Social and Emotional Functioning and Academic Skills in Preschool: Attention Problems, Anxiety and Adaptability

by

Meghan Anne Walker

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Education

in

School and Clinical Child Psychology

Department of Educational Psychology
University of Alberta

Abstract

Children's social and emotional functioning is increasingly viewed as a crucial factor necessary for children's learning, academic success, and overall well-being. The role of children's social and emotional functioning in preschool is fundamental to children's school readiness, as preschool is a critical period for enhancing children's preparation for formal school entry and improving their educational outcomes. The present study investigated the predictive relationship of preschoolers' social and emotional functioning on their academic school success in preschool, based on language, literacy and executive functioning measures. In addition, this research has sought to extend previous research and examine gender differences in children's levels of attention problems, anxiety and adaptability in preschool. Data was collected from preschool children in Head Start programs and from their teachers in the fall and spring of the school year. Children's attention problems in the fall were found to significantly predict their academic scores in the fall and spring, with higher attention problems predicting lower academic scores. Children's levels of adaptability were found to significantly predict children's academic skills in the fall and spring, with higher levels of adaptability predicting higher academic scores. Levels of anxiety were not found to significantly predict children's academic skills in the fall or spring of their preschool year. The current study did not find any significant gender differences between children's levels of attention problems, anxiety or adaptability in preschool. The discussion will focus on contributions to the present understanding of how children's attention problems, anxiety and adaptability behaviours in preschool contribute to their academic skills prior to their formal school entry into kindergarten. This study highlights the importance of studying the relationship between children's social and emotional functioning and academic

skills in preschool, and the implications of this study can be used to help inform early learning programs and promote children's overall development and well-being in early childhood.

Acknowledgements

Completing this process would not have been possible without the support of my family, colleagues, and faculty members, to only some of whom it is possible to give particular mention here. I would like to express my gratitude to my supervisor, Dr. Christina Rinaldi, for her guidance, expertise and support throughout this process and my entire graduate program. I would also like to thank Dr. Jacqueline Pei and Dr. Larry Prochner for taking the time to participate as committee members on my oral defence committee and providing me with helpful feedback.

Lastly, I am most grateful to my family, Mac, Vicky, Rebecca, Jacob, Hannah, Hallie, and Rory, my friend, Alison, and my partner, Nicolas, for their continuing love, support and encouragement.

Table of Contents

List of Tables

Introduction

Contemporary kindergarten classrooms are comprised of diverse learners from various backgrounds, having a wide range of experiences and abilities, and some children are more successful than others in meeting the heightened demands of kindergarten (Rimm-Kaufman, Pianta, & Cox, 2000). The Early Child Development (ECD) study, implemented by the Government of Alberta, collected data from kindergarten teachers for over 70, 000 children between 2009 and 2014 (Government of Alberta, 2014). The ECD study measured five areas of child development: (1) physical health and wellbeing, (2) social competence, (3) emotional maturity, (4) communication skills and general knowledge, and (5) language and thinking skills. The results of the ECD study found that nearly 29% of kindergarten aged children in Alberta are experiencing great difficulty in one or more of the five areas of development, compared to the Canadian norm of 25.4%. Kindergarten teachers reported that 24.8% and 25.8% of children in Alberta are experiencing difficulty or great difficulty in the developmental areas of social competence and emotional maturity respectively. The results of the ECD study are alarming as Alberta has the fastest growing population of preschool aged children in Canada, and a large percentage of children in Alberta are already falling behind developmentally by kindergarten (Government of Alberta, 2014).

Children's skills at entry into formal schooling (kindergarten) are highly correlated with later skills, including in the domains of early literacy and mathematics (Fantuzzo, Bulotsky-Shearer, McDermott, McWayne, & Frye, 2007; Snow, 2006). Therefore, there has been an increasing interest in studying young children's transition to formal schooling and the challenge it presents to educators, parents and policymakers (Boivin & Bierman, 2013; Gullo, 2014; Snow, 2006). Preschool is a critical period for enhancing children's preparation for school entry and

improving their educational outcomes. Early learning programs for preschoolers from low-income families, such as Head Start, have been shown to consistently improve children's early writing, mathematics, and vocabulary scores (High, 2008). However, there continues to be debate over the critical components of child development that contribute to school success (Snow, 2006).

Over the past several decades there has also been an increase in attention to children's social and emotional development as a crucial factor for children's concurrent and later overall well-being and mental health, as well as their learning and academic success (Denham, 2006). Approximately 10% to 15% of children in preschool exhibit moderate to clinically significant levels of social, emotional and behavioural difficulties (Cooper, Masi & Vick, 2009). The role of children's social and emotional functioning on their academic school success in preschool is complex and requires further investigation. There are also discrepancies between studies on gender differences between preschoolers' social and emotional functioning, and the effects of gender differences between boys and girls in preschool are not well understood.

The Present Study

The purpose of the present study is to examine the predictive relationship of preschoolers' social and emotional functioning (as assessed by teachers in the fall) on children's academic school success in preschool, based on language, literacy and executive functioning measures in the fall and spring. The social and emotional behaviours of attention problems, anxiety and adaptability were the focus of the study. Data was collected from preschool children in Head Start programs and their teachers in the fall and spring of the school year, to answer the following research questions: (1) Do children's levels of attention problems, anxiety and adaptability predict their school success in preschool? (2) Are children's levels of anxiety,

attention and adaptability stable across the school year, or is there a difference between children's levels of anxiety, attention and adaptability in the fall compared to the spring? and (3) Do children's levels of attention problems, anxiety and adaptability in preschool differ between boys and girls?

Researchers have suggested the ability to control and sustain attention predicts children's school success during preschool (Duncan et al., 2007; Fantuzzo et al., 2007; Romano, Babchishin, Pagani, & Kohen, 2010). Less is known about the role of anxiety on children's academic success in preschool, despite anxiety being one of the most frequently reported issues affecting school-age populations (Côté et al., 2009; Pahl, Barrett, & Gullo, 2012). There is also less research on positive strengths-based aspects of social and emotional functioning, such as adaptability. Therefore, attention problems, anxiety and adaptability, as rated by children's teachers, were the focus of this research. The present study aims to draw attention to the importance of children's levels of social and emotional functioning at school entry as a predictor of their academic skills at the end of preschool, and aims to inform early education programs curriculum to support skill-building in these areas in order to promote children's academic skills.

Literature Review

The following review of the literature will focus on relevant themes to the present study, namely, the importance of developing children's school readiness skills prior to school entry, the influence of children's social and emotional development on their academic outcomes and overall well-being, as well as the links between children's school readiness and social and emotional development in preschool. Child gender differences in social and emotional development will also be reviewed.

School Readiness

Traditionally, the construct of school readiness (or "readiness to learn" and "teachability") has been viewed from a maturationist perspective. That is, children are ready to enter school when they have achieved a certain level of expected maturity based on a set chronological age (Snow, 2006). For example, the Education Act of Alberta, Canada states that children must be at least four years of age before March 1st to begin kindergarten in September of the same year. However, there has been a growing consensus among researchers, practitioners, policymakers and teachers that children's school readiness is based on more than a child's chronological age. The construct of school readiness has grown to include the state of a child's competencies at the time they begin school that are important for later success (Snow, 2006).

Defining school readiness. Although there is a lack of agreement on a precise content definition of school readiness (Boivin & Bierman, 2013), there is a general consensus that school readiness includes the domains of physical development and motor skills, approaches to learning (i.e. curiosity, creativity, independence, cooperativeness, and persistence), language development, cognition and general knowledge, as well as social and emotional development

(Belfield & Garcia, 2014; High et al., 2008; National Education Goals Panel, 1991; Romano et al., 2010). Further, school readiness is a multidimensional construct that includes the cognitive, communicational, behavioural and emotional skills, and the basic knowledge that enables young children to learn and adjust to school entry (Duncan et al., 2007; Forget-Dubois et al., 2007). For the purpose of this study, school readiness is defined as a broad set of characteristics and skills that affect a child's ability to learn in academic environments. This includes the five dimensions of: (1) physical well-being and motor development, (2) social and emotional development, (3) approaches towards learning, (4) language development, and (5) cognition and general knowledge (Gullo, 2014; National Education Goals Panel, 1991). The present study focuses on the dimensions of social and emotional development and cognition and general knowledge of preschoolers.

Theoretical Framework

Children's social and emotional development, school readiness and success in transition to kindergarten is grounded in several theories. In this review cognitive-stage theory and sociocultural theory are discussed to provide a theoretical framework to guide the present research study.

Cognitive-stage theory. Piaget's (1952; 1970) cognitive-stage theory provides a theoretical framework for understanding how children's cognitive development influences their social and emotional functioning in preschool. This model describes children's development as a process caused by the specific, everyday encounters they have with the objects and people around them, which lead to their general ways of understanding the world (Miller, 2011). In this way preschoolers actively construct their knowledge through encounters with their teachers and peers, as well as the learning and play objects around them. Proponents of this model suggest

that children's understanding of the world changes throughout their development, as they proceed through a series of sequential stages and actively construct their knowledge (Miller, 2011). Piaget described preschoolers as being in the *preoperational stage* of development, as they are able to use mental symbols, including language, to think and reason, but are unable to think objectively, systematically and rationally (Piaget, 1970). Such limitations in preschoolers' thinking, including inflexible and irreversible reasoning, also cause misleading judgments and difficulties with social understanding (Thompson & Goodman, 2011). Cognitive-stage theory recognizes the central role of cognition in children's development on their learning and social and emotional development (Miller, 2011). More recently neo-Piagetians (Case, 1998; Fischer & Bidell, 2006) have expanded on Piaget's cognitive-stage theory to include the social-contextual idea of social supports for emerging cognitive skills. Fischer and Bidell (2006) argue that children are more likely to be advanced in their number concepts if they are raised in an environment that supports the development of their number skills, compared to an environment that does not support or train them for such skills. Therefore, children's cognitive, social and emotional development is dependent on the support available in their environment. It is expected that early learning programs, such as Head Start, will support children in developing their cognitive, social and emotional development and prepare them for entry into formal schooling.

Sociocultural theory. Sociocultural theory (Vygotsky, 1978) views children as inherently social, with children and cultural communities mutually creating and influencing each other (Miller, 2011). Culture consists of one's shared beliefs, values, knowledge, skills, relationships, customs, and social settings, and is expressed through family and social routines (Miller, 2011). Differences between families' composition, ethnicity, economic status, and

physical setting all influence how children learn new information and skills (Miller, 2011). Sociocultural theory suggests that children in preschool with different levels of social and emotional functioning will interact with their environment, such as their parents, teachers, and peers, differently. Proponents of sociocultural theory assume that in order for a child to learn they need to be involved with others, such as peers and supportive adults. In this way children's social and emotional functioning affects their school readiness, as social and emotional functioning influences their ability to interact with and form relationships with others (e.g. family members, teachers, peers), to effectively engage in learning activities and the classroom learning process (Duncan et al., 2007; Sheridan, Knoche, Edwards, Bovaird & Kupzyk, 2010). For example, children who are described as exhibiting more positive social and emotional functioning when they enter kindergarten (i.e., being well liked and able to make and sustain friendships) are more likely to engage with their peers and teachers, feel more positive about school, participate more in classroom activities, successfully transition from preschool to kindergarten, and have superior grades and school achievement (Denham, 2006; Raver & Knitzer, 2002). Preschoolers with deficits in social and emotional functioning (i.e. displaying aggression or difficulties regulating negative emotions) participate less in the classroom, are less accepted by their teachers and peers, like school less, and are at an increased risk for psychopathology and academic failure (Denham, 2006; Fantuzzo, Bulotsky-Shearer, Fusco, & McWayne, 2005, Raver & Knitzer, 2002; Sheridan et al., 2010). From a sociocultural view, children's difficulties with social and emotional functioning cause them to be limited in their exchanges with others, and negatively affects their social, emotional and academic readiness for school. Therefore, it is expected that children with higher levels of social and emotional problems will also have lower levels of academic functioning in preschool.

Social and Emotional Development

Rose-Krasnor's (1997) Prism model provides a theoretical framework for defining a child's social and emotional functioning. Rose-Krasnor's model describes social and emotional competence as effectiveness in interaction, and is the prism's top level. Effectiveness is the result of a system of behaviours organized to meet a child's short and long-term developmental needs. Social competence is the middle level of the prism, and is divided into the domains of the Self and Others. The Self domain includes the aspects of social competence where a child's own needs take priority, while the Other domain includes the aspects of social and emotional functioning that require interpersonal connectedness. The bottom level of the prism includes the social, emotional and cognitive abilities and motivations required for children's social and emotional competence. These abilities include the relationship and social skills of listening, taking turns and seeking help, as well as friendship skills (Dehnam, 2006; Rose-Krasonor, 1997). Rose-Krasnor (1997) also describes social competence as transactional, occurring through interactions between people, context-dependent, and relative to specific goals. Social and emotional competence are also interdependent, as children's emotions help determine the flow and outcome of their social interactions. Children's behaviours are often antecedents for their emotions, and emotional expressiveness is an important source of information for others (Denham, Warren-Khot, Bassett, Wyatt & Perna, 2011). Social and emotional functioning tasks also differ across childhood, as the manner in which a child experiences, regulates and understands emotions is expected to be different for a child in preschool compared to one in middle childhood.

In preschool, children's social and emotional functioning includes developing a sense of self and self-awareness, self-regulatory behaviours, social and emotional understanding, as well

as the capacity for empathy and caring for others (Thompson & Goodman, 2011). Children's social and emotional functioning in preschool is also demonstrated through their initiatives in learning, which includes the qualities of curiosity and enthusiasm in the classroom (Thompson & Goodman, 2011). The development of social interaction skills with peers and familiar adults (e.g. parents, teachers and caregivers), cooperating with others, taking turns, listening, seeking help, and group participation are all social and emotional skills that continue to develop during the preschool years (Denham, 2006; Rose-Krasonor, 1997; Thompson & Goodman, 2011). Children's social and emotional functioning are also interdependent developmentally, as children's social competence promotes their ability to manage conflicts with their peers successfully, which in turn fosters positive peer interactions (Nix, Bierman, Heinrichs, Gest, Welsh, & Domitrovich, 2016).

The preschool period provides an important opportunity for fostering children's social and emotional functioning (Sheridan et al., 2010). Early childhood is associated with a number of developmental milestones related to children's social and emotional functioning. During this time, children's interactions with their peers' increases in both frequency and importance, and becomes more complex as children begin to make specific friendships (Denham, Wyatt, Bassett, Echeverria, & Knox, 2008). Children's prosocial behaviours begin to emerge, and the ability to regulate their emotional arousal while interacting with their peers is crucial (Denham et al., 2008). In addition, children begin to understand others' expressions and basic emotions during this time (Denham et al., 2008).

Social and emotional functioning and academic skills. While many parents tend to focus on children's academic skills for school entry, teachers place the most importance on children's social and emotional skills (Graue, 2006; Snow, 2006). In particular, kindergarten

teachers have rated the social and emotional skills of following directions, taking turns, sharing, being empathetic, sensitive, enthusiastic and curious, communicating their wants and needs verbally, not being disruptive, as well as completing independent group work, as essential characteristics associated with being ready to start school (Clancy, 2002; Lin, Lawrence & Gorrell, 2003; Rimm-Kaufman et al., 2000). In one study, less than a third of teachers indicated a child's ability to name colours and shapes, count to 20 or more, and know most of the alphabet as important skills for kindergarten entry (Lin et al., 2003). Researchers have also found positive social and emotional functioning (i.e. self-control and pro-social connectedness) to be associated with better school performance and greater well-being, while deficits in these areas were associated with a variety of personal, social and academic difficulties (Durlak, Weissberg, Dymnicki, Taylor & Schellinger, 2011; Guerra & Bradshaw, 2008; Nix et al., 2016). Early learning programs should not focus solely on cognitive and linguistic skills, as this risks undermining the key role of social and emotional functioning on children's overall cognitive growth (Thompson & Goodman, 2011).

It is not well understood how the domains of school readiness relate to and possibly lead to each other (Montes, Lotczewski, Halterman, & Hightower, 2011; Snow, 2006). Although it has been widely accepted that children's academic and social and emotional skills are important factors in school readiness, it is not well researched how the two interact in preschool (Fantuzzo et al., 2007; Snow, 2006). Researchers have suggested that components of early intervention programs that enhance children's social and emotional development are just as important as factors enhancing children's academic skills (Shonkoff & Phillips, 2000; Thompson & Goodman, 2011). It is also necessary to understand which skills are linked to children's

academic achievement to help inform the development of early education programs (Duncan et al., 2007).

Social and emotional functioning and children of low socioeconomic status. Socioeconomic status (SES) is strongly related to children's physical and mental health, and behavioural, social, and developmental outcomes (Hill & Witherspoon, 2011). All of the participants in the current study were children in Head Start preschool programs in Edmonton, Alberta. To qualify for the Head Start program, families had to meet low-income qualifications. Research suggests that kindergarten teachers continue to be concerned about children of low SES lacking the basic learning behaviours and the social and emotional functioning needed to transition successfully into the kindergarten environment (Rimm-Kaufman et al., 2000). Family income is considered to be a powerful and commonly used indicator for SES (Hill & Witherspoon, 2011). Children from low income families are more likely to be exposed to multiple stressors, such as poor living conditions, family instability, and community violence (Nix et al., 2016). Children from low-income families are also more likely to attend lower quality schools with peers who are also at-risk for social and emotional functioning problems (Nix et al., 2016). School readiness, particularly among children of low SES, may help prevent the long-lasting negative consequences of early academic failure, such as dropping out of high school, delinquency, and unemployment (Anderson et al., 2003). Children in Head Start programs in the United States and Canada have been the participants in studies researching the relationship between low SES and a number of variables, such as school readiness and social and emotional functioning. Head Start Programs in the United States are funded by the Department of Health and Human Services, and aim to promote school readiness for children in low-income families by offering educational, nutritional, health, social and other services to preschool aged

children and their families (Head Start, 2016). Aboriginal Head Start, ABC Head Start, and Head Start are all Canadian programs for children and families of low SES. In the present study, each of the participating Head Start programs offered families a preschool program taught by a certified teacher supported by early childhood educators, and family support workers or social workers. Weekly parent meetings were also provided. Researchers have found that Head Start programs have some positive effects on children's academic and social and emotional development (U. S. Department of Health and Human Services, 2010). However, other studies have not found significant associations between Head Start participation and ratings of children's school readiness and social and emotional development (Forry, Davis & Welti, 2012). It is important to note the majority of the existing literature on the effectiveness of Head Start programs focuses on U.S. populations of children.

Social and Emotional Functioning: Attention, Anxiety and Adaptability

Children's social and emotional functioning in preschool includes their capacity to regulate emotions and develop positive relationships with both peers and teachers (Fantuzzo et al., 2007; Sheridan et al., 2010). Children who have difficulties with social and emotional functioning, such as paying attention, behavioural self-control, getting along with others, and controlling negative emotions do less well in school (Denham, 2006; Duncan et al., 2007; Fantuzzo et al., 2007). Researchers have found the prevalence rates of social, emotional and behavioural problems of preschool children to be as high as 20% to 26% (Egger & Angold, 2006; Kato, Yanagawa, Fujiwara, & Morawska, 2015). For preschoolers enrolled in Head Start programs in the U.S. prevalence rates for externalizing problems have ranged from 16% to 30% for externalizing problems (e.g. aggression, hyperactivity) and 7% to 31% for internalizing problems (e.g. anxiety, depression; Qi & Kaiser, 2003). Although prevalence rates vary within

the literature, approximately 10% to 15% of preschool aged children experience social and emotional problems that negatively impact their functioning, development and school readiness (Cooper, Masi, & Vick, 2009). For the purpose of the current study, the social and emotional behaviours of attention, anxiety and adaptability, as rated by children's teachers, were the focus of research.

Attention problems. During preschool, children's ability to control their attention and suppress irrelevant information often improves. The ability to concentrate and attend to important tasks in the preschool classroom, while ignoring distractions and impulses, is a significant aspect of children's self-regulation and social and emotional functioning. Children who are able to manage their attention are more likely to engage in an appropriate manner with their teachers and peers (Coolahan, Fantuzzo, Mendez, & McDermott, 2000; Eisenberg, Valiente, & Eggum, 2010). Inattentive behaviours are associated with lower levels of motivation and persistence (Fantuzzo et al., 2005). Attention-related skills, such as task persistence and self-regulation, are related to children's school readiness and academic success as they increase the time children are engaged in and participating in school activities (Duncan et al., 2007). The ability to control and sustain attention while participating in classroom activities also predicts children's school success during preschool, the early elementary grades and in later adolescence (Duncan et al., 2007; Fantuzzo et al., 2007; Romano et al., 2010). Early childhood researchers have found children's math and attention skills to be significantly correlated in kindergarten, and children's attention skills significantly predict children's later math, reading and general achievement (Pagani, Fitzpatrick, Archambault, & Janosz, 2010). Children's academic skills in kindergarten have also significantly predicted their social and emotional behaviours, including better attention and less anxiety, up to grade three (Romano et al., 2010). Findings such as these

suggest there is a reciprocal relationship between children's attention and school achievement in early childhood (Romano et al., 2010), with higher attention problems predicting lower academic achievement in school (Polderman, Boomsma, Bartels, Verhulst & Huizinnk, 2010). Additional research on the relationship between children's attention levels and their academic skills at the end of preschool will influence early intervention programs for children at-risk for early attention problems and academic failure.

Anxiety. Anxiety is one of the most common and debilitating disorders affecting children's mental health and well-being (Côté et al., 2009; Pahl et al., 2012). Anxiety problems are defined by recurrent, excessive, intense and overwhelming fears and worries about everyday things (American Psychiatric Association, 2013). The onset of anxiety problems can begin as early as 24 months (Côté et al., 2009). Prevalence rates of anxiety problems in preschoolers are estimated to range from 10% to 15% with rates increasing over childhood (Egger & Angold, 2006). Anxiety problems are likely to persist if not treated, with many adults reporting their anxiety problems began in childhood (Donovan & Spence, 2000). Some studies have found the rate of anxiety disorders for children between the age of four and seven years old to be as high as 22% (Paulus, Backes, Sander, Weber & von Gontard, 2015). Children with anxiety also appear to have problems with inhibited or rigid behaviour, and difficulties with controlling their thoughts and emotions (Eisenberg et al., 2010). Preschool children who are behaviorally inhibited, have over-involved mothers or have mothers with anxiety disorders are at an increased risk for anxiety in middle childhood (Hudson & Dodd, 2012).

Anxiety may have a direct impact on children's early academic competence in preschool, as it interferes with children's attention, memory, concentration and persistence during academic tasks (Wood, 2007). High levels of anxiety can also cause young children to be withdrawn and

inhibited in the classroom, and decreases both the quality and quantity of their social interactions with their teachers and peers (Walker & Henderson, 2012). Pagani, Fitzpatrick, Archambault and Janosz (2010) found that preschoolers' anxiety was negatively related to later reading achievement in one study, but not in a second study. Other studies have found that children's levels of anxiety in preschool were not significantly associated with their academic achievement in grade three (Romano et al., 2010). Although anxiety problems are common in preschool children, they are frequently overlooked (Paulus et al., 2015); there have been a limited number of studies investigating the role of anxiety on children's academic success in preschool. The present study aims to add to the literature on the relationship between children's anxiety and academic skills in preschool, and inform early childhood interventions.

Adaptability. Adaptive behaviour refers to everyday coping with environmental demands and includes the skills of daily living that people need to function effectively (Grossman, 1983). Children with adaptive skills deficits may have difficulties interacting with their peers, taking care of their personal needs, learning new skills, and general functioning in their home, school and community (Harrison & Raineri, 2008). Adaptability refers to a child's ability to adapt to changes, explore new places and situations, recover from negative emotions, and exhibit positive emotions while interacting with others (Reynolds & Kamphaus, 2004). Within the classroom children's adaptability is measured through their ability to adjust to changes in routine and teacher assignment, shift from one task to another, and share toys or possessions with other children (Field & Greenberg, 1982; Reynolds & Kamphaus, 2004). Adaptability is considered to be a temperament variable that correlates with children's early school achievement (Reynolds & Kamphaus, 2004). Children with low adaptability often have difficulties with behavioural and academic adjustment at school entry, and may also have a

tendency towards negative emotionality and poor emotional self-control (Reynolds & Kamphaus, 2004). Adaptability also includes a child's capacity to cope with stressful situations and experiences in early childhood. Few studies have examined the association between positive strengths-based aspects of social functioning and children's academic skills. It is necessary to study positive attributes of social and emotional functioning, such as adaptability, to better understand the characteristics that maximize children's development and well-being in preschool.

Gender Differences

The increasing interest in children's social and emotional functioning and academic skills over the past decade has also brought up questions regarding gender differences. On average, boys receive poorer grades and have more difficulties related to school (e.g. grade retention, drop out and special education) compared to girls. Moreover, these differences have been found to be more pronounced for low-income children (Duncan et al., 2007). However, gender differences between children's social and emotional functioning in preschool, such as attention problems, anxiety and adaptability, are not consistent between studies.

Researchers studying preschooler's social and emotional functioning across 24 societies found small differences between gender (Rescorla, et al., 2011). In particular, boys had significantly higher attention problems compared to girls (effect size less than 1%), while gender differences for anxiety were non-significant (Rescorla, et al., 2011). Fantuzzo et al. (2007) found that boys demonstrate lower self-control and higher externalizing problems compared to girls in preschool. Other studies found boys had significantly higher scores compared to girls on measures of anxiety, social problems, attention problems, and internalizing behaviours (Beyer, Postert, Müller, & Furniss, 2012). While other researchers have suggested girls with higher

levels of attention in kindergarten perform better than boys on measures of second grade math achievement (Duncan et al., 2007). Therefore, current research suggests that early gender differences in social and emotional functioning has an impact on children's later academic achievement. For adaptability, studies have not researched gender differences in preschool. This study aims to add to the existing literature on children's social and emotional functioning and gender differences in preschool, focusing on the social and emotional behaviours of attention problems, anxiety and adaptability.

Purpose of Study and Research Questions

The primary aim of the present study is to examine the predictive relationship of children's social and emotional functioning (as assessed by teachers in the fall) on their academic skills in preschool, as assessed by language, literacy and executive functioning measures in the fall and spring. The current study also aims to investigate gender differences in the relationship between children's social and emotional functioning and academic school success in preschool. Children's social and emotional functioning was assessed by teachers in the fall and spring of the preschool year. Teachers assessed children's social and emotional functioning by completing the *Behavioural Assessment System for Children* Teacher Rating Scale – Preschool (BASC-2 TRS-Preschool; Reynolds & Kamphaus, 2004). Research assistants assessed children's academic skills in the fall and spring with measures of language, literacy and executive functioning.

In the literature reviewed, it is hypothesized that children's attention problems, anxiety and adaptability may be strong predictors of children's academic skills in preschool. The current study investigated the following general questions:

1. Do children's levels of anxiety, attention and adaptability independently predict their school success in preschool?

It is expected that there will be a significantly negative relationship between children's levels of social and emotional problems, as rated by their teachers, and their academic skills in the fall and spring. It is expected that children with higher levels of anxiety, attention or adaptability problems in the fall will also have lower scores on the academic measures in the fall and spring.

2. Are children's levels of anxiety, attention and adaptability stable across the school year, or is there a difference between children's levels of anxiety, attention and adaptability in the fall compared to the spring?

Previous studies suggest Head Start intervention programs decrease children's attention problems (Zhai, Brooks-Gunn & Waldfogel, 2011) and increase children's academic skills and overall social and emotional functioning (Nix et al., 2016). Therefore, it is expected that children's levels of attention, anxiety and adaptability problems will decrease across the preschool year due to the supports provided in their early learning program.

3. Do children's levels of attention problems, anxiety and adaptability in preschool differ between boys and girls?

Overall studies have been inconsistent in regards to finding gender differences in children's behavioural functioning in preschool. Studies have reported that externalizing problems are higher and internalizing problems are lower in boys, while other studies suggest that gender differences in children's externalizing and internalizing behaviours are not marked in preschool children (Campbell, 1995). As gender differences in behaviour become more apparent after children are two years of age (Blakemore, Berenbaum, & Liben, 2009; Leaper & Friedman, 2007) and differences in social interaction begin to emerge between two and five years of age (Leaper & Bigler, 2011), it is expected that gender differences in children's attention problems,

anxiety and adaptability will be apparent in preschool. It is hypothesized that girls will have lower levels of attention problems compared to boys, as boys are more likely to suffer from inattention and be diagnosed with attention related disorders in childhood, such as Attention-Deficit/Hyperactivity Disorder (ADHD; American Psychiatric Association, 2013). As anxiety disorders occur more frequently in females compared to males (American Psychiatric Association, 2013), it is expected that girls will have higher levels of anxiety in preschool compared to boys. It is also hypothesized that girls will have higher levels of adaptability in preschool, as girls generally demonstrate more adaptive behaviours such as self-control, connective and collaborative behaviour, and less impulsivity compared to boys (Else-Quest, Hyde, Godlsmith, & Van Hulle, 2006; Leaper & Bigler, 2011).

Method

This section provides a description of the children and preschool programs that participated in this study. The procedures, ethical practices and measures used to test the hypotheses presented in the previous chapter will also be discussed.

Participants

The present study aimed to measure children's academic skills and social and emotional development in preschool, as rated by teachers. Participants were recruited through eight locations of Early Head Start programs in Edmonton. During the first data collection in the fall 102 parents consented to have their children participate in the current study. Eight participants were lost due to attrition between the fall and spring data collection periods. Of the 94 participants that completed the child measures in the fall and spring, complete teacher data was collected for 80 of the participants. The 80 participants were composed of 41 girls and 39 boys. The participants were between the ages of 37 and 57 months old ($M = 48.60$, $SD = 4.16$) at the start of the school year (September 1, 2014). Of the 80 participants, 55 families (67.90%) returned parent demographic surveys. The 55 families identified their children's ethnicity as a combination of Canadian (38.2%), Arab/West Asian (20.0%), Black/African American (16.4%), Aboriginal (14.5%), White/Caucasian (12.7%), South Asian (12.7%), Eastern European (5.5%), Filipino (3.6%), South East Asian (1.8%), or Latin American (1.8%). Parents identified their citizenship status as Canadian citizens (76.4%), immigrant (18.2%), permanent resident (3.6%) or temporary resident (1.8%). The majority of parents had spent more than five years living in Canada (85.2%). The majority of parents responded that they spoke English in their homes (81.5%), while 20.8% responded that a language other than English is spoken to their child all the time at home. Parents were either married (50.0%), single (27.8%), separated (13.0%) or

common-law (9.3%). The majority of parents had a college or university degree (mothers 35.2%, fathers 28.6%); the remaining parents were divided between high school diploma or GED (mothers 22.2%; fathers 24.5%), partial college or university (mothers 13.0%, fathers 8.2%), a certificate in trade/technology (mothers 3.7%, fathers 16.3%), graduate or professional education (mothers 14.8%, fathers 6.1%), partial high school training (mothers 9.3%, fathers 12.2%) or eight years of schooling or less (mothers 1.9%, fathers 2.0%).

The age range of children's parents were 18 to 25 years old (mothers 13.0%, fathers 2.0%), 26 to 35 years old (mothers 51.9%, fathers 45.1%), 36 to 45 years old (mothers 35.2%, fathers 37.3%), or over the age of 45 years old (mothers 0.0%, fathers 15.7%).

The eight early learning programs that participated in the study included ABC Head Start (four sites), E4C (two sites) and Oliver Center (two sites) preschool programs. Children at seven of the eight sites received the preschool program four half days per week. At one of the sites children received a full day preschool and childcare program five days per week. Each program offered families a preschool program taught by a certified teacher supported by early childhood educators, family support workers or social workers, and weekly parent meetings. All of the programs were offered for low income families with children aged three and a half to five years old.

Procedure

The current study was part of the *School Readiness Project: Understanding Early Learning*, a larger study conducted at the University of Alberta in partnership with early learning preschool programs (ABC Head Start, E4C and Oliver Center) in Edmonton. A detailed proposal of the larger study's purpose, methodology, consent process, and potential harms was prepared for and accepted by the University of Alberta's Research Ethics Board. The proposal

included an agreement that additional research questions and theses could be tied to this project work. No new measures were included and no new data were collected, therefore the present study was covered under the larger project's ethics approval. Trained research assistants collected data with participants during two school visits during each data collection period (in the fall and spring). Prior to data collection, research assistants received instructions and training for implementing the study's procedures and received training for all of the child measures. Each school visit session lasted from 30 to 50 minutes with each child. Teachers agreed to complete a package of questionnaires that included measures of children's social-emotional functioning in the fall and spring.

Measures

Demographic questionnaire. Mothers and fathers completed a questionnaire about family and child information. The questionnaire included the child's name, age, date of birth, gender, preschool program, and parent's ethnicity, age, citizenship, years lived in Canada, level of education, relationship status, and employment. Questions asking parents about which languages were spoken in their home and how often a language other than English was spoken in their home were also included.

Academic Skills: Receptive Vocabulary. Children's receptive vocabulary skills were assessed using the *Peabody Picture Vocabulary Test*, 4th Ed. Form B (PPVT-4; Dunn & Dunn, 2007). The PPVT-4 is a standardized measure designed to provide a comprehensive evaluation of receptive vocabulary attainment for children and adults. The PPVT-4 is a useful tool for assessing preschool children, as it can also be used to measure a child's response to instruction or vocabulary growth in general. A preschooler's vocabulary acquisition is an important indicator of their linguistic and cognitive development and readiness for formal schooling. The PPVT-4

contains training items followed by 228 test items, each consisting of four full-colour pictures arranged on a page. During the assessment children look at the four pictures and point to the picture that best represents the meaning of the stimulus word presented. The 228 items are grouped into 19 sets and arranged in order of increasing difficulty, so the examiner can easily administer only the set appropriate for the child's vocabulary level. The PPVT-4 can typically be administered in 10 to 15 minutes. The test authors reported reliability coefficients for Form B to be 0.95 (for children aged 2:6-3:5 and 4:0-4:5) and 0.96 (for children aged 3:6-3:11 and 4:6-4:11).

Academic and Literacy Skills. Children's academic and literacy skills were assessed using the *Woodcock-Johnson Tests of Achievement*, 3rd Ed. (WJ-3; Woodcock, McGrew, & Mather, 2001). The WJ-3 is an individually administered, standardized measure that is used in educational, clinical and research settings. The WJ-3 is a tool used for measuring children's general achievement ability, as well as measures of specific achievement skills. The WJ-3 contains 22 tests measuring five curricular areas: reading, mathematics, written language, oral language and academic knowledge. Specific combinations of the 22 tests form clusters for interpretive purposes. For the purposes of the current study, six tests were chosen focusing on children's literacy skills, and administered to all participants: Letter-Word Identification, Spelling, Passage Comprehension, Applied Problems, Oral Comprehension and Word Attack. The Letter-Word Identification subtest measures children's letter and word identification skills. During the test the child identifies letters and words as they appear in the test easel. The Spelling subtest is a measure of children's ability to correctly write orally presented letters and words. Preschoolers write specific upper and lower case letters of the alphabet and specific words. The Passage Comprehension subtest includes items that involve symbolic learning, which is the

ability to match a pictographic representation of a word with an actual picture of the object. Applied Problems measures a child's ability to analyze and solve practical math problems. Children must listen to the problem and recognize the procedure to be followed and then perform simple calculations. The Oral Comprehension test assesses a child's ability to comprehend short spoken passages and provide missing words based on syntactic and semantic clues. During the Oral Comprehension test children listen to a passage with a word missing, and respond orally with the correct word that completes the passage. The final subtest, Word Attack, measures one's ability to apply phonic and structural analysis skills to the pronunciation of printed non-words. Children produce the sounds for single letters, and later read aloud letter combinations that are phonically consistent in English orthography but are non-words. Children's raw scores were converted into standardized *W*-scores in the fall and spring. Two standardized cluster scores were also derived from the tests administered: Brief Reading and Brief Achievement. The authors of the measure reported the reliability split-half coefficients of the tests and cluster scores for children aged three to five years old to be: 0.97 - 0.99 for Letter-Word Identification, 0.77 - 0.90 for Spelling, 0.94 - 0.96 for Passage Comprehension, 0.92 - 0.94 for Applied Problems, 0.93 - 0.94 for Word Attack, 0.85 - 0.90 for Oral Comprehension, 0.96 - 0.98 for Brief Reading, 0.94 - 0.98 for Basic Reading Skills, and 0.92 - 0.97 for Brief Achievement.

Academic Skills: Estimate of Executive Functioning. An estimate of children's executive functioning abilities was measured using the *Head Toes Knees Shoulders* (HTKS; Ponitz et al., 2008) and *Pencil Tap* (Diamond & Taylor, 1996) measures. Research assistants were trained on both of the tasks prior to data collection. During the HTKS task children were asked to play a game in which they were asked to do the opposite of what the experimenter said. The experimenter instructed children to touch their head (or their toes), and children were

supposed to do the opposite. The HTKS task is a measure of inhibitory control (as the child must inhibit the dominant response of imitating the examiner), working memory (the child must remember the rules of the task), and attention focusing. Previous research suggests the HTKS is a reliable and valid measure of developing behavioral regulation in the early childhood period (Ponitz et al., 2008; Pointz, McClelland, Matthews, & Morrison, 2009).

Pencil Tap (also referred to as Peg Tap; Diamond & Taylor, 1996; Diamond, Prevor, Callender, & Druin, 1997) is one of the seven tasks included in the *Preschool Self-Regulation Assessment* (Smith-Donald, Raver, Hayes, & Richardson, 2007). During the *Pencil Tap* task children were asked to tap a peg twice when the experimenter tapped once and vice versa. After children demonstrated an understanding of the task during a warm-up phase (three trials), they completed 16 scored trials. Research assistants tallied the number of incorrect taps (including errors and omissions) that children made. *Pencil Tap* requires children to inhibit a natural tendency to mimic the experimenter while remembering the rule for the correct response, and has been widely used in other research (Bassett, Denham, Wyatt & Warrant-Khot, 2012; Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009; Diamond & Taylor, 1996). *Pencil Tap* measures the executive functioning skills of inhibitory control, working memory, and attention (Brock et al., 2009). Researchers have found a difference between cool executive functioning tasks, which involve problem solving and cognitive flexibility, and hot executive functioning tasks, which require regulation of potentially intense emotions during problem solving (Bassett et al., 2012; Brock et al., 2009). *Pencil Tap* is a cool executive functioning task as it does not include an emotional component (Brock et al., 2009). Studies have found that children's cool executive functioning predicts children's later school achievement, and that cool executive functioning deficits in kindergarten have been found to be more predictive of high school dropout than

observed levels of aggression or opposition (Brock et al., 2009). The authors of the *Preschool Self-Regulation Assessment* reported the Intraclass Correlation Coefficient (ICC) for consistency between multiple observers of the *Pencil Tap* task to be 1.00.

Children's Social and Emotional Functioning. Teachers assessed children's social and emotional functioning by completing the BASC-2 TRS-Preschool (Reynolds & Kamphaus, 2004). The BASC-2 is a standardized measure used to help understand children's emotions and behaviours, and is designed to assist professionals in the identification and diagnosis of emotional and behavioural disorders. The BASC-2 provides a comprehensive set of rating scales to measure children's adaptive and problem behaviours, and is developmentally sensitive. The TRS-Preschool rating scale consists of 100 items describing children's positive and negative behaviours (e.g. offers to help other children; is easily upset). For each item teachers reported how often each child displayed each of the behaviours using the responses never, sometimes, often or almost always. Research assistants scored the BASC-2 forms using the BASC-2 ASSIST computer software. Scoring of the BASC-2 classifies behaviours into four composite scales: Externalizing Problems, Internalizing Problems, Behavioural Symptoms Index, and Adaptive Skills. Behaviours are also classified into eleven subscales: Hyperactivity, Aggression, Anxiety, Depression, Somatization, Atypicality, Withdrawal, Attention Problems, Adaptability, Social Skills, and Functional Communication. Children may be classified in the Average (T-Score below 60), At-Risk (T-score = 60 - 69), or Clinically Significant (T-Score greater than 70) classification range based on standardized T-scores (M=50, SD=10). For the purpose of the current study, the subscales of Anxiety, Attention Problems, and Adaptability were analyzed. The authors of the measure reported the reliability alpha coefficients of subscales for children

aged two to three years old and four to five years old to be respectively: 0.75/0.81 (Anxiety), 0.92/0.93 (Attention Problems), and 0.79/0.83 (Adaptability).

Data Analyses

Initial descriptive analyses were conducted to explore the demographic information and the distribution of the data and to determine the utility of the data for subsequent analyses. Correlations between the variables were also examined to observe the nature of the relationships between all the variables of interest. Following these initial analyses, specific analyses were conducted to address each of the three research questions.

Separate linear regression analyses were conducted to investigate the first research questions, namely, examining the predictive value of children's attention problems, anxiety and adaptability at the beginning of the school year on their academic skills. To examine the differences in children's levels of attention problems, anxiety and adaptability in the fall and spring, paired samples *t*-tests were conducted. Finally, independent samples *t*-tests were completed to examine whether there was a significant difference between boys and girls in relation to their levels of attention problems, anxiety and adaptability in the fall and the spring.

All analyses were conducted using IBM SPSS Statistics program (version 24), with a significance level of $\alpha = .05$. Prior to each of the planned analyses, a preliminary investigation was completed and adjustments necessary for the subsequent analyses were addressed. All results of the analyses are reported in the following section.

Results

Statistical analyses were conducted to address the three study research questions. In this chapter, the results of this study are described in detail. Firstly, the descriptive statistics are presented, followed by preliminary analyses, and the statistical assumptions related to each analysis. Finally, the detailed results for each of the three research questions are presented.

Descriptive Statistics

Outcome variables. Means, standard deviations and ranges for children's BASC-*2* subscales and academic skills, as measured by the PPVT-4, HTKS, *Pencil Tap*, WJ-3 Brief Achievement and WJ-3 Brief Reading measures, in the fall and spring are all reported in Table 1. The BASC-2 teacher subscale scores are presented as T-scores, with a mean of 50 and a standard deviation of 10. Children's PPVT-4, WJ-3 Brief Achievement and WJ-3 Brief Reading scores are presented as standard scores, all with a mean of 100 and a standard deviation of 15. The HTKS and *Pencil Tap* measures are unstandardized and are presented as raw scores. The possible range of scores for HTKS is 0 to 40, while the possible range of scores for *Pencil Tap* is 0 to 16.

Variability was found in children's BASC-2 scores and children's academic measure scores. Subscale scores for the BASC-2 at or above 60 on the Attention Problems and Anxiety subscales, and below 40 on the Adaptive behaviour subscale, fall into the at-risk or clinical range, and are suggestive of problems in these areas. Table 2 reports the percentage of children in the sample who were rated by their teachers as being in the at-risk or clinical classification range for attention, anxiety, and adaptability behavior problems in the fall and spring. Based on these reports, some of the children in the sample were experiencing at-risk or clinical levels of attention problems, anxiety or adaptive behaviour problems.

Table 1. Descriptive Statistics for Measures

Variable	Range	*M*	*SD*
Fall BASC-2 Teacher-rated social and emotional functioning			
Attention Problems T-Score	32-75	51.49	8.74
Anxiety T-Score	39-83	48.84	9.65
Adaptability T-Score	30-68	47.29	8.73
Fall Measures of Children's Academic skills			
PPVT Standard Score	54-138	93.85	17.95
WJ Brief Achievement Standard Score	54-123	96.34	13.69
WJ Brief Reading Standard Score	64-124	98.71	11.70
HTKS Total Score /40	0-34	9.63	9.91
Pencil Tap Total Score /16	0-16	7.53	4.86
Spring BASC-2 Teacher-rated social and emotional functioning			
Attention Problems T-Score	39-80	49.49	8.38
Anxiety T-Score	34-73	49.30	9.32
Adaptability T-Score	32-69	49.21	9.28
Spring Measures of Children's Academic Skills			
PPVT Standard Score	62- 132	97.65	15.46
WJ Brief Achievement Standard Score	74-126	100.44	10.54
WJ Brief Reading Standard Score	77-120	100.65	10.20
HTKS Total Score /40	0-40	15.11	12.71
Pencil Tap Total Score /16	0-16	10.61	5.10

Note. $N = 80$; BASC = Behaviour Assessment of Children; PPVT = Peabody Picture Vocabulary Test; WJ = Woodcock Johnson; HTKS = Head, Toes, Knees and Shoulders.

Table 2. Percent of Children Experiencing Social and Emotional Functioning Difficulties

	Attention Problems	Anxiety	Adaptability
Fall			
Average	87.5	88.8	68.8
Experiencing Difficulties	12.5	11.3	31.3
Spring			
Average	88.8	85.0	70.0
Experiencing Difficulties	11.3	15.0	30.0

Note. $N = 80$. Average = percent of children with a BASC TRS T-score in the Average classification range (T-score < 60 for Attention Problems and Anxiety subscales, and > 40 for the Adaptability subscale). Experiencing difficulties = percent of children with a BASC TRS T-score in the At-Risk or Clinically Significant classification range (T-score ≥ 60 for Attention Problems and Anxiety, and T-score ≤ 40 for Adaptability).

For the WJ-3 measure, Brief Achievement and Brief Reading composite standard scores ranging from 90 to 110 are considered in the average range, while standard scores at or above 111 are considered above average, and scores at or below 89 are classified as below average. For the PPVT-4 measure children with standard scores between 85 and 115 are classified as average, standard scores above 115 are categorized as above average, and standard scores below

85 are considered below average. Table 3 reports the frequencies of children who scored in the above average, average and below average classification ranges on the PPVT-4 and WJ-3 measures in the fall and the spring. Based on these measures, there was variability between children, with some children performing in the below average range on the different academic measures.

Table 3. Frequencies of Children Scoring in the Average range on Academic Measures

		Academic Measures	
	PPVT-4	WJ-3 Brief Achievement	WJ-3 Brief Reading
Fall			
Below Average	36	22	14
Average	35	49	51
Above Average	9	9	14
Spring			
Below Average	24	11	11
Average	46	55	55
Above Average	10	14	14

Note. *N*=80. PPVT-4 = Peabody Picture Vocabulary Test; WJ-3 = Woodcock Johnson. Below average = standard score < 85 for PPVT-4, and < 90 for WJ-3; Average = standard score in the range of 85-115 for PPVT-4, and 90-110 for WJ-3; Above average = standard score > 115 for PPVT-4, and > 110 for WJ-3.

For HTKS, other researchers have reported that their participants scored an average of 17.38 on the HTKS measure in the fall of pre-kindergarten (McClelland et al., 2014). However, the sample was older with a mean age of 55.67 months, compared to the present study's mean participant age of 48.74 months in the fall. The authors of the HTKS also reported results on a sample of preschoolers, and found the percentage of children scoring at the floor or ceiling of the measure to range from 65% at the floor and zero percent at the ceiling for children aged 36 months, to two percent at the floor and 20% at the ceiling for children aged 60 months (Ponitz et al., 2008). For the present study, in the fall 23% of children scored at the floor and zero percent scored at the ceiling, and children's ages ranged from 38 to 58 months at the time of testing. In the spring, 14% of the children scored at the floor and one percent scored at the ceiling, and the

range of ages at the time of testing was 44 to 54 months of age. Therefore, percentages of participants scoring at the floor or ceiling levels were comparable across studies.

For *Pencil Tap,* the authors of the measure reported their participants (preschoolers in a Head Start program aged 41-70 months old) scored an average of 58.8% (*SD* = 0.37) correct on the measure (Smith-Donald et al., 2007). Using percent correct, the participants of the current study scored an average of 47.03% correct in the fall (*SD*=30.39) and 66.33% correct in the spring (*SD*=31.86). Other researchers have reported a mean of 46.88% (*SD*=33.19) for children's scores on the *Pencil Tap* measure, in a study that included a three-year old (*M*=35.09 months) and four-year old group (*M*=45.75 months), and children were tested between November and March (Denham, et al., 2011). Another study that used *Pencil Tap* included a group of three-year old (*M*=41.5 months, *SD*=3.9) and four-year old (*M*=53.6 months, *SD*=3.6) participants, and assessed children in the fall and spring (Bassett et al., 2012). The researchers reported the percentage of students who scored 100% on the *Pencil Tap* measure to be 7.3% in the fall and 16.4% in the spring (Bassett et al., 2012). The present study found that 7.5% of participants scored 100% on *Pencil Tap* in the fall, and 16.3% scored 100% in the spring. Therefore, children's scores on the *Pencil Tap* measure as reported by other researchers were comparable to children's scores in the present study.

Correlations. Table 4 reports the correlations that were run between children's attention problems, anxiety, adaptability and academic skills in the fall and spring. These correlations revealed weak to moderate associations between the variables. While these correlations were weak, children's attention problems were negatively correlated with their scores on the academic measures in the fall and spring, while children's levels of adaptability were positively correlated with their scores on the academic measures in the fall and spring. Interestingly, children's

anxiety was positively and negatively correlated with different academic measures in the fall, and negatively correlated with all of the academic variables in the spring.

Table 4. Pearson Correlations for Children's Social and Emotional Functioning and Academic Skills

	Fall			Spring		
	Attention Problems	Anxiety	Adaptability	Attention Problems	Anxiety	Adaptability
Academics – Fall						
1. PPVT	-.18	-.01	.12	-.05	-.08	.22*
2. WJ Achiev.	-.34**	.05	.34**	-.24*	.03	.31**
3. WJ Reading	-.22*	.05	.12	-.22	.14	.10
4. HTKS	-.29**	.09	.22*	-.29*	.11	.15
5. Pencil Tap	-.33**	.04	.21	-.20	-.19	.11
Academics - Spring						
6. PPVT	-.27*	.06	.16	-.19	-.02	.30**
7. WJ Achiev.	-.22*	.02	.26*	-.19	-.06	.29*
8. WJ Reading	-.03	.02	.08	-.13	-.08	.08
9. HTKS	-.15	.01	.05	-.15	-.00	.17
10. Pencil Tap	-.24*	-.03	.24*	-.13	-.11	.32**

Note. N = 80. PPVT = Peabody Picture Vocabulary Test; WJ Achiev. = Woodcock Johnson Brief Achievement composite scale; WJ Reading = Woodcock Johnson Brief Reading composite scale; HTKS = Head, Toes, Knees and Shoulders. $^{*} = p < .05$, $^{**} = p < .01$

Question 1: Do children's levels of attention problems, anxiety and adaptability independently predict their school success in preschool?

To explore this research question, separate simultaneous linear regression analyses were conducted for children's academic skills measured by the PPVT-4, WJ-3, HTKS and *Pencil Tap* in the fall and spring. Children's attention problems, anxiety and adaptability on the BASC-2 in the fall were included separately in each model to explore how they predict children's academic skills outcome variables in the fall and spring of their preschool year.

Preliminary analysis. Prior to running linear regression analyses, correlations between predictor variables and outcome variables were examined. Additional predictor variables, such as mother's education level and children's ethnicity, were unable to be included in the regression models as this data was returned by only 67.90% of the parents of the participants in the sample.

The assumptions of general linear regression, as identified by Glass and Hopkins (1996) and Tabachnick and Fidell (2013) were tested for all of the models. Linearity was assessed using scatter plots, while normality and variance of residuals were assessed using histograms and plots of residuals. Mahalanobis distance was used to detect outliers (Tabachnick & Fidell, 2013). It was revealed that there were issues with several outliers, and these cases were removed from the regression analyses. In particular, three extreme outliers were removed from each of the attention problems, anxiety and adaptability regression analyses. The sample sizes for each regression analysis were deemed to be large enough, using the equation $N \geq 50 + 8m$, where m is the number of independent variables for testing regression (Tabachnick & Fidell, 2013). The Durban-Watson test of independence of errors was examined and all values were within acceptable parameters (Field, 2013).

Attention problems regression analyses. For children's attention problems in the fall, the linear regression model explained a small but significant portion of the variance in their scores on the academic measures HTKS (7%), *Pencil Tap* (7%) and WJ-3 Brief Achievement (8%) in the fall with $R^2adj = 0.07$, $F\ (1, 75) = 7.09$, $p < .01$, $R^2adj = 0.07$, $F\ (1, 75) = 6.93$, $p < .05$ and $R^2adj = 0.08$, $F\ (1, 75) = 7.70$, $p < .01$ respectively. Children's attention problems in the fall did not significantly explain the variance in their scores on the PPVT-4 or WJ-3 Brief Reading measures with $R^2adj = 0.02$, $F\ (1, 75) = 2.83$, ns and $R^2adj = 0.03$, $F\ (1, 75) = 2.20$, ns.

Children's attention problems in the fall explained a small (8%) but significant portion of the variance in their scores on the PPVT-4 academic measure in the spring with $R^2adj = 0.08$, $F\ (1, 75) = 6.45$, $p < .05$. Children's attention problems also explained a small but significant portion of the variance in their scores on the *Pencil Tap* (9%) and WJ-3 Brief Achievement (4%) measures in the spring, with $R^2adj = 0.09$, $F\ (1, 75) = 8.03$, $p < .01$ and $R^2adj = 0.04$, $F\ (1, 75) =$

3.89, $p < .05$ respectively. Children's attention problems in the fall did not significantly explain the variance in their scores on the HTKS or WJ-3 Brief Reading measures in the spring with $R^2adj = 0.02$, $F(1, 75) = 1.50$, ns and $R^2adj = -0.01$, $F(1, 75) = 0.01$, ns.

In summary, children's attention problems in the fall significantly predicted children's scores on the HTKS, *Pencil Tap*, and WJ-3 Brief Achievement measures in the fall. Specifically, children's scores on the HTKS, *Pencil Tap*, and WJ-3 Brief Achievement measurements decreased as their attention problems increased. Children's attention problems in the fall also significantly predicted their scores on the PPVT, *Pencil Tap* and WJ-3 Brief Achievement measures in the spring. Children's scores on the PPVT, *Pencil Tap* and WJ-3 Brief Achievement measures decreased as their attention problems increased. Levels of attention problems in the fall were not predictive of children's scores on the PPVT-4 or WJ-3 Brief Reading measures in the fall, or the HTKS and WJ-3 Brief Reading measures in the spring. See Table 5 for full regression results.

Table 5. Summary of Attention Problems Linear Regression Analyses Predicting Children's Academic Skills (as Assessed by Teacher's BASC-2 reports in the Fall)

Dependent Variable	*B*	*SE B*	*β*	*t*
Predictor Variable: Attention Problems				
Academic Variables - Fall				
PPVT	-0.41	0.25	-0.19	-1.68
HTKS	-0.36	0.14	-0.29	-2.66**
Pencil Tap	-0.18	0.07	-0.29	-2.63*
WJ Brief Achievement	-0.52	0.19	-0.31	-2.78**
WJ Brief Reading	-0.25	0.17	-0.17	-1.49
Predictor Variable: Attention Problems				
Academic Variables - Spring				
PPVT	-0.53	0.21	-0.28	-2.54*
HTKS	-0.22	0.18	-0.14	-1.23
Pencil Tap	-0.20	0.07	-0.31	-2.83**
WJ Brief Achievement	-0.29	0.15	-0.22	-1.97*
WJ Brief Reading	-0.01	0.15	-0.01	-0.08

Note. $N = 77$. PPVT = Peabody Picture Vocabulary Test; HTKS = Head, Toes, Knees and Shoulders. WJ Brief Achievement = Woodcock Johnson Brief Achievement composite scale; WJ Brief Reading = Woodcock Johnson Brief Reading composite scale. $^{*}p < .05$, $^{**}p < .01$

Anxiety regression analyses. The linear regression model for children's anxiety in the fall did not significantly explain the variance in their scores on any of the academic measures in the fall or spring. Further, children's anxiety was not predictive of their scores on the PPVT, HTKS, *Pencil Tap*, WJ-3 Brief Achievement or WJ-3 Brief Reading in the fall, with R^2adj = -0.00, F (1, 75) = 0.90, *ns,* R^2adj = 0.02, F (1, 75) = 1.59, *ns*, R^2adj = -0.00, F (1, 75) = 0.86, *ns*, R^2adj = 0.03, F (1, 77) = 2.13, *ns*, and R^2adj = -0.01, F (1, 75) = 0.38, *ns* respectively. Children's anxiety was also not predictive of their scores on the PPVT, HTKS, *Pencil Tap*, WJ-3 Brief Achievement or WJ-3 Brief Reading in the spring, with R^2adj = 0.01, F (1, 75) = 1.76, *ns*, R^2adj = 0.00, F (1, 75) = 1.08, *ns*, R^2adj = 0.00, F (1, 75) = 1.26, *ns*, R^2adj = 0.02, F (1, 75) = 2.23, *ns*, and R^2adj = -0.01, F (1, 75) = 0.21, *ns*. In summary, children's anxiety in the fall did not significantly predict their scores on any of the academic measures in the fall or the spring. See Table 6 for full regression results.

Table 6. Summary of Anxiety Linear Regression Analyses Predicting Children's Academic Skills (as Assessed by Teacher's BASC-2 reports in the Fall)

Dependent Variable	*B*	*SE B*	*β*	*t*
Academic Variables - Fall				
PPVT	0.25	0.27	0.11	0.95
HTKS	0.18	0.15	0.14	1.26
Pencil Tap	0.07	0.07	0.11	0.93
WJ Brief Achievement	0.38	0.20	0.22	1.91
WJ Brief Reading	0.21	0.18	0.14	1.21
Academic Variables - Spring				
PPVT	0.30	0.23	0.15	1.33
HTKS	0.20	0.19	0.12	1.04
Pencil Tap	0.08	0.07	0.13	1.12
WJ Brief Achievement	0.23	0.15	0.17	1.50
WJ Brief Reading	0.07	0.16	0.05	0.46

Note. N = 77. PPVT = Peabody Picture Vocabulary Test; HTKS = Head, Toes, Knees and Shoulders. WJ Brief Achievement = Woodcock Johnson Brief Achievement composite scale; WJ Brief Reading = Woodcock Johnson Brief Reading composite scale; all p-values non-significant.

Adaptability regression analyses. For children's adaptability in the fall, the linear regression model explained a small but significant portion of the variance in their scores on the PPVT-4 (4%), HTKS (9%), *Pencil Tap* (5%) and WJ-3 Brief Achievement (12%) measures in the fall, with $R^2adj = 0.04$, $F\ (1, 75) = 4.19$, $p < .05$, $R^2adj = 0.09$, $F\ (1, 75) = 8.06$, $p < .01$, $R^2adj = 0.05$, $F\ (1, 75) = 5.36$, $p < .05$, $R^2adj = 0.12$, $F\ (1, 75) = 11.72$, $p < .01$. Levels of adaptability were not predictive of their scores on the WJ-3 Brief Reading in the fall, with $R^2adj = 0.03$, $F\ (1, 75) = 3.47$, *ns*.

The regression linear model explained a small but significant portion of the variance in children's scores on the PPVT-4 (5%), *Pencil Tap* (5%), and WJ-3 Brief Achievement (6%) measures in the spring, with $R^2adj = 0.05$, $F\ (1, 75) = 5.38$, $p < .05$, $R^2adj = 0.05$, $F\ (1, 75) = 5.07$, $p < .05$, and $R^2adj = 0.06$, $F\ (1, 75) = 6.14$, $p < .05$ respectively. Children's adaptability in the fall did not significantly explain the variance in their scores on the HTKS or Brief Reading measures in the spring with $R^2adj = 0.01$, $F\ (1, 75) = 1.69$, *ns* and $R^2adj = -0.01$, $F\ (1, 75) = 0.47$, *ns* respectively.

In summary, children's levels of adaptability significantly predicted their scores on the PPVT, HTKS, *Pencil Tap* and WJ-3 Brief Achievement measures in the fall. Specifically, children's academic scores on the PPVT, HTKS, *Pencil Tap* and WJ-3 Brief Achievement measures increased as their adaptability increased. Children's levels of adaptability also significantly predicted their scores on the PPVT, *Pencil Tap*, and WJ-3 Brief Achievement measures in the spring. Higher levels of adaptability were also associated with higher scores on the PPVT, *Pencil Tap*, and WJ-3 Brief Achievement academic measures. Adaptability was not significantly predictive of children's scores on the HTKS in the spring and the WJ-3 Brief Reading measures in the fall or the spring. See Table 7 for full regression results.

Table 7. Summary of Adaptability Linear Regression Analyses Predicting Children's Academic Skills in the Spring (as Assessed by Teacher's BASC-2 reports in the Fall)

Dependent Variable	*B*	*SE B*	*β*	*t*
Academic Variables - Fall				
PPVT	0.50	0.24	0.23	2.05*
HTKS	0.38	0.14	0.31	2.84**
Pencil Tap	0.16	0.07	0.26	2.32*
WJ Brief Achievement	0.63	0.18	0.37	3.42**
WJ Brief Reading	0.30	0.16	0.21	1.86
Academic Variables - Spring				
PPVT	0.48	0.21	0.26	2.32*
HTKS	0.23	0.18	0.15	1.30
Pencil Tap	0.16	0.07	0.25	2.25*
WJ Brief Achievement	0.36	0.15	0.28	2.48*
WJ Brief Reading	0.10	0.15	0.08	0.69

Note. $N = 77$. PPVT = Peabody Picture Vocabulary Test; HTKS = Head, Toes, Knees and Shoulders. WJ Brief Achievement = Woodcock Johnson Brief Achievement composite scale; WJ Brief Reading = Woodcock Johnson Brief Reading composite scale; $^{*}p < .05$, $^{**}p < .01$

Question 2: Are children's levels of anxiety, attention and adaptability stable across the school year, or is there a difference between the fall and spring?

Paired samples *t*-tests were conducted to examine whether there was a significant difference between children's levels of attention problems, anxiety and adaptability at the entry of preschool (fall) and end of the school year (spring). The assumptions of paired samples *t*-tests,

as identified by Glass and Hopkins (1996) were tested for all of the models. Outliers for the difference between children's attention problems, anxiety and adaptability in the fall and spring were detected using box plots, histograms and normal probability plots, and by converting variables to standard (*z*) scores. As no standard values exceeded ± 3.29, no outliers were found in the data (Tabachnick & Fidell, 2013). Shapiro-Wilk tests were conducted to test the assumption of normality. The *p*-values for the Shapiro-Wilk tests for the difference in children's adaptability were found to be non-significant. However, the *p*-value for the difference in children's attention problems and anxiety were found to be significant. Analyses were continued as the paired samples *t*-test is robust with respect to failure to meet the normality assumptions (Glass & Hopkins, 1996).

Separate paired sample *t*-tests were conducted to compare teacher-rated levels of children's attention problems, anxiety and adaptability in the fall and spring. Table 8 reports the results of the paired sample *t*-tests. There was a significant difference in children's T-scores on the BASC-2 for attention problems in the fall (M=51.49, SD=8.74) and spring (M=49.49, SD=8.38); $t(79) = 2.55$, $p < .05$, as well as adaptability in the fall (M=47.29, SD=8.73) and the spring (M=49.21, SD=9.28); $t(79) = -2.29$, $p < .05$. There was not a significant difference between children's T-scores on the BASC-2 for anxiety in the fall (M=48.84, SD=9.65) and the spring (M=49.30, SD=9.32); $t(79) = -0.43$, *ns*.

In summary, on average children's T-scores on the BASC-*2* for attention problems significantly decreased between the fall and the spring, while children's adaptability significantly increased. This suggests that, on average, children's levels of attention problems decreased, while their levels of adaptability increased over the preschool school year. Children's T-scores on the BASC-2, on average, increased over the preschool year for anxiety. However, the

increase in anxiety was not found to be statistically significant and should be interpreted with caution.

Table 8. Paired Sample T-Test Results for the Spring and Fall Rounds of Data Collection.

	Fall		Spring			
Variable	*M*	*SD*	*M*	*SD*	*r*	*t*
Attention Problems	51.49	8.74	49.49	8.38	0.71**	2.55*
Anxiety	48.84	9.65	49.30	9.32	0.56	-0.43
Adaptability	47.29	8.73	49.21	9.28	0.69	-2.29*

*Note. N=80; *p <.05, **p <.01*

Question 3: Do children's levels of attention problems, anxiety and adaptability in preschool differ between boys and girls?

Independent samples *t*-tests were conducted to examine whether there was a significant difference between boys and girls in relation to their levels of attention problems, anxiety and adaptability in the fall and the spring (see Table 2). The assumptions of independent samples *t*-tests, as identified by Glass and Hopkins (1996) were tested for all of the models. Outliers were detected using box plots, histograms and normal probability plots, and by converting variables to standard (*z*) scores (Tabachnick & Fidell, 2013). Two outliers (one each from the fall and spring data set for girls) were found to be extreme values, and were removed from the analyses. The *p*-values for the Shapiro-Wilk tests for all of the anxiety dependent variables for males and females, as well as the adaptability variable in the fall for males, was found to be significant. All other *p*-values for the Shapiro-Wilk tests were non-significant. The Levene's test *p*-value for each of the analyses were non-significant and equal variances were assumed, with the exception of comparing boys' and girls' levels of anxiety in the spring. Despite these issues with normality, the independent-samples t-test is considered to be reasonably robust, so long as (a) sample sizes are equal or nearly so, (b) sample sizes are fairly large ($N \geq 25$ or 30), and (c) tests

are two-tailed (Sawilowsky & Clifford, 1992). As the current study met these requirements, the independent samples *t*-test analyses were continued.

For attention problems, boys' mean attention problems score was on average 1.90 points higher than girls in the fall and 3.35 points higher than girls in the spring. No significant difference in mean attention problems scores between boys and girls in the fall or spring was found, with $t(78) = 0.97$, *ns* and $t(78) = 1.81$, *ns*, respectively.

For children's levels of anxiety in the fall, boys' mean scores were 0.11 points higher than girls, and there was not a statistically significant difference between boys and girls, with $t(77) = 0.06$, *ns*. In the spring this relationship changed, and boys' mean anxiety scores were on average 1.40 points lower than girls' mean anxiety scores. There was not a statistically significant difference in mean anxiety score between boys and girls, $t(70.99) = -0.71$, *ns*. In the fall boys' mean adaptability scores were 2.16 points lower than girl's mean adaptability scores. However, in the spring boy's adaptability scores were 0.39 points higher than girls. The analyses revealed no statistically significant difference between girls' and boys' levels of adaptability in the fall or spring, with $t(78) = -1.11$, *ns* and $t(78) = 0.19$, *ns* respectively. See Table 9 for the summary of the *t*-test analyses.

In summary, boys had higher levels of attention problems in the fall and spring compared to girls. Boys had slightly higher levels of anxiety in the fall, while girls had higher levels of anxiety in the spring of preschool. Boys had lower levels of adaptability in the fall and slightly higher levels in the spring compared to girls. However, there was not a significant difference between boys and girls mean scores of attention problems, anxiety or adaptability in the fall or spring.

Table 9. Summary of Group Statistics for Gender Differences between Children's Levels of Attention Problems, Anxiety and Adaptability in the Fall and the Spring

	Gender						
	Boys			Girls			
Dependent Variable	*N*	*M*	*SD*	*N*	*M*	*SD*	*t-statistic*
Fall							
Attention Problems	39	52.46	8.57	41	50.56	8.92	0.97
Anxiety	39	48.46	8.83	40	48.35	9.08	0.96
Adaptability	39	46.18	8.81	41	48.34	8.62	-1.11
Spring							
Attention Problems	39	51.21	8.61	41	47.85	7.91	1.81
Anxiety	39	48.21	7.20	40	49.60	9.99	0.85
Adaptability	39	49.41	9.82	41	49.02	8.85	0.19

Note. All p-values non-significant.

Discussion

The aim of the present study was to expand on the current literature on children's social and emotional functioning and academic skills in preschool, specifically focusing on the social and emotional behaviours of attention problems, anxiety and adaptability. The following section is an interpretation and discussion of the results from the present investigation in light of existing literature. Suggestions for future research and implications of this study will be presented, and the limitations of the current study will also be addressed.

The findings of this research contribute to the present understanding of how children's attention problems, anxiety and adaptability behaviours in preschool contribute to their academic skills prior to their formal school entry into kindergarten. The study of these areas of development help inform early education programs curriculum and supports skill building in the areas that promote children's academic skills and overall well-being.

Attention Problems, Anxiety and Adaptability

The primary research question of the present study aimed to determine the relationship between children's levels of attention problems, anxiety and adaptability and their academic skills in preschool.

Attention Problems. Children's attention problems in the fall significantly predicted their executive functioning and brief academic scores in the fall, and their receptive vocabulary, executive functioning and brief academic scores in the spring. Children's levels of attention problems as reported by teachers did not significantly predict their scores on the brief reading literacy measure in the fall or spring. There was a negative relationship between children's academic scores and attention problems, as children's scores decreased as their attention problems increased. Researchers have found children's early math and attention skills to be

correlated, and attention skills in early childhood to significantly predict children's later math, reading and achievement skills (Pagani et al., 2010). In addition, the results of the present study suggest that preschoolers' attention skills in the fall are predictive of their executive functioning and general academic skills in the fall and spring, as well as their receptive vocabulary skills at the end of preschool. The negative relationship between children's attention problems and academic skills in preschool are also consistent with previous research with older populations (Polderman, et al., 2010), highlighting the importance for early education programs to monitor and intervene when children are exhibiting attention problems in preschool.

Anxiety. Children's anxiety in the fall did not significantly predict their scores on any of the academic measures in the fall or spring. These findings are in contrast with the hypothesis that higher levels of anxiety would be predictive of lower scores on the academic measures in the fall and spring. Studies on the predictive relationship of children's anxiety in preschool on their academic achievement in elementary school have been mixed (Pagani, et al., 2010), with some researchers finding that anxiety was not significantly associated with children's later academic achievement (Romano et al., 2010). In the present study anxiety was teacher reported, and it is possible that children's anxiety was unnoticed as children do not always display physical signs of anxiety. Further, anxiety can be difficult to assess in young children, as children often manifest many fears and anxieties as part of their typical development (Beesdo, Dipl-Psych, & Pine, 2009). This raises the question as to a teacher's ability to effectively assess children's levels of anxiety during a preschool year, which is beyond the scope of this investigation.

Adaptability. Levels of adaptability in the fall were found to be significantly predictive of children's academic scores on the receptive vocabulary, executive functioning and brief academic measure in the fall and the spring. Children's levels of adaptability did not

significantly predict their scores on the brief reading literacy measure in the fall or spring. There was a positive relationship between academic scores and children's adaptability, as children's scores on all of the academic measures increased as their levels of adaptability increased. There have been a limited number of studies on strength-based aspects of social and emotional functioning, such as adaptability, and children's academic school success. While adaptive behaviours have been shown to increase children's functioning in the classroom, such as interacting with teachers and peers, (Harrison & Raineri, 2008; Reynolds & Kamphaus, 2004), the present study found significant associations between children's adaptability and academic skills in preschool. Specifically, children's adaptability in the fall of preschool had a positive and predictive relationship with children's executive functioning, receptive vocabulary and general academic skills throughout the preschool year.

Children's Levels of Attention Problems, Anxiety and Adaptability in the Fall Compared to the Spring

On average, children's levels of attention problems significantly decreased between the fall and spring, while their levels of adaptability significantly increased. Children's levels of anxiety did not significantly increase between the fall and spring.

Research findings have shown that children's attention-related skills continue to develop in early childhood, and reach a relative stability between the ages of six and eight years old (Olson, Sameroff, Kerr, Lopez & Wellman, 2005) and attention problems show a decreasing frequency as a function of age (Shaw, Lacourse & Nagin, 2005). The results of the present study are consistent with these research findings, and suggest that as children continue to develop throughout their preschool years their ability to control their attention and suppress irrelevant information in the classroom improves. Interestingly, older preschoolers (four and five year olds

vs. two and three year olds) are more likely to meet criteria for the attention related disorder of Attention-Deficit/Hyperactivity Disorder (ADHD; Egger, Kondo, & Angold, 2006; Schoemaker, Bunte, Espy, Dekovic, & Matthys, 2014). It is likely that as children progress through preschool, higher levels of attention problems become more atypical and suggestive of dysfunctional behaviours, which results in the increase in the diagnosis of attention related disorders as children age.

The present study also found that children's adaptability, including their ability to adapt to changes, explore new places and situations, recover from negative emotions, and exhibit positive emotions, significantly increased over the preschool year and has important implications for future research and early education interventions. These findings are consistent with the hypothesis that children's adaptability skills would increase over their Head Start preschool year. Further research is necessary to determine if children's adaptability skills act as a protective factor against school failure. Such investigations may help inform early education programs and interventions for at-risk groups of preschoolers.

Children's anxiety did not significantly increase between the fall and spring of preschool in the present study. These findings are consistent with previous research that anxiety problems are stable across childhood and do not significantly increase across preschool (Beesdo et al., 2009).

Finally, the transition to kindergarten requires children to cope with more academics, independent work time, instruction-following, activity transitions, instructional periods and self-care compared to preschool. Future longitudinal research is required to investigate if the decrease in children's attention problems and increase in adaptability at the end of preschool are sustained in the fall of kindergarten.

Gender Differences

The current investigation did not find any significant gender differences between children's levels of attention problems, anxiety or adaptability in preschool. These results are consistent with previous research that has not found significant gender differences between children's social and emotional functioning in preschool (Campbell, 1995). It is possible that childhood gender differences in social and emotional functioning are not as evident during the preschool years compared to other stages of development. As boys and girls continue to develop during childhood, and gender differences in their social interactions become more apparent, gender directly and indirectly affects children's social and emotional functioning. Although gender differences in children's attention problems, anxiety and adaptability were not found to be significantly different in preschool, gender differences may be beginning for children at this early age. More research is necessary to determine if there are gender differences in experiencing the onset of attention, anxiety and adaptability problems in preschool.

Limitations and Future Directions

There were many strengths of the current research study, including assessing children's academic skills with a variety of measures, and collecting teacher and child data across two time points. However, based on the following limitations, caution must be used when generalizing the findings to other populations.

Firstly, while the sample size of this study is fairly typical of studies using preschool participants, it was relatively small ($N = 80$) compared to other early childhood studies, especially when the groups were delineated to analyze gender differences (boys $N = 39$). Ideally, future studies should aim to recruit larger samples to increase the power of the study to reveal significant findings, and to generalize the results to a larger population.

Secondly, parents who consented to their children participating in the study also agreed to complete mother and father survey packages at two time points (fall and spring). However, only 53.8% of mothers and 26.3% of fathers completed and returned the survey packages at both time points. This prevented the researchers from being able to compare multi-rater reports for children's levels of attention problems, anxiety and adaptability across home and school settings. Further, as demographic surveys were not returned by approximately one-third of the participants, demographic variables such as socioeconomic status and ethnicity were unable to be investigated in the regression analyses. Thus, we are unable to conclude that the results of the study are generalizable across settings, such as in children's homes and communities. Future studies partnering with early learning programs should aim to better engage parents and teachers to ensure they are motivated to complete questionnaires and survey measures. This will increase the power of the study and the ability to generalize the results to a larger, more diverse population.

Thirdly, two academic tests were selected to measure children's executive functioning. In contrast, other researchers often use a battery of tests to measure children's executive functioning. The present study chose two easy-to-administer tests that measured children's "cool" executive functioning, or cognitively mediated behavioural regulation skills, such as inhibitory control, attention and working memory (Hongwanishkul, Happaney, Lee & Zelazo, 2005; Ponitz et al., 2008). In contrast, no measures of children's "hot" executive functioning, or affectively mediated regulation skills (i.e. delay of gratification or controlling aggression; Hongwanishkul et al., 2005; Ponitz et al., 2008), were included in the study. Employing a battery of performance tests to draw conclusions about children's executive functioning should be considered in future studies.

Despite these limitations, the findings from this study highlight the importance of continuing to expand our understanding of children's attention problems, anxiety and adaptability and academic skills in preschool, and have implications for both researchers and practice. Firstly, it would be important to replicate the study's findings with preschoolers from different populations (i.e. other early learning programs), ideally with a larger sample size. Further, engaging mothers and fathers in the research study would allow for drawing conclusions across multi-ratings and settings, and may be more representative of children's social and emotional functioning as a whole. Further investigation is also warranted to continue to develop a clearer understanding of how attention problems, anxiety and adaptability impact children's academic skills.

Conclusion

In conclusion, the current study adds new depth to the study of social and emotional functioning and academic skills in preschoolers. Higher attention problems in the fall were found to be associated with lower academic skills in the fall and spring, and children's levels of attention problems significantly decreased over the preschool year. Higher levels of adaptability were found to be associated with higher scores on the academic measures over the preschool year. Children's levels of anxiety were not found to significantly increase over the preschool year, and children's anxiety did not significantly predict their academic skills in the fall or spring. Finally, the current study did not find any significant gender differences between children's levels of attention problems, anxiety or adaptability in preschool. However, it is believed that with further study employing larger sample sizes, gender differences may be found. The current study highlights the importance of studying the relationship between children's

social and emotional functioning and academic skills in preschool, to help inform early learning programs that promote children's overall development and well-being in early childhood.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Anderson, L. M., Shinn, C., Fullilove, M. T., Scrimshaw, S. C., Fielding, J. E., Normand, J., Carande-Kulis, V. G., & Task Force on Community Preventative Services. *American Journal of Preventative Medicine, 24*(3), 32-46. doi: 10.1016/S0749-3797(02)00655-4

Bassett, H. H., Denham, S., Wyatt, T. M., & Warren-Khot, H. K. (2012). Refining the preschool self-regulation assessment for use in preschool classrooms. *Infant and Child Development, 21*(6). doi: 10.1002/icd.1763

Beesdo, K., Dipl-Psych, S. K., & Pine, S. D. (2009). Anxiety and anxiety disorders in children and adolescents: Developmental issues and implications for the DSM-V. *Psychiatric Clinics of North America, 32*(3), 483-524. doi: 10.1016/j.psc.2009.06.002

Belfield, C., & Garcia, E. (2014). Parental notions of school readiness: How have they changed and has preschool made a difference. *The Journal of Educational Research, 107*(2), 138-151. doi: 10.1080/00220671.2012.753863

Beyer, T., Postert, C., Müller, J. M., & Furniss, T. (2012). Prognosis and continuity of child mental health problems from preschool to primary school: Results of a four-year longitudinal study. *Child Psychiatry and Human Development, 43*(4), 533-543. doi: 10.1007/s10578-012-0282-5

Blakemore, J. E. O., Berenbaum, S. A., & Liben, L. S. (2009). *Gender development*. New York: Taylor & Francis.

Boivin, M. & Bierman, K. L. (2013). School readiness: Introduction to a multifaceted and developmental construct. In Boivin, M. & Bierman, K. L. (Eds.), *Promoting school*

readiness and early learning. Implications of developmental research for practice. New York, NY: Guilford Publications.

Brock, L. L., Rimm-Kaufman, S. E., Nathanson, L., & Grimm, K. J. (2009). The contributions of 'hot' and 'cool' executive function to children's academic achievement, learning-related behaviours, and engagement in kindergarten. *Early Childhood Research Quarterly, 24*(3), 337-349. doi: 10.1016/j.ecresq.2009.06.001

Campbell, S. B. (1995). Behaviour problems in preschool children: A review of recent research. *Journal of Child Psychology and Psychiatry, 36*(1), 113-149. doi: 10.1111/j.1469-7610.1995.tb01657.x

Case, R. (1998). The development of conceptual structures. In W. Damon (Series Ed.) & D. Kuhn & R. S. Siegler (Vol. Eds.), *Handbook of child psychology: Vol. 2. Cognition, perception and language* (5th ed.). New York: Wiley.

Clancy, B. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. *American Psychologist, 57*(2), 111-127. doi:10.1037/0003-066X.57.2.111

Coolahan, K., Fantuzzo, J., Mendez, J., & McDermott, P. (2000). Preschool peer interactions and readiness to learn: Relationships between classroom peer play and learning behaviours and conduct. *Journal of Educational Psychology, 92*(3), 458-465. doi: 10.1037/0022-0663.92.3.458

Cooper, J., Masi, R., & Vick, J. (2009). Social-emotional development in early childhood: What every policymaker should know. *National Center for Children in Poverty* report. Mailman School of Public Health, Columbia University.

Côté, S. M., Boivin, M., Liu, X., Nagin, D. S., Zoccolillo, M., & Tremblay, R. E. (2009). Depression and anxiety symptoms: onset, developmental course and risk factors during early childhood. *Journal of Child Psychology and Psychiatry, 50*(10), 1201-1208. doi:10.1111/j.1469-7610.2009.02099.x

Denham, S. A. (2006). Social-emotional competence as support for school readiness: What is it and how do we assess it. *Early Education and Development, 17*(1), 57-89. doi: 10.1207/s15566935eed1701_4.

Denham, S. A., Warren-Khot, H. K., Bassett, H. H., Wyatt, T., & Perna, A. (2011). Factor structure of self-regulation in preschoolers: Testing models of a field-based assessment for predicting early school readiness. *Journal of Experimental Child Psychology, 111*(3), 386-404. doi: 10.1016/j.jecp.2011.10.002.

Denham, S. A., Wyatt, T. M., Bassett, H. H., Echeverria, D., & Knox, S. S. (2008). Assessing social-emotional development in children from a longitudinal perspective. *Journal of Epidemiology and Community Health, 63,* i37-i52. doi: 10.1136/jech.2007.070797

Diamond, A., Prevor, M. B., Callender, G., & Druin, D. P. (1997). Prefrontal cortex cognitive deficits in children treated early and continuously for PKU. *Monographs of the Society for Research in Child Development, 62(*4, Serial No. 252). doi:10.2307/1166208

Diamond, A., & Taylor, C. (1996). Development of an aspect of executive control: Development of the ability to remember what I said and to "do as I say, not as I do." *Developmental Psychobiology, 29*, 315-334. doi: 0012-1630/96/040315-20

Donovan, C., L. & Spence, S. H. (2000). Prevention of childhood anxiety disorders. *Clinical Psychology Review*, *20*(4), 509-531. doi:10.1016/S0272-7358(99)00040-9

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., Pagani, L. S., Feinstein, L., Engel, M., Brooks-Gunn, J., Sexton, H., Duckworth, K., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology, 43*(6), 1428-1446. doi:10.1037/0012-1649.43.6.1428

Dunn, D. M., & Dunn, L. M. (2007). *Peabody Picture Vocabulary Test* (4th ed.). Circle Pines, MN: American Guidance Service.

Durlak, J. A., Weissberg, R. P., Dymnicki, A.B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*(1), 405-432. doi: 10.1111/j.1467-8624.2010.01564.x

Egger, H. L. & Angold, A. (2006). Common emotional and behavioural disorders in preschool children: Presentation, nosology, and epidemiology. *Journal of Child Psychology and Psychiatry, 47*(3-4), 313-337. doi: 10.1111/j.1469-7610.2006.01618.x

Egger, H. L., Kondo, D., & Angold, A. (2006). The epidemiology and diagnostic issues in preschool attention-deficit/hyperactivity disorder: A review. *Infants and Young Children, 19*(2), 109-122. doi: 10.1097/00001163-200604000-00004

Eisenberg, N., Valiente, C., & Eggum, N. D. (2010). Self-regulation and school readiness. *Early Education and Development, 21*(5), 681-698. doi: 10.1080/10409289.2010.497451

Else-Quest, N., Hyde, J., Goldsmith, H., & Van Hulle, C. (2006). Gender differences in temperament: A meta-analysis, *Psychological Bulletin, 132,* 33-72. doi: 10.1037/0033-2909.132.1.33

Fantuzzo, J. W., Bulotsky-Shearer, R., Fusco, R. A., & McWayne, C. (2005). An investigation of preschool classroom behavioural adjustment problems and social-emotional school

readiness competencies. *Early Childhood Research Quarterly, 20*(3), 259-275. doi: 10.1016/j.ecresq.2005.07.001

Fantuzzo, J., Bulotsky-Shearer, R., McDermott, P. A., McWayne, C., & Frye, D. (2007). Investigation of dimensions of social-emotional classroom behaviour and school readiness for low-income urban preschool children. *School Psychology Review, 26*(1), 44-62. Retrieved from http://repository.upenn.edu/gse_pubs/152

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). Thousand Oaks, CA: Sage Publications Inc.

Field, T. & Greenberg, R. (1982). Temperament ratings by parents and teachers of infants, toddlers and preschool children. *Child Development, 53*(1), 160-163. doi: 10.2307/1129648

Fisher, K. W., & Bidell, T. R. (2006). Dynamic development of action and thought. In W. Damon (Series Ed.) & R. M. Lerner (Vol. Ed.), *Handbook of child psychology: Vol. 1, Theoretical models of human development* (6th ed.). New York, NY: Wiley.

Forget-Dubois, N., Lemelin, J.P., Boivin, M., Dionne, G., Séguin, J. R., Vitaro, F. & Tremblay, R.E. (2007). Predicting early school achievement with the EDI: A longitudinal population-based study. *Early Education and Development*, *18*(3), 405-426. doi:10.1080/10409280701610796

Forry, N. D., Davis, E. D., & Welti, K. (2012). Ready or not: Associations between participation in subsidized child care arrangements, pre-kindergarten, Head Start and children's school readiness. *Early Childhood Research Quarterly, 28*(3), 634-644. doi: 10.1016/j.ecresq.2013.03.009

Glass, G.V. & Hopkins, K. D. (1996). *Statistical methods in education and psychology* (3rd ed.). Needham Heights: MA: Pearson Education.

Government of Alberta. (2014, August). *How are our young children doing? Final report of the Early Child Development Mapping Project (ECMap).* Retrieved from: http://www.ecmap.ca/images/results/ECMap_Final_Report_20141118.pdf

Graue, E. (2006). The answer is readiness- Now what is the question. *Early Education and Development, 17*(1), 43-56. doi: 10.1207/s15566935eed1701_3

Grossman, H. J. (Ed.) (1983). *Classification in mental retardation.* Washington, DC: American Association on Mental Deficiency.

Guerra, N. G. & Bradshaw, C. P. (2008). Linking the prevention of problem behaviours and positive youth development: Core competencies for positive youth development and risk prevention. *New directions for Child and Adolescent Development, 122,* 1-17. doi: 10.1002/cd.225

Gullo, D. F. (2014). Multiple dimensions of biological development: Implications for kindergarten readiness among young children in poverty. *Journal of Social Science Studies, 2*(1), 106-128. doi: 10.5296/jsss.v2il.6394

Harrison, P. L., & Raineri, G. (2008). Best practices in the assessment of adaptive behaviour. In A. Thomas & J. Grimes (Eds.), *Best Practices in School Psychology* (5th ed.,pp. 605-616). Bethesda, MD: NASP Press.

Head Start: An office of the Administration for Children and Families Early Childhood Learning & Knowledge Center (ECLKC). (2016). *Head Start program facts fiscal year 2015.* Retrieved from https://eclkc.ohs.acf.hhs.gov/hslc/data/factsheets/2015-hs-program-factsheet.html

High, P. C. & American Academy of Pediatrics Committee on Early Childhood, Adoption, and Dependent Care and Council on School Health. (2008). School readiness. *Pediatrics*, *121*(4), e1008-e1015. doi: 10.1542/peds.2008-0079.

Hill, N. E., & Witherspoon, D. (2011). Race, ethnicity, and social class. In M. K. Underwood & L. H. Rosen (Eds.)., *Social Development: Relationships in Infancy, Childhood, and Adolescence* (pp. 17-43). New York, NY: Guilford.

Hongwanishkul, D., Happaney, K. R., Lee, W. S. C., & Zelazo, P. D. (2005). Assessment of hot and cool executive function in young children: Age-related changes and individual differences. *Developmental Neuropsychology, 28*(2), 617–644. doi: 10.1207/s15326942dn2802_4

Hudson, J. L. & Dodd, H. F. (2012). Informing early intervention: Preschool predictors of anxiety disorders in middle childhood. *PLoS ONE, 7*(8), e42359. doi: 10.1371/journal.pone.0042359

Kato, N., Yanagawa, T., Fujiwara, T., & Morawska, A. (2015). Prevalence of children's mental health problems and the effectiveness of population-level family interventions. *Journal of Epidemiology, 25*(8), 507-516. doi: 10.2188/jea.JE20140198

Leaper, C. & Bigler, R. S. (2011). Gender. In M. K. Underwood & L. H. Rosen (Eds.), *Social development: Relationships in infancy, childhood and adolescence* (pp. 289 – 315). New York: Guilford Press.

Leaper, C. & Friedman, C. K. (2007). The socialization of gender. In J. E. Grusec & P. D. Hastings (Eds.), *Handbook of socialization: Theory and research* (pp. 561-587). New York: Guilford Press.

Lin, H. L., Lawrence, F. R., & Gorrell, J. (2003). Kindergarten teachers' views of children's readiness for school. *Early Childhood Research Quarterly, 18*(2), 225-237. doi: 10.1016/S0885-2006(03)00028-0

McClelland, M. M., Cameron, C. E., Duncan, R., Bowles, R. P., Acock, A. C., Miao, A., & Pratt, M. E. (2014). Predictors of early growth in academic achievement: The head-toes-knees-shoulders task. *Frontiers in Psychology, 5*, 1-14. doi:10.3389/fpsyg.2014.00599

Miller, P. H. (2011). *Theories of Developmental Psychology*. New York: Worth Publishers.

Montes, G., Lotczewski, B.S., Halterman, J.S., & Hightower, A.D. (2011). School readiness among children with behaviour problems at entrance into kindergarten: Results from a U.S. national study. *European Journal of Pediatrics, 171*(3), 541-549. doi: 10.1007/s00431-011-1650-4

National Education Goals Panel. (1991). *The National Education Goals Report*. Washington, DC: National Education Goals Panel.

Nix, R. L., Bierman, K. L., Heinrichs, B. S., Gest, S. D., Welsh, J. A., & Domitrovich, C. E. (2016). The randomized controlled trial of Head Start REDI: Sustained effects on developmental trajectories of social-emotional functioning. *Journal of Consulting and Clinical Psychology, 84*(4), 310-322. doi: 10.1037/a0039937

Olson, S. L., Sameroff, A. J., Kerr, D. C., Lopez, N. L., & Wellman, H. M. (2005). Developmental foundations of externalizing problems in young children: The role of effortful control. *Developmental Psychopathology, 17*(1), 25-45. doi: 10.1017/S0954579405050029

Pagani, L. S., Fitzpatrick, C., Archambault, I., & Janosz, M. (2010). School readiness and later achievement: A French Canadian replication and extension. *Developmental Psychology,*

46(5), 984-994. doi: 10.1037/a0018881

Pahl, K. M., Barrett, P. M. & Gullo, M. J. (2012). Examining potential risk factors for anxiety in early childhood. *Journal of Anxiety Disorders, 26*(2), 311-320. doi: 10.1016/j.janxdis.2011.12.013

Paulus, F. W., Backes, A., Sander, C. S., Weber, M. & von Gontard, A. (2015). Anxiety disorders and behavioural inhibition in preschool children: A population-based study. *Child Psychiatry and Human Development, 46*(1), 150-157. doi: 10.1007/s10578-014-0460-8

Piaget, J. (1952). *The origins of intelligence in children.* New York: Norton.

Piaget, J. (1970). *The child's conception of movement and speed.* London: Routledge & Kegan Paul.

Polderman, T. J. C., Boomsma, D. I., Bartels, M., Verhulst, F. C., & Huizink, A. C. (2010). A systematic review of prospective studies on attention problems and academic achievement. *Acta Psychiatrica Scandinavica, 122*(4), 271-284. doi: 10.1111/j1600-0447.2010.01568.x

Ponitz, C. C., McClelland, M. M., Jewkes, A. M., Connor, C. M., Farris, C. L., & Morrison, F. J. (2008). Touch your toes! Developing a direct measure of behavioural regulation in early childhood. *Early Childhood Research Quarterly, 23,* 141-158. doi: 10.1016/j.ecresq.2007.01.004

Ponitz, C. C., McClelland, M. M., Matthews, J. S., & Morrison, F. J. (2009). A structured observation of behavioural self-regulation and it's contribution to kindergarten outcomes. *Developmental Psychology, 45*(3), 605-619. doi: 10.1037/a0015365

Qi, C. H. & Kaiser, A. P. (2003). Behaviour problems of preschool children from low-income families: Review of the literature. *Topics in Early Childhood Special Education, 23*(4), 188-216. doi: 10.1177/02711214030230040201

Raver, C., & Knitzer, J. (2002). *Ready to enter: What research tells policymakers about strategies to promote social and emotional school readiness among three- and four-year old children*. New York: National Center for Children in Poverty.

Rescorla, L. A., Achenbach, T. M., Ivanova, M. Y., Harder, S. H., Otten, L., Bilenberg, N., … Verhulst, F. C. (2011). International comparisons of behavioural and emotional problems in preschool children: Parent's reports from 24 societies. *Journal of Clinical Child & Adolescent Psychology, 40*(3), 456-467. doi: 10.1080/15374416.2011.563472

Reynolds, C. R., & Kamphaus, R. W. (2004). *Behavior Assessment System for Children (2nd ed.)*. Circle Pines, MN: American Guidance Service.

Rimm-Kaufman, S. E., Pianta, R. C., & Cox, M. J. (2000). Teachers' judgments of problems in the transition to kindergarten. *Early Childhood Research Quarterly, 15*(2), 147-166. doi: 10.1016/S0885-2006(00)00049-1

Romano, E., Babchishin, L., Pagani, L. S., & Kohen, D. (2010). School readiness and later achievement: Replication and extension using a nationwide Canadian survey. *Developmental Psychology, 46*(5), 995-1007. doi: 10.1037/a0018880

Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social Development, 6,* 111-135. doi: 10.1111/j.1467-9507.1997.tb00097.x

Sawilowsky, S. S. & Clifford, B. R. (1992). A more realistic look at the robustness and Type II error properties of the *t* test to departures from population normality. *Psychological Bulletin, 111*(2), 352-360. doi: 10.12691/ajams-1-5-4

Schoemaker, K., Bunte, T., Espy, K. A., Dekovic, M. & Matthys, W. (2014). Executive functions in preschool children with ADHD and DBD: An 18-month longitudinal study. *Developmental Neuropsychology, 39*(4), 302-215. doi: 10.1080/87565641.2014.911875

Shaw, D. S., Lacourse, E., & Nagin, D. S. (2005). Developmental trajectories of conduct problems and hyperactivity from ages 2 to 10. *Journal of Child Psychology and Psychiatry, 46*(9), 931-942. doi: 10.1111/j.1469-7610.2004.00390.x

Sheridan, S. M., Knoche, L. L., Edwards, C. P., Bovaird, J. A., & Kupzyk, K. A. (2010). Parent engagement and school readiness: Effects of the getting ready intervention on preschool children's social-emotional competencies. *Early Education and Development, 21*(1), 125-156. doi: 10.1080/10409280902783517

Shonkoff, J. P. & Phillips, D. A. (Eds.). (2000). *From neurons to neighborhoods: The science of early childhood development*. Washington, DC: National Academies Press.

Smith-Donald, R., Raver, C. C., Hayes, T., & Richardson, B. (2007). Preliminary construct and concurrent validity of the Preschool Self-Regulation Assessment (PSRA) for field-based research. *Early Childhood Research Quarterly, 22*(2), 173-187. doi: 10.1016/j.ecresq.2007.01.002

Snow, K. L. (2006) Measuring school readiness: Conceptual and practical considerations. *Early Education and Development, 17*(1), 7-41. doi:10.1207/ s15566935eed1701_2

Tabernick, B. G. & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Upper Saddle River, NJ: Pearson Education Inc.

Thompson, R. A. & Goodman, M. (2011). Development of self, relationships, and socio-emotional competence. In O. A. Barbarin & Wasik, B. H. (Eds.), *Handbook of Child Development and Early Education: Research to Practice* (pp. 143–171). New York:

Guilford Press.

U.S. Department of Health and Human Services. (2010, January 15). *Head Start impact study: Final report, executive summary*. Retrieved from http://www.acf.hhs.gov/opre/resource/head-start-impact-study-final-report-executive-summary

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Walker, O. L., & Henderson, H. A. (2012). Temperament and social problem solving competence in preschool: Influences on academic skills in early elementary school. *Social Development, 21*(4), 761-779. doi: 10.1111/j.1467-9507.2011.00653.x

Wood, J. J. (2007). Academic competence in preschool: Exploring the role of close relationships and anxiety. *Early Education and Development, 18*(2), 223-242. doi: 10.1080/10409280701282868

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock-Johnson III Tests of Achievement*. Itasca, IL: Riverside Publishing.

Zhai, F., Brooks-Gunn, J., & Waldfogel, J. (2011). Head Start and urban children's school readiness: A birth cohort study in 18 cities. *Developmental Psychology, 47*(1), 134-152. doi: 10.1037/a0020784