did they like it? Did it help them calm down? Did it help their learning?). Your child's name **will not** be included nor will any other identifiable information.

This information is important because it can help myself and other teachers learn what teaching tools can help students with both their learning and their wellbeing.

If you have any questions, please call me at the school.

Thank you,

Ms. Eadie

Permission Form – Please Sign and Return

I/we give permission for the feedback provided by my/our child _____

to be used in a research paper on mindfulness apps.

Name of Parent/Guardian: _____

Signature of Parent/Guardian: _____