

Running Head: PATHS, SOCIAL COMPETENCE AND READING ACHIEVEMENT

The Effect of *Promoting Alternative THinking Strategies* on Social Competence and Reading Achievement in Elementary School Children

by

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Submitted in partial fulfilment of the requirements
for the degree of Master of Arts in Research in Education

at

Mount Saint Vincent University
Halifax, Nova Scotia
September 2014

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Abstract

This study examined the effect of the *Promoting Alternative Thinking Strategies* universal intervention on measures of social competence, word identification and word attack in elementary school children. This study constituted the first analysis of data collected in the *Socially and Emotionally Aware Kids* study and included data from the first of four years of the project. Ninety-eight participants spanning grades primary to 2 at the study's inception (mean age = 80.25 months) participated in the present study. Participants in the intervention condition (n = 57) were included in the PATHS Social Emotional Learning intervention for 14 months. Students were compared to same-aged controls (n = 41) on measures of aggressive/disruptive behaviours, attention, and social-emotional competence as well as word recognition, and non-word reading. No effect of the intervention was demonstrated through analysis of variance (ANOVA). Both intervention and control students realized significant gains in attention/concentration, and social-emotional competence over the 14 month time span. Both intervention and control participants demonstrated a significant change in scores on both reading achievement tasks over time. Regression analysis demonstrated a significant contribution of aggressive/disruptive behaviours to word-recognition skills concurrently at pre-test.

List of Abbreviations and Symbols

ADHD – ATTENTION DEFICIT HYPERACTIVITY DISORDER

ANOVA – ANALYSIS OF VARIANCE

β – STATISTICAL POWER

CASEL – COLLABORATIVE FOR ACADEMIC AND EMOTIONAL LEARNING

CMHA NS – CANADIAN MENTAL HEALTH ASSOCIATION NOVA SCOTIA DEVISION

CPRPG – CONDUCT PROBLEMS RESEARCH PREVENTION GROUP

C-CTOPP – COMPREHENSIVE TEST OF PHONOLOGICAL PROCESSING

ES – EFFECT SIZE

F – F DSITRIBUTION, FISHER’S F RATIO

GPA – GRADE POINT AVERAGE

IQ – INTELLIGENCE QUOTIENT

N – SAMPLE SIZE

NLSCY – NATIONAL LONGITUDINAL STUDY OF CHILDREN AND YOUTH

η_p^2 - EFFECT SIZE, ETA SQUARED

NRP – NATIONAL READING PANEL

p – PROBABILITY

PATHS – PROMOTING ALTERNATIVE THINKING STRATEGIES

r – ESTIMATE OF THE PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENT

R² - ESTIMATE OF THE PEARSON PRODUCT-MOMENT CORRELATION SQUARED

S.A.F.E. - SEQUENCED LESSONS, ACTIVE LESSONS, FOCUSED LESSONS, EXPLICIT
TEACHING IN THE LESSONS

TOWRE – TEST OF WORD READING ABILITY

PATHS, SOCIAL COMPETENCE AND READING ACHIEVEMENT

SAT – STANFORD ACHIEVEMENT TEST

SEAK – SOCIALLY AND EMOTIONALLY AWARE KIDS

SEL – SOCIAL EMOTIONAL LEARNING

SES – SOCIO-ECONOMIC STATUS

CHAPTER ONE

Literature Review

Childhood is a time filled with unparalleled growth, learning, and development in a variety of domains and across multiple contexts and settings. Many facets of childhood are important for adjustment, growth, and development during a child's early years and are also predictive of key indices of positive adult adjustment (Williams, 2002; National Research Council and Institute of Medicine, 2000; Moffitt et al., 2011; Crick & Dodge, 1994). Specifically, research using both prospective and retrospective designs has demonstrated that childhood indicators of well-being (e.g. socio-economic status, academic achievement, psychosocial adjustment, and success) can contribute in meaningful ways to developmental pathways that will lead to either positive or negative adjustment across childhood and adolescence and into adulthood (Crick, & Dodge, 1994; Caspi, Elder, & Bem, 1987; Parker & Asher, 1987). Many adult determinants of well-being, including educational and occupational attainment, employment status, positive interpersonal relationships, health, and mental health status follow trajectories that are established throughout the early and middle childhood period (National Research Council and Institute of Medicine, 2000; Moffitt, et al, 2011; Caspi, Elder & Bem, 1987; Hymel & Ford, 2003).

Indices of a child's current level of functioning provide information regarding whether children are positively or negatively adjusted and are also predictive of long-term trajectories of child development. One way of understanding the effect of current level of functioning on later development is to examine developmental trajectories. Developmental trajectories have emerged over the course of the past 20 years as a means through which to analyze and describe information sampled from longitudinal population data, on an individual level (Nagin, 1999). In the context of child development, developmental trajectories are useful when identifying factors that serve to

contribute to positive, healthy child development or that disrupt such development (Forer & Lloyd, 2014).

Findings from the National Longitudinal Study of Children and Youth

A vast amount of research has been devoted to investigating the childhood skills, behaviours, and specific indicators that can reliably predict positive childhood development and later adult well-being. Indeed, the National Longitudinal Study of Children and Youth (2002) examined such indicators in childhood. In a large scale study, 22 831 children between the ages of 0 and 23 months were followed until age five years and examined on indicators of vulnerability (e.g. receptive vocabulary, math achievement, externalizing behaviours) in childhood; the interactions of these indicators with socio-economic gradients across ages, family structures (i.e., single parent versus two-parent families), neighbourhoods, and Canadian provinces were examined. The NLSCY used a broad definition of vulnerability in which children with just one episode of poor developmental outcome in a particular domain could be considered vulnerable, and which without significant intervention could put the child at risk of numerous difficulties and poor adjustment in adulthood. (Sloat & Williams, 2002).

Some outcomes from the NLSCY's study relevant to the present literature review include the findings that children's cognitive development is influenced by schools, teacher characteristics (e.g. math teachers having a background in the math domain) and classroom practices (e.g., exercising classroom management and maintaining classroom discipline) can affect student learning outcomes as well as reduce the effects of vulnerability for individual students. Additionally, findings show that although a child's environment during his or her first five years of life may introduce sources of vulnerability, strong, best-practice, and consistent practices in the school environment can serve to mitigate sources of vulnerability. This positions the school

environment as one through which to initiate trajectories of positive adjustment through childhood, adolescence, and into adulthood (Frempong & Williams, 2002). During these years of early development, skills such as self-regulation (i.e., self-control, appropriate emotional response in conflict situations, and the ability to direct and sustain attention), acquiring strong abilities to learn and communicate, learning to relate well with others, and develop positive interpersonal relationships have been identified as critical to healthy adjustment (National Research Council and Institute of Medicine, 2000). Taken together, this research indicates that developing such skills prior to school entry will set the stage for a smooth and positive transition from the home environment into the school environment; however, for those students who lack opportunities to develop these skills in the preschool period, schools are a primary environment through which to develop these abilities (Williams, 2002; Ladd, 1990).

The Effect of Social Competence on Child Development in the School Environment

After age five, a large proportion of children's development is shared between the school and home environments. Children enter school with a wide variety of early childhood experiences that include diversity in parental/caregiver modeling of socially competent behaviours and diversity in behavioural expectations (Beauchamp & Anderson, 2010). Children's personality and temperament further influence the ways in which they interact within specific environments (e.g. home, school). Therefore when children enter school, they bring with them a wide range of social competencies, personality, and temperament traits that influence their adjustment to and success within the school environment.

Social competence. By definition, social competence is a broad term describing effective behaviour in social situations or on a specific social task (Cavel, 1991). Social competence is generally conceptualized as being comprised of social skills, social performance, and social

adjustment (Cavell, 1990), such that children's specific social skills will contribute to their more generally observed social performance and will ultimately inform one's overall level of social adjustment. Gresham and Elliott (1984) suggest that social skills are learned behaviours that allow children to interact positively with others. Theoretical support from Bandura's Social Learning Model (Bandura, 1977) is consistent with the assertion that social skills are learned from various adult (e.g. parent, caregiver, grandparent) and peer (e.g. sibling, friend) models. This would suggest that important social skills in childhood such as cooperation, assertiveness, attention, compliance with adult requests, self-control in conflict situations, and managing emotions should be modeled by significant adult figures (e.g. parent, teacher) in children's environments and, as such, learned by children (Frey, Elliott, & Gresham, 2011; Conduct Problems Research Prevention Research Group, 2010; Dodge, et al., 2003; Durlak, Weissberg, Dymnicki, Taylor, Schellinger, 2011).

Social performance characterizes an individual's level of sophistication at executing a specific social behaviour or a group of social behaviours to either a predetermined level of expertise or to a generally agreed upon level of success (Cavel, 1990). For example, the ability of pre-school children to navigate peer group entry illustrates a situation in which specific pro-social behaviours (e.g. greeting the other children, making eye contact, smiling) would likely be met with success (e.g. joining the peer groups of interest; Cavel, 1990). Often, for social performance to be considered adequate or successful, a child must understand and possess the necessary social skill(s) in their repertoire of behaviour but also be able to initiate, produce and follow through with a particular skill in the appropriate environment (Cavel, 1990).

Social adjustment is the cumulative effect of the correctness of using social skills in social performance, thereby determining the degree of success with social goals recognized by either a

specific environment (e.g. school) or society (e.g., North American society). The degree of an individual's social adjustment may act as an indicator of his or her overall global functioning and can inform domains including interpersonal relationships, health, mental health, academic success and attainment, employment, and occupational success and attainment in childhood and later in adulthood (Cavel, 1990; Birch & Ladd, 1996; Hymel & Ford, 2003; Crick & Dodge, 1994). Indicators of social adjustment also contribute to developmental trajectories and are used as meaningful indicators of vulnerability.

Social competence and academic achievement. Social competence has been found to directly influence academic achievement, reliably predict academic achievement, and mediate academic achievement (Wentzel, 1993; Carpara, Barbarabelli, Pastorelli, Bandura, & Zimbardo, 2000; Greenberg, Kusché, & Riggs, 2004). Specific behaviours within the domain of social competence including prosocial behaviour, and attention demonstrate a positive relation with academic success (Algozzine, Wang, & Violette, 2011; Arnold, Kupersmidt, Voegler-Lee, & Marshall, 2010; Wentzel, 1993). Others, including externalizing behaviours and inattention, have been found to have a reliable and enduring negative relation with academic achievement (Algozzine, et al., 2011; Arnold, 1997; Arnold, et al., 2010). Finally, social competence is a meaningful factor to success in and completion of school (Birch & Ladd, 1996).

Prosocial behaviour. Prosocial behaviour is an adaptive social skill. Examples of prosocial behaviours include helpfulness, cooperation, empathy, academic competence, and self-control. Development and maturation of prosocial skills in childhood is dependent on neurocognitive development, language development, and the emergence of important social abilities (e.g. theory of mind, understanding of others' intentions, and false beliefs; Beauchamp & Anderson, 2010). Some prosocial actions are evident by 18 months to two years (Rushberg,

1982). Through the early childhood period, as cognitive and social information processing abilities develop, so too do prosocial skills (e.g. Crick & Dodge, 1994). However, individual differences in prosocial behaviours appear fairly stable across the early childhood period (ages four to seven years; Underwood & Moore, 1982).

The literature demonstrates that well developed prosocial behaviour has a positive influence on academic achievement (Wentzel, 1993; Carpara, et al., 2000). For example, Wentzel's (1993) examination of the association between prosocial behaviour and academic achievement in a group of 423 grade six and seven students indicated significant correlations between prosocial behaviour, and grade point average (GPA) and significant, but weaker, correlations between prosocial behaviour and standardized academic achievement scores. Similarly, Algozzine and colleagues (2011) examined social competence and reading achievement in three cohorts of at-risk early elementary students. Correlations between reading achievement and social skills were significant but also small in size (i.e., $r_s = 0.21 - 0.25$).

In Wentzel's (1993) study, prosocial behaviour also emerged as a significant positive predictor of GPA. Contributions of social skills to individual differences in academic achievement emerged after controlling for IQ, teacher preference, and family background. Finally prosocial behaviour was the only variable to make an independent significant contribution to standardized achievement scores above that from academic behaviour, teacher preference for students, IQ, sex, cultural affiliation, and school absences. In a similar study, Carpara and colleagues (2000) followed 294 Italian children over a five-year period examining the relation between prosocial skills and academic achievement. Findings indicated that student prosocial skills in third grade contributed 35% of the variance to individual differences in academic achievement later in eighth grade. This suggests that young children with well developed

prosocial behaviour develop into adolescents with greater academic success than their peers with lower levels of prosocial behaviour. Moreover, when the contribution of early prosocial skills was controlled, researchers found that early (i.e. third grade) academic achievement did not make a significant contribution to the model. By contrast, in Algozzine and colleagues' study (2011), prosocial behaviour did not significantly predict reading achievement either concurrently or prospectively.

Wentzel's (1993) study shows that prosocial behaviour can predict variability in standardized measures of academic achievement. Carpara and colleagues (2000) suggest that the paired relation of prosocial skills and prior academic achievement predict later academic achievement, illustrating the importance of prosocial skills to academic achievement. Conversely, Algozzine et al., (2011) argue that the positive association between student behaviour and academic achievement exists because teachers are more likely to rate well behaved students positively on tools that measure social skills while maintaining higher academic expectations of them.

Inattention, aggression and academic achievement. Attention can be defined as the ability to regulate and focus cognitive resources on a goal-directed activity. The additional ability to regulate and maintain attention during objectively uninteresting tasks is illustrative of well developed attentional capacities (National Research Council and Institute of Medicine, 2000; Spira & Fischel, 2005). Attentional abilities are considered part of executive function, a higher order cognitive process responsible for directing self-regulation of behavioural and emotional capacities, and promoting goal directed behaviours (Bernier, Carlson, & Whipple, 2010). During childhood, theories suggest a stage-like progression of development featuring increases in maturation and growth around ages four to six years and ten years, followed by relative stability

(National Research Council and Institute of Medicine, 2000; Spira & Fischel, 2005). Posner and Rothbart (2000) suggest that after age six to eight years, dimensions of attention (e.g. inhibitory control) stabilize. Further, Posner and Rothbart (2000) describe improvement in the behaviours associated with inattention at this stage, even for children with a more severe presentation, such as attention deficit hyperactivity disorder (ADHD). Children exhibit individual differences in attention such that substantial inattention and distractibility may precede a more clinical presentation of attention deficit disorder (Spira & Fischel, 2005). Further, factors including individual engagement with a task, and the environment also influence children's ability to attend.

Whereas a unified definition of aggressive behaviour has been difficult to establish, it can be conceptualized as an action that is intended to harm or frighten another individual or object (Brendgen, & Barker, 2006; Shaw et al., 2000). Aggressive behaviours can be delineated into proactive (those that are intentional and initiated) versus reactive (in response to a perceived negative act) as well as physical versus relational (Vitaro, Brendgen, & Barker, 2006). Aggressive and disruptive behaviours have a particularly enduring nature and are frequently comorbid with academic, peer, relationship, and substance-use problems (Vitaro, Brendgen, & Barker, 2006). From a developmental perspective, multiple conditions in early childhood contribute to the stability of aggressive and externalizing behaviours. Oppositional behaviours as early as age three are reinforced and perpetuated by harsh and inconsistent forms of discipline (Patterson, Reid, & Dishion, 1992). Neuropsychological deficits in executive functioning, poor self-regulation, and poor inhibition control are intrinsic child characteristics common to those with aggressive behaviours (Moffitt & Lynam, 1994; Tremblay, Pagani-Kurtz, Mâsse, Vitaro, & Pihl, 2004). Parental habits (e.g. maternal substance use), inconsistent parental involvement, and

other language and cognitive deficits collectively contribute to the stability of aggressive and conduct problems throughout the childhood and adolescent developmental period (Moffitt & Lynam, 1994). Socio demographic vulnerabilities including low SES, and parent work responsibilities that demand large numbers of hours outside of the home exacerbate existing disruptive and aggressive behaviours during the pre-school period (Shaw, Owens, Vonda, Keenan, & Winslow, 1997).

At school entry, children displaying aggressive and externalizing behaviours often lag behind their same aged peers in emotional, interpersonal, and social skills (Shaw et al., 1997) and, consequently experience peer rejection, poor quality student-teacher relationships, and academic difficulties. Limited problem-solving abilities, immature cognitive preparation for the school environment, and an overestimation of the positive effect of aggression in social problem-solving contribute to this negative school experience (Coie & Dodge, 1988; Perry, Perry, & Rasmussen, 1986).

Inattention and aggression are two maladaptive social behaviours that are particularly counterproductive to academic achievement and often lead to academic failure (Arnold et al., 2012). Externalizing behaviour and co-existing academic difficulty is less amenable to intervention and the co-existence of aggression and academic difficulty in the school setting occurs at a higher than chance rate (Arnold, 1997). Arnold and colleagues (2012) suggest that inattention limits students from engaging in classroom learning opportunities, affecting their development of academic skills. As children get older and academic difficulties persist, aggression becomes more pronounced, and children present with disruptive behaviours due to frustration with their academic difficulties (Arnold et al., 2012). Subsequently, students may become increasingly more disengaged from school and from opportunities to learn, which is

further exacerbated by the widening gap between these students' academic skills and age and grade expectations (Arnold et al., 2012). Inattention and aggression do not always present with comorbidity but are frequently examined together to elucidate the nature of their relation and the direction between inattention, aggression, and academic achievement.

In early childhood (ages three to eight years), during the pre-school and early elementary school period, inattention appears as a reliable predictor of academic difficulties (Arnold, et al., 2012). Conversely, aggressive/disruptive behaviours illustrate a relation to academic achievement during this developmental period, but have less empirical support for their contribution to individual differences in academic success (Carpara, et al., 2000; Algozzine, et al., 2011; Rabner, Coie & Conduct Problems Research Prevention Group (2000). In one study, Arnold and colleagues (2012) investigated the effect of inattention and aggression on emergent reading in 467 pre-school children. Correlations between each maladaptive social predictor (i.e. inattention and aggression) and emergent reading were negative and significant, although small ($r = -0.21$; $r = -0.11$, respectively). Follow-up analyses indicated that, whereas inattention contributed to variability in emergent reading scores, aggression did not when inattention and social skills were controlled. In an earlier study Arnold (1997) examined the hypothesis that externalizing behaviour and inattention in young children was associated with concurrent emergent academic difficulty. Correlation between a composite score of externalizing behaviour and academic achievement demonstrated a moderately strong relation ($r = -0.59$). Correlations between externalizing behaviour and emergent academic skills grew stronger as a function of age, with the largest relation emerging for children aged 65-74 months ($r = -0.84$). Finally Arnold (1997) found that attention mediated the path from emergent academic skill to disruptive behaviour where poor academic skill led to disruptive behaviours, causing children to be less attentive to lessons and

school work. Rabner, Coie and the Conduct Problems Research Prevention Group (2000) examined the effect of inattention on reading achievement in a large group ($N = 387$) of preschool children enrolled in the Head Start program. They conducted a randomized, controlled study in which students' inattention and reading achievement skills were measured from kindergarten to fifth grade. Inattention emerged as a consistently negative predictor of reading achievement with higher inattention predicting lower reading achievement in grade one. In later elementary, higher levels of inattention measured in grade two independently predicted individual word identification and reading comprehension in fifth grade after the effect of prior reading achievement were accounted for. Similarly, in Carpara and colleagues' study (2000) aggression scores in third grade did not significantly predict variability in academic achievement in eighth grade. Similar findings in an investigation conducted by Maleki and Elliott (2002) demonstrated that problematic or negative behaviours are correlated with concurrent academic success, but do not predict later academic achievement.

By contrast, whereas Arnold et al. (2012) and Carpara et al. (2000) did not find contributions from aggression to academic parameters, other research has demonstrated that aggression in early schooling can predict academic failure in later grades (see Hinshaw, 1992). To elucidate the relationship between aggression and reading achievement, Miles and Stipek (2006) followed approximately 400 students at-risk of academic difficulty from first to fifth grade.

Correlation analyses indicated significant positive associations for aggression scores across grades (i.e., grade one, grade three, grade five), demonstrating the stability of this construct over time. Similarly, reading achievement scores were also significantly associated across grades, suggesting stability in reading achievement over time. Between variables, lower levels of reading

achievement in earlier grades were associated with higher aggression scores in later grades. However, aggression in grade one was not correlated with reading achievement in grade three. Aggression in grade three was negatively and significantly related to reading achievement in grade five. Miles and Stipek's (2006) correlational findings demonstrate support for the stability of aggressive behaviours across the elementary grades, as well as support for the hypothesis that impairments in reading achievement in early grades can be followed with externalizing behaviours in later grades, and finally that aggressive behaviours observed in students in middle elementary are associated with later academic difficulty.

Predictions within constructs were supported where first grade aggression significantly predicted third grade aggression, which, in turn, predicted fifth grade aggression. Results were mirrored for reading achievement. Between constructs, lower reading achievement predicted higher aggression. Specifically, lower reading achievement in first grade predicted higher aggression scores in third grade and low reading achievement in third grade predicted high aggression scores in fifth grade. Miles and Stipek's (2006) results provide further support for those discussed earlier in which aggression in the very early years of schooling, while observed as a problematic behaviour, provides little to no independent contribution to individual differences in reading achievement. However, by third grade findings here suggest that a relationship that begins with poor reading achievement in early grades leads to higher levels of aggressive behaviours in later years (Miles, & Stipek, 2006).

Inattention, even during the pre-school period, adversely affects academic achievement (Arnold, et al., 2012; Arnold, 1997), and is predictive of academic achievement. Aggressive and externalizing behaviour shows a correlation with academic achievement that is stronger as children get older (Arnold, 1997), but does not consistently contribute to individual differences in

academic achievement in pre-school or early elementary populations (Arnold et al., 2012; Arnold, 1997; Carpara, et al., 2000; Malecki & Elliott, 2002).

Childhood Well-Being and the Effect on Adult Adjustment

Research has demonstrated the stability of some behavioural traits over time and the effect of childhood functioning concurrently and on later adjustment (Caspi, et al., 1987; Parker & Asher, 1987; Cunningham & Stanovich, 1997). Externalizing behaviours including aggression and conduct disorder are two that may be particularly stable and enduring and which cause many undesirable outcomes. Caspi and colleagues (1987) found that aggression, in their sample, followed a life-course persistent trajectory, which resulted in many forms of adult maladjustment. In their study, children who exhibited disruptive behaviours persistently across the elementary grades developed into adults who were more likely to engage in substance use and dependency, attain lower levels of education, have unstable employment or unemployment, and were more inclined to divorce. Whereas not all forms of childhood aggression maintain the same negative trajectory, Caspi, et al., (1987) suggest that maladaptive behaviour in childhood may pull individuals into environments that sustain and perpetuate those same behaviours, thus maintaining maladaptive social behaviour across the lifespan. Similarly, in a seminal study investigating the influence of peers on the socialization of aggressive impulses and cognitive development, Parker and Asher (1987) demonstrated that aggressive behaviour was stable over time, occurred in conjunction with increased instances of academic difficulties, and predicted school drop out at a rate of six times that of non-aggressive students. Rolf and Wirt (1984) also determined that aggression in childhood directly contributed to behaviours that were precursors to later delinquent behaviour (e.g., stealing, running away, infractions with the law, and truancy).

Academic achievement is also a robust predictor of concurrent and long-term adjustment. In particular, academic achievement is positively related to overall academic success (Ladd, 1990), while negatively related to early school withdrawal, and dropping out (McCaul, Donaldson, Coldarci & Davis, 1992). These academic factors affect later opportunities for academic attainment, occupational attainment, and financial security (National Centre for Educational Statistics, 1997). The effect of early academic success is underscored by rates of low literacy and numeracy in populations of incarcerated adults where 62% have reportedly not completed high school (Landry, 2012) and 55% of those in correctional facilities in Eastern Canada report literacy and math skills below a grade 10 level (Literacy Nova Scotia, 2003).

In sum, the early years of children's development have been shown to have an important effect on healthy adjustment in childhood and can serve to set the stage for positive adult adjustment. Many skills, behaviours, and environments in childhood are stable over time and inform developmental trajectories. It has been suggested that the school environment can act as an environment of universal intervention to shape children's development, re-directing vulnerabilities toward positive trajectories (Frempong & Williams, 2002; CPRPG, 1999a). The literature investigating inattention, aggression, and academic achievement supports the negative effect of these behaviours on academic achievement. Aggression and externalizing behaviours become increasingly counterproductive to academic success as children age, namely by mid elementary (grade three and above; see Arnold, 1997). Attention has been shown to mediate the causal path between academic success status and externalizing behaviour (Arnold, 1997), while inattention has been linked to the initiation of academic difficulty (Arnold, et al., 2012). However, the nature of the relations between attention, aggression, and academic achievement remains unclear. In particular the early elementary and pre-school years literature has demonstrated a

consistent relation among these constructs but mixed evidence supporting its nature. Further, during very early years of schooling (i.e. pre-school and early elementary) the relations are weaker among these variables.

Literacy

The Importance of Literacy

Whereas the concept of literacy can be interpreted to encompass effective skills in a variety of areas (e.g. reading, writing, technology), for the purposes of the present discussion, it is intended to refer to reading. Becoming an efficient reader is important because of reading's effect on the ability to meet academic outcomes, but also because of its contribution to success in every day life (Whitehurst, & Lonigan, 2001; Miles and Stipek, 2006). Reading skills in early elementary school (i.e. grades kindergarten through three) are significantly associated with completion of high school, overall academic success (Whitehurst, & Lonigan, 2001), and academic attainment (e.g. Torgesen, 2002). Later, adult literacy predicts economic security, income, occupational attainment, and sustained employment (Conference Board of Canada, 1997). Conversely, children who struggle academically and experience persistent academic failure initiate trajectories that may lead to underemployment, limited occupational success, financial stress, and impaired interpersonal relationships in adulthood (Kokko & Pulkkinen, 2000). Few educators, researchers, or parents would fail to recognize the importance of well developed reading skills in childhood or as they contribute to healthy developmental trajectories (e.g. Nelson, Lane, Benner, & Kim, 2011). Purposes of reading include comprehending narrative and connected text, making connections between text and current knowledge, the enjoyment of prose, attaining new information, and educating oneself (Metsala, 2012). However, because of the opacity of the English language, there can be significant challenges to the acquisition of strong

and efficient reading skills for children as they are learning to read during the early elementary years (Miles, 2000).

The Development of Reading in Children

Two theories of reading acquisition inform our current understanding of how efficient and skilled readers develop. The Self-Teaching Hypothesis of reading acquisition (Share, 1999) suggests that, with each word that is successfully decoded during a child's independent reading experience, an opportunity to embed the specific orthography of that word occurs. Children are therefore viewed as self-directed contributors to the acquisition of the strong word identification skills needed to be independent and efficient readers (Share, 1999). The self-teaching hypothesis proposes an item-by-item progression rather than a progression through a series of stages from phonological to printed forms. As such, Share (1995) suggests that through the developmental process of phonological recoding, the number of exposures to individual words will influence the processing of orthographic information, which is a process that could occur in just a few exposures (see Ehri, & Saltmarsh, 1995). Words that are frequently encountered during independent reading will be readily embedded while unknown words, even for skilled readers, will prompt the reader to rely on phonological elements and decoding (Share, 1999). A salient feature of the self-teaching hypothesis to the promotion of strong and efficient reading skills is its focus on early experiences in the reading acquisition process. Specifically, Share (1999) argues that, even before children are fully capable of segmenting and blending phoneme-grapheme correspondences to decode unfamiliar words, they are able to benefit from their ability to self-teach. Knowledge of the alphabetic principle, a developed sense of basic phonetic letter-sound associations, and sufficient context information to determine the pronunciation of the word allow

children to begin to process and embed orthographic representations of many words during this developmental stage (Share, 1999).

Stage theory (Ehri, 2005) suggests that readers move through four distinct stages as they continue to gain additional information about the alphabetic principle. In the *pre-alphabetic* stage, readers have little working knowledge of the alphabetic principle and therefore identify words using almost exclusively environmental cues (i.e., salient visual cues) without engaging in the letter-sound connection-forming process. In the *partial-alphabetic* phase, information and knowledge about vowels and their sounds have not been solidified, but children develop a stronger understanding of letter-word connections and how these associations apply to reading words. Readers in the partial-alphabetic stage almost exclusively rely on the most salient letter-sound connections found within the words they encounter, typically the initial and final sounds. In the *full-alphabetic* phase, children are able to form complete connections between letters, phonemes, and make phono-grapheme correspondences, allowing them to learn to read accurately by sight, as well as building and solidifying a larger repertoire of words in memory. In the *consolidated* phase, children become more adept with letter-sound correspondences and are able to efficiently recognize larger chunks of individual words. In doing so, children's efficiency with correctly identifying multi-syllabic words grows significantly (Ehri, 2005).

In sum, accepted theories of reading acquisition assert that strong, efficient readers are able to recognize a large number of words effortlessly (Metsala, 2012), which in turn allows cognitive resources to be used for higher order process such as comprehension, metacognitive strategy use, and making connections from print (Parfetti, 1985). Word recognition skills are facilitated by underlying mechanisms that support the development of early and strong reading

skills including a thorough understanding of the alphabetic principle, strong phonological awareness, and letter-sound knowledge (Adams, 1990).

Educational and Instructional Practices to Support Strong and Efficient Reading Skills

In the earliest years of schooling, efficient word recognition contributes to successful reading throughout children's school experience (Metsala, 2012; Stanovich, 1986), encourages engagement in reading (see Whitehurst and Lonigan, 2001), encourages a high volume of reading (Stanovich, 1997), and has been demonstrated to predict reading comprehension in later grades (Cunningham & Stanovich, 1997). In a seminal review and meta-analysis of the extant literature investigating reading instruction, the National Reading Panel (2000) made extensive recommendations with respect to instructing all students to read skillfully and efficiently. Instructional reading programs with components addressing phonemic awareness, the alphabetic principle, and phonics instruction were deemed to be superior in their ability to teach core reading skills to children of various ages and grades than programs without these components (NRP, 2000). Indeed, some research indicates that instruction incorporating these elements in the earliest grades (i.e. grade primary, grade one) substantially reduces concurrent referrals to support services for reading remediation (Al Otiaba & Torgesen, 2007; D'Anguilli, Seigel, & Maggi, 2004).

Individual Differences in Reading Acquisition

Poor word recognition appears as one of the most frequent obstacles in the development of efficient reading skills and is typically due to weak phonological skills (Metsala, 2012). Early identification of children's underdeveloped phonological awareness, decoding, and word recognition skills is essential because, left unattended, these deficits may develop into reading difficulties and disabilities that can present as stable deficits across the school experience into

adulthood (e.g. Torgesen, 2002). Research investigating interventions for older students (i.e., grades 7 to 12) with reading disabilities has demonstrated the stability and enduring nature of these challenges if they are not remediated early (Lovett et al., 2012; Siegel, 2013). As such, remediation efforts with students beyond grade four require substantial increases in intensity, duration, and perhaps individual delivery of remediation (Wanzek, Vaughn, Roberts, & Fletcher, 2011; Roberts, Torgesen, Boardman, & Scammacca, 2008). Whereas younger students (i.e., grades kindergarten to two) with poorly developed phonological awareness skills, decoding skills, or word recognition skills can attain grade-level expectations after approximately 40 hours of reading intervention in these areas, this is less so for older students beyond grade five (NRP, 2000; Lovett et al., 2012). Further, students struggling with reading who are in junior high and high school may require upwards of more than 70 to 80 hours of intensive, direct instruction in a small group or individually to meet age and grade-level expectations (Lovett et al, 2012).

At a later stage in their education, students in late elementary (i.e., grades five and six) and junior high (i.e. grades seven to nine) experience more profound consequences from reading deficits. Instructional texts become more prevalent and learning opportunities require the acquisition of knowledge and information from such sources. Further, older struggling readers can display deficits in many areas of reading, including comprehension and fluency (Roberts et. al, 2008; Ritchey, Silverman, Montanaro, Speece, & Schatschneider, 2012; Wanzek, & Kent, 2012), but many still show measurable deficits in word recognition ability (Goswami, 1993; Waznek, & Kent, 2012) and decoding ability (Paulesu, 2001; Waznek, & Kent, 2012). As such, more time intensive multicomponent interventions that target specific deficits in word recognition and word decoding as well as comprehension and fluency strategies are frequently required (Ritchey, et al., 2012). For example, Wanzek and colleagues (2011) sought to

investigate the efficacy of supplemental reading interventions in a group of students with reading disabilities in grades six through eight. Participants received one 45-50 minute period of intervention on a daily basis for the duration of the school year. In addition to instruction in vocabulary and reading comprehension, participants also received explicit instruction in English phonology, recognizing high frequency words accurately and quickly, and strategies for applying phonics to multisyllabic words. Results indicated moderate and significant effects for the treatment group over the control group on measures of sight word reading fluency and small effects on phonemic decoding fluency. Therefore, after the reading intervention students were more accurate and efficient on timed measures of decoding and word recognition. On untimed measures of word recognition, word attack (phonemic decoding), and comprehension no significant differences were found between groups which lead the investigators to posit that by grades six and up, students with reading disabilities would require more instructional time spent in the intervention to make sizable gains in these areas (Wanzek, et al., 2011).

In sum, processes including phonological awareness, phonetic understanding, an understanding of the alphabetic principle, and efficient word recognition are each essential in the development of strong and efficient reading skills. Share (1999), and Ehri's (2005) theories of reading acquisition provide theoretical support for the contribution of these skills to the developmental process of learning to read in childhood. The reading intervention literature (Torgesen, 2001; 2006; Lovett et al., 2012; D'Aniulli et al., 2004; Wanzek, et al., 2011) has demonstrated the stability of unremediated reading difficulties over time, the consequent increases in intensity and duration that remedial interventions require as children get older, as well as the lost opportunities for knowledge acquisition when students are unable to comprehend instructional texts. Further the existing relation between socio-economic vulnerability and

difficulty in acquiring efficient reading skills (Whitehurst, & Lonigan, 2001; Newman, 2001) has been strengthened by D'Angiulli and colleagues' (2004) study in which students with low socio-economic status initially displayed larger impairments in reading skills. Finally, the consequential association of reading difficulty to school drop-out leading to lower educational attainment, lower occupational achievement, unstable employment, and unemployment is well established (Whitehurst, & Lonigan, 2001). This makes skills that support or underlie reading acquisition important to examine in students in their early years of school, even more so within the context of child development where concurrent and prospective indices of healthy adjustment are of interest, as in the present study.

CHAPTER TWO

The Effect Of Promoting Alternative Thinking Strategies on Social Competence and Reading Achievement

Whereas the primary purpose of school is to promote academic skills, the school environment is also a social setting in which the social and academic domains are interconnected (Miles, & Stipek, 2006). The challenges currently facing Canadian schools have changed considerably over the past 50 years, as increased numbers of students has resulted in increased class sizes in many schools (Greenberg, et al., 2003). Along with the increased numbers of students being educated, diversity within the student body and surrounding communities continues to grow, as do the numbers of immigrant families and multilingual students. (Greenberg, et al., 2003; LaCroix, 2014). The ability of schools to provide a welcoming, inclusive, and supportive environment that is capable of educating all students in both academics and appropriate social behaviour can be a challenging process with many levels of complexity (Learning First Alliance, 2001).

A Description of the Regional Climate of Education

In Canada, 3.2% of children aged 5-14 years self-identify as having learning, attentional or psychosocial challenges that may affect their school experience (e.g., dyslexia, ADHD; Statistics Canada, 2006). Further, 94.5% of students with such challenges are enrolled in Canadian schools and, of those students, 89.6% require special education services to assist them in meeting age and grade level learning objectives (Statistics Canada, 2006). Additionally, mental health concerns affect a large number of school-aged children. Approximately 10-20% of Canadian youth present with symptoms of mental health disorders such as depression, anxiety, and schizophrenia (Canadian Mental Health Association, 2014). Of those students at risk for mental illness, only a

reported 20% receive appropriate medical or psychological intervention and care, leaving unidentified youth at increased risk for academic, health, and interpersonal difficulties (Canadian Mental Health Association, 2014). This underscores the responsibility of Departments of Education, school boards, and individual schools to invest resources and time into curriculum aimed at building resiliency and coping skills, and reducing the effects of risk factors in children. Children who are at-risk for academic difficulty due to socio-economic vulnerability, underdeveloped processing skills (i.e. phonological awareness), disruptive behaviour, inattention or mental health concerns are at increased risk of persistent academic failure (Newman, 2011; Lonigan, 2011; Arnold, et al., 2011; Algozzine et al., 2011), school drop-out (Hymel & Ford, 2003), and limitations to healthy adjustment in adulthood (Parker & Asher, 1987; Moffit et al., 2011).

Social Emotional Learning

Curricula aimed at increasing students' health, resiliency, motivation to learn, reducing the effects of risk factors or risky behaviours (e.g., substance use), and cultivating high academic achievement, as well as positive forms of social behaviour or social competence have been developed and implemented over the past 30 years (Greenberg, et al., 2003; Conduct Prevention Research Group, 2010; Wentzel, 1998). Social Emotional Learning (SEL) was introduced in the early 1990s as a framework through which to conceptualize such school-based health promotion as a unified approach (Greenberg, et al., 2003). Social Emotional Learning is implemented through classroom instruction that is culturally sensitive. Curricula is applicable to common situations and provides direct instruction in recognizing and managing emotions, understanding the perspectives of others, establishing positive goals, making responsible decisions, and behaving appropriately during interpersonal interactions (Collaborative for Academic, Social, and

Emotional Learning, CASEL, 2003). Current research suggests that SEL programs are effective in increasing academic achievement and social competencies in children (Durlak et al., 2011). Given the literature demonstrating the adverse consequences of underdeveloped social competence, maladaptive behaviour, and persistent academic difficulty, SEL programs propose a multi-component method to address these areas in a unified manner.

Social Emotional Learning has demonstrated efficacy in simultaneously promoting protective factors and reducing the effect of risk factors in children and youth (Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2002), thereby bridging the fields of risk prevention and resiliency promotion (Guerra & Bradshaw, 2008). Many SEL programs operate as programs of universal intervention/prevention and include all students in the curricula, rather than targeting specific populations for intervention due to either risk status (e.g., SES) or maladaptive factors (e.g., academic failure, aggressive behaviours). Traditional secondary or tertiary intervention programs that are aimed at children with deficits in specific areas have historically used a largely categorical approach, in that they have focused on isolated risk factors (e.g., reducing aggressive behaviours, increasing assertive behaviours; Greenberg, et al., 2003) or have been restricted due to theoretical grounding in either resiliency promotion or risk prevention (Guerra & Bradshaw, 2008). Whereas categorical intervention programs have been met with success in very specific areas (e.g. reduction in substance use), consequent effects are restricted to only these specific areas, meaning that generalizability of programs is limited.

Social Emotional Learning programming is aimed at fostering development in the following five interrelated areas that incorporate cognitive (i.e. thoughts), affective (i.e. emotional), and behavioural domains: (1) self-awareness; (2) self-management; (3) social-awareness; (4) relationship skills; and (5) responsible decision-making (Durlak, et al., 2011). It is

hypothesized that, if SEL programs are implemented with quality teaching and ‘real-life’ opportunities to practice strategies outside of specific lessons, students will experience increased adjustment, higher academic achievement, fewer conduct problems, and more positive social behaviours (Greenberg, et al., 2003).

Durlak and colleagues (2011) conducted the first large meta-analysis of SEL programs and assessed outcomes such as social and emotional skills, attitudes toward the self and others, positive social behaviour, conduct problems, emotional distress, and academic performance. Results of this meta-analysis indicated that SEL programs led to positive outcomes in the areas of social-emotional competency and attitudes about the self, school, and others. Additionally, SEL programs increased student academic achievement as assessed through standardized assessment measures or through review of student grades. One specific criterion on which each SEL program was measured in this meta-analysis was whether implementation included sequenced lessons, *active lessons*, *focused lessons*, and *explicit teaching in the lessons* (i.e., *S.A.F.E.* practices). Intervention programs that integrated these components significantly outperformed others at increasing SEL skills and attitudes, increasing social behaviour and academic achievement, and reducing emotional distress and conduct problems. Conversely, programs without *S.A.F.E.* practices only resulted in significant improvements in the areas of SEL attitudes, reducing conduct problems, and increasing academic achievement (Durlak et al., 2011). Therefore, while programs without *S.A.F.E.* practices reduced negative social behaviours (i.e. conduct problems), they lacked effectiveness in increasing pro-social behaviours and reducing emotional distress, two factors important to emotional well-being, interpersonal relationships, and school success (Wentzel, 1993; Kam et al, 2004). Intervention programs that were implemented by classroom teachers were more effective in reducing conduct problems, increasing academic achievement,

increasing positive social behaviour, and reducing emotional distress (Durlak, et al., 2011). Therefore, the authors assert that SEL programs demonstrate positive effects for students across the following domains; increases in positive attitudes toward the self and others, increased positive social behaviour in the form of better developed prosocial skills, reductions in examples of maladaptive behaviours including conduct problems and other externalizing behaviours, as well as significant increases in academic success (Durlak, et al., 2011).

Promoting Alternative THinking Strategies (PATHS)

One SEL program that has been particularly successful at meeting these goals in elementary schools is the *Promoting Alternative THinking Strategies (PATHS)* program (Greenberg & Kusché, 1993; Catalano et al., 2002; Conduct Problems Research Prevention Group, 2010; Kam et al., 2004). The PATHS program is a universal Social Emotional Learning prevention/ intervention program that is delivered in elementary schools and includes curriculum and lessons for students in kindergarten through grade six to facilitate a ‘whole-school’ approach. Students receive direct instruction in social-emotional learning and are dually supported through a whole-school climate of faculty, administrators, and learners working towards high levels of social-emotional awareness and skills. Specifically, the PATHS program was designed to support social and emotional development and build problem-solving abilities. The program does so by focusing instruction in five key areas: (1) self-control; (2) emotional understanding; (3) self-esteem; (4) peer relations; and (5) interpersonal problem-solving. These areas are consistent with broad SEL domain areas and are also consistent with factors identified in the literature to either positively affect the school experience (e.g. emotional understanding, interpersonal problem-solving) or negatively affect the school experience (e.g. poor self-control, peer rejection; Greenberg & Kusché, 1993).

With respect to its empirical foundation, the PATHS program draws directly on child development research, with specific focus on the affective-behavioural-cognitive-dynamic (ABCD) model of development (Kam et al., 2004; Greenberg & Kusché, 1993). According to the ABCD model of development, emotional development occurs before many other forms of cognition. Therefore, children in their early years experience emotions and emotional responses to various people (e.g., adults or peers), situations (e.g., conflict or change) and environmental stimuli (e.g., home environment or school environment) before having the appropriate language to describe and process associated feelings. As such, the ABCD model focuses on the developmental integration of affect and language (Kam, et al., 2004). Drawing on this theoretical underpinning, PATHS promotes children's understanding of social problems, thinking through interpersonal conflicts, and choosing responsible solutions that reflect well developed social emotional understanding (Kam et al., 2004). By teaching children to understand their feelings and correctly identify them, PATHS promotes prosocial solutions to interpersonal interactions (Kam et al., 2004). As children develop, along with their language abilities, one of the fundamental goals of PATHS is for children to refine the process of understanding emotions and affect and build their individual self-regulation through internal verbal mediation (Kam et al., 2004).

PATHS Program Implementation

The PATHS program is curriculum-based and is delivered by classroom teachers who are trained by PATHS coaches. Curriculum is delivered in weekly lessons and additional activities that are used to generalize the concepts outside of the lessons. Generalization of skills throughout the school environment provides additional practice of the concepts, which is hypothesized to facilitate internalization of important skills (Greenberg & Kusché, 1993). At the school level, PATHS coaches instruct teachers and school staff in methods of incorporating the PATHS

philosophy throughout the whole school (Conduct Problems Research Prevention Group, 2010). In this way, the PATHS program effectively encourages individual development of students' social-emotional learning and positive relationships between peers, as well as between students and teachers, and improves the teacher's approach to interacting with students (Greenberg, Kusché, & Riggs, 2004). In using and capitalizing on school-based resources, the PATHS program has the advantage of integrating its curriculum and philosophy into an already existing infrastructure and environment, rather than attempting to restructure it completely. Furthermore in doing so, PATHS school administrators and staff can attempt to reduce the economic costs associated with programming.

Effectiveness of PATHS

The PATHS intervention has been implemented in both regular education and special education classrooms for the past 20 years. The PATHS program has been demonstrated to effectively reduce maladaptive social behaviours including aggressive/disruptive behaviours and externalizing behaviours in some populations (Conduct Problems Research Prevention Group, 1999a; 1999b; 2010). It has also shown utility in promoting and increasing positive social behaviours including social competence and emotional understanding (CPRPG, 1999a; Kam et al., 2004). Perhaps its greatest strength, as reported in the literature, is in teaching children to correctly, accurately, and fluently identify feelings and emotions. Finally, PATHS meets the *S.A.F.E.* criteria identified by Durlak and colleagues (2011) in their meta-analysis of SEL programs. As such, PATHS should demonstrate robust utility in teaching students in SEL domain areas if the program is implemented correctly.

Externalizing behaviours and inattention. The Conduct Problems Research Prevention Group (CPRPG) has conducted multiple studies investigating the efficacy of PATHS. In one randomized controlled study, the CPRPG (1999a) evaluated the PATHS component of ‘Fast Track’, a multicomponent intervention program developed to reduce aggressive, disruptive, hyperactive behaviours, and conduct problems. The PATHS program was implemented in 378 classrooms of children at risk of persistent aggression, over three years. Results demonstrated the effectiveness of PATHS in reducing aggression and hyperactive behaviours, based on peer report; however, reported effect sizes were small (aggression $ES = -0.22$ and hyperactive/disruptive behaviour $ES = -0.22$) and the intervention was not effective in reducing teacher ratings of externalizing behaviours at post-test. Small effect sizes and non-significant changes in teacher reports of aggression were attributed to problems with treatment fidelity. Despite these difficulties, the authors suggest their findings demonstrate the utility of a school-wide, universal intervention in modifying student behaviour.

In a similar study, the CPRPG (1999b) evaluated the efficacy of “Fast Track” for children at high risk of long-term antisocial behaviour. “Fast Track” combines the PATHS universal intervention with targeted social-skills, parent training, and academic tutoring interventions as secondary efforts for identified children. Kindergarten students from 54 schools in four regions of the United States who displayed high oppositional and aggressive behaviours participated in one year of the intervention ($N = 891$). At post-test, independent raters noted fewer observations of aggressive behaviours for students in the intervention group than in the control group. Some teacher and parent-reported scores of aggressive and externalizing behaviours showed significant differences between groups at post-test, while many did not indicate an effect of the intervention. In a final study examining the effect of PATHS on externalizing behaviours, the CPRPG (2010)

examined the efficacy of PATHS on externalizing behaviours in students from grades one to three ($N = 2937$). At post-test, intervention schools exhibited significantly lower levels of problem behaviours as compared to students in control schools. Teacher-report scores reflected intervention effects, however, effect sizes were small ($ES = 0.12-0.24$). Investigators further found that students with higher levels of aggressive behaviours at the inception of the study derived the greatest benefit from the PATHS program, as evidenced by greater reductions in aggressive behaviours. Conversely, intervention effects were not as strong for outcome measures in schools with lower socio-economic status. (CPRPG, 2010). In another study, Curtis and Norgate (2007) investigated the efficacy of the PATHS intervention in five intervention and three control schools as a pilot project for their school district. Students were measured on outcome variables including, conduct problems, and peer relationship problems. Post-intervention results demonstrated significant reductions in conduct problems, and peer relationship problems in students receiving the PATHS curriculum as compared to students in the control schools.

Finally, Crean and Johnson (2013) examined the efficacy of PATHS for students with aggressive behaviours. Investigators described theirs as a particularly unique investigation of PATHS, as the first independent randomized replication of the intervention and, as such, as presenting unbiased results. Participants included two cohorts of grade three children from 14 schools who were followed over two years. Once schools agreed to participate, they were randomly assigned to either a PATHS treatment groups ($N = 7$ schools) or a control group ($N = 7$ schools) in which educational practice continued as usual.

Participants began the intervention in grade three and were followed until the end of grade five. Results of teacher-report measures demonstrated a reduction in conduct problems over time, in which the data were curvilinear. Therefore, in the first year following the inception of the

intervention, conduct problems were reportedly higher than at pre-test. Reported effect sizes were stronger as children got older, for changes in conduct problems. Regarding student self-report measures, scores reflecting social problem-solving, hostile-attribution bias, and aggressive interpersonal problem-solving strategies were significantly improved for the intervention group. However, scores reflecting aggression, delinquency, and victimization were not affected by the intervention. Therefore, PATHS was demonstrated to be effective in diminishing conduct problems in students over time and appeared to improve elements that are important within the social-information processing model of interpersonal interaction and managing emotions (i.e. hostile attribution bias, social problem-solving, and aggressive interpersonal strategies). However, it was not effective in reductions of aggressive or externalizing behaviours as measured by teacher-report in the first year.

With respect to attention, Dimitrovich, Cortes, and Greenberg (2007) examined PATHS effectiveness in improving inhibitory control, and attention in four year-old students from the Head Start Programs. However, neither inhibitory control nor attention were changed by the intervention according to post-test measures. By contrast, in the CPRPG (2010) study of students at-risk for persistent externalizing behaviours, students were also assessed on dimensions of attention and concentration. Results indicated small effect sizes on measures of cognitive concentration.

Social-emotional competence. In the CPRPG (1999b) study reviewed above, authors also examined the effect of “Fast Track” on prosocial behaviour, emotion understanding, and social problem-solving. Results indicated that students in the intervention group performed significantly better on measures of emotion recognition, emotion coping, and social problem solving. By contrast, in the CPRPG (1999a) study, authors examined the efficacy of PATHS in

improving at-risk students' social-emotional competence. Results indicated no intervention effect on peer report of prosocial behaviours. (CPRPG 1999a). Therefore, the additional targeted social-skills training contributed to improvements in prosocial behaviour among this population of youth at-risk of persistent aggressive and conduct problems.

Dimitrovich, Cortes, and Greenberg's (2007) study supports PATHS' utility in improving social-emotional competence and emotion understanding. These authors examined the effect of PATHS on measures of social-skills, in four year-old students from the Head Start Program. Participants were randomized at the classroom level, resulting in 10 intervention and 10 control classrooms (N = 246). Students received PATHS for one school year. Teacher-report measures demonstrated that PATHS students illustrated higher levels of social skills, were more cooperative, more emotionally aware, and had more positive interpersonal abilities. Thus, this study further demonstrated the utility of the PATHS intervention in successfully improving children's prosocial skills.

The PATHS program has also been effective in improving social-competence in students with special needs. Kam and colleagues (2004) followed 133 first to third grade students with either learning disability, mild intellectual disability, emotional/behaviour disorder, ADHD or physical disability for one year. These investigators suggest that children with these diagnoses may be at increased risk for aggressive behaviour, internalizing symptoms, externalizing symptoms, interpersonal difficulties, and peer rejection, positioning them as students who could benefit substantially from the PATHS curriculum. With respect to internalizing symptoms, the rates of increase were significantly lower for PATHS students than for students in control schools. At post-test, self-reported depressive symptoms were significantly lower for participants in the PATHS schools than for those students not receiving the PATHS curriculum. At the study's

inception, PATHS students illustrated lower levels of social-competence and emotion knowledge, higher levels of both internalizing and externalizing symptoms, and higher levels of depressive symptoms, as compared to typically developing control students which may limit the generalizability of results.

Emotion knowledge and understanding. The PATHS program has demonstrated efficacy in increasing vocabulary, knowledge, and fluency in understanding, processing, and expressing emotions. In a field trial evaluating the efficacy of the PATHS intervention on children's ability to discuss and understand emotions, Greenberg, Kusché, Cook and Quamma (1995) evaluated the intervention for 286 elementary school children. Participants were in grades two and three. Groups were comprised of students from both regular education classrooms (70%) and special education classrooms (30%). After just under one academic year of participation in PATHS, results indicated improved vocabulary and fluency in discussing emotions, improvements in efficacy beliefs about managing personal emotions, as well as better emotional understanding as compared to control students. In the CPRPG (1999b) study examining "Fast Track", intervention students demonstrated improved skills associated with understanding emotions (including emotion understanding, emotion coping, and reduced aggressive responses to conflict). Given that "Fast Track" is intended for targeted populations, and that participants were at-risk of long-term aggression because they were deemed early starters, findings provide support for PATHS' utility in clinical populations. Finally, in Dimitrovich, Cortes, and Greenberg's (2007) study, dimensions of emotional understanding and knowledge were examined in relation to PATHS. Results demonstrated significant intervention effects on measures of emotion knowledge such that students showed larger feelings vocabularies, and were more accurate in identifying their feelings.

Reading achievement. In early studies examining PATHS efficacy, Greenberg & Kusché (1993; 1998) implemented the intervention in a population of students who were deaf or hard of hearing. One variable of interest included reading achievement as a function of PATHS. Scores using the Stanford Achievement Test (SAT; Madden, Gardner, Rumania, Karlsen, & Merwin, 1972) showed significant improvements in reading for the intervention groups versus the control group. In the following study (1998), the group that had comprised the waitlist control in the (1993) study, participated in the PATHS intervention and realized similar gains in reading achievement.

In the CPRPG (1999b) examination of “Fast Track”, reading achievement was assessed as well. At pre-test, both control and intervention students were assessed for reading achievement using the Woodcock-Johnson Psycho-Educational Battery letter-word ID (a measure of word recognition; Woodcock, Johnson, & Mather, 1989). Post-test scores on the letter-word identification task showed no group differences. The authors introduced a secondary test of word attack (the Wide Range Achievement Test; WRAT; word attack; Wilkinson, 1993) because they felt the item gradients on the Woodcock-Johnson letter-word ID task were not sensitive enough to capture the range of abilities of the developmental level of their participants. Further results indicated that intervention students significantly out-performed control students on the WRAT word-attack task as well as on language-arts grade scores; however, these measures did not have a pre-test score for either group. In the absence of a score at the study’s inception, attributing differences in reading achievement between groups at post-test exclusively to the Fast Track intervention is difficult. Further, “Fast Track” combined the universal PATHS intervention with targeted and specific components addressing parenting, social skills, and reading achievement to enhance generalization and intervention effects. Therefore, whereas reading achievement scores

showed improvements at post-test for intervention students, this cannot be attributed solely to PATHS.

In sum, the literature examining the efficacy of PATHS as a means through which to improve students' social-emotional knowledge, social competence, and academic achievement as well as reduce externalizing behaviours, aggression, and inattention has demonstrated some variability. A strength of the PATHS literature is that, across investigations, PATHS has demonstrated significant effects in increasing behaviours associated with social competence (Curtis & Norgate, 2007; CPRPG, 2010; Kam et al., 2004). In particular, researchers examining effects in populations with existing diagnoses (e.g., learning disability, ADHD, aggression, mild intellectual disability) have demonstrated reductions in externalizing behaviours and increases in social competence skills (CPRPG, 2010; Kam et al., 2004). In populations of students with special needs, PATHS has also demonstrated utility in reducing associated internalizing symptoms, thereby promoting emotional well-being. The PATHS intervention demonstrates its greatest strength in reducing aggressive, disruptive, and externalizing behaviours across populations of pre-school and elementary school students. However, a limitation of this literature is that behavioural ratings are not always consistent between sociometric nomination and teacher reports (Crean & Johnson, 2013) and further that teacher-report measures do not consistently show intervention effects (CPRPG, 1999a; 1999b; Crean & Johnson, 2013).

A second limitation to the literature is a dearth of recent studies singularly examining PATHS that include direct measures of academic achievement. Zins and colleagues (2007) suggest that because of the breadth of literature demonstrating the association between social competence skills and academic achievement, empirical evidence to substantiate the efficacy of SEL interventions in improving both of these domains is essential. Of the recent PATHS

literature, with the exception of early efficacy studies (Greenberg & Kusché, 1993; 1998), only one included direct measures of reading achievement (CPRPG, 1999a). However, this study implemented a unique, multicomponent Fast Track intervention in which PATHS comprised one of four components. The additional inclusion of a reading tutoring intervention for participants confounds findings regarding the efficacy of PATHS at improving students' reading achievement. While the Collaborative for Academic Social and Emotional Learning Report: Guide to Effective Social and Emotional Learning Programs in Preschool and Elementary School (CASEL, 2013) reports PATHS as effective at improving academic achievement in elementary school children, a review of the studies cited for use in their review of PATHS indicated that none used direct measures of academic achievement in the form of grades or standardized achievement tests, with the exception of the study of the Fast Track intervention (CPRPG, 1999b) discussed above.

A third limitation of the PATHS literature examining the effect of PATHS on social-competence behaviours is the methodology used in some of the reported studies, where control and intervention groups had significant differences on outcome variables at pre-test (e.g. Curtis & Norgate, 2007). These studies demonstrated significant gains on many outcomes of interest at post-intervention for participants in the intervention groups, however, because participants entered the study with group differences at pre-test these findings are also confounded. Another limitation in this literature has been proposed by Crean and Johnson (2013), who indicate a dearth of randomized, controlled studies conducted by researchers independent from PATHS program developers. A final limitation of this literature appears as the lack of Canadian studies and specifically none to date have been conducted in Eastern Canada.

The Present Study

The present study examined the efficacy of PATHS on social competence variables including aggressive/disruptive behaviours, attention, and social-emotional competence. This study is the first of its kind in Eastern Canada, and researchers are not affiliated with the developers of PATHS. As such, limitations identified by Crean & Johnson (2013) suggesting a dearth of studies conducted by researchers with no connection to PATHS developers, are addressed here. In addition, the current study examines the effect of PATHS on indicators of reading achievement including word recognition and word decoding skills. Including direct measures of reading achievement addresses the dearth of studies in the PATHS literature examining the effect of PATHS on reading achievement.

Research Questions

The current study addressed three primary research questions. First, an examination of the effect of PATHS on elementary students' social functioning (i.e., aggressive/disruptive behaviour, attention, and social-emotional competence) was conducted. Based on previous findings (e.g., Curtis & Norgate, 2007; CPRPG, 2010; Kam, et al., 2004; Crean & Johnson, 2013), it was hypothesized that students receiving the PATHS curriculum in grades primary through three would show reductions in aggressive/disruptive behaviour, increased attention, and increased social-emotional competence. Second, an examination of the effect of PATHS on word recognition and word decoding in the same population of children was conducted. Word recognition and word decoding were expected to improve as a function of PATHS. The final research question examined whether any of the three measures of social competence (i.e., aggressive/disruptive behaviours, attention, and social-emotional competence) predicted reading achievement either concurrently or prospectively. It was hypothesized that a relation would

emerge between attention and academic achievement given previous research in this area (Arnold, et al., 2012) and that attention would positively predict individual differences in reading achievement concurrently (Rabner et al., 2000). Given Wentzel's (1993) and Carpara et al.'s, (2000) findings, it was hypothesized that social-emotional competence would correlate with academic achievement but it was not expected to contribute unique variance to reading achievement at either time point. Wentzel's (1993) study demonstrated prosocial skills as a predictor of concurrent academic achievement, however, participants were considerably older than those in the present study. Carpara et al., (2000) also demonstrated prosocial skills to predict academic achievement, however their scores were collected over the course of five years. Finally, aggressive/disruptive behaviours were expected to be correlated with reading achievement, however, it was not expected that aggressive/disruptive behaviours predict individual differences in reading achievement. (see Carpara, 2000; Arnold, 2012).

Method

Participants

Data collection for the current study was carried out as part of a larger project entitled the *Socially and Emotionally Aware Kids (SEAK)* project. *Socially and Emotionally Aware Kids* was a national four-year project conducted by the Canadian Mental Health Association Nova Scotia division (CMHA NS) in partnership with Dalhousie University and funded by the Public Health Agency of Canada. For the purposes of the current study, data included those collected from three elementary school sites (i.e., two intervention schools, and one waitlist control school) in one school board in Eastern Canada. Participants included students attending these three schools who were enrolled in grades primary, one, and two at the study's inception and were followed for 14 months. At inception 98 students participated with 26 students in grade primary, 40 in grade one,

and 32 participants in grade two. Grade distribution in intervention and control groups was as follows: intervention group (12 students in grade one, 26 students in grade two, and 19 students in grade three); and control group (14 students in grade one, 14 students in grade two, and 13 students in grade three; refer to Table 1 for further participant demographic information).

Inclusion criteria were receipt of an informed consent letter signed by a parent or caregiver and student assent to participate in the student assessments. Exclusion criteria were lack of either parental/caregiver consent or student's assent. Specific demographic information for students participating in the current study was not available due to limitations of privacy and consent; as such, this information is not presented here.

Measures

Reading Achievement Measures

Woodcock-Johnson III: Tests of Achievement Letter-Word Identification (WJ-III; Woodcock, McGrew, & Mather, 2001). The WJ-III: Tests of Achievement letter-word identification sub-test was used to measure word identification. This subtest assesses the ability to read real words, apply letter and word recognition techniques, and apply phonological representations to printed letter forms (Wendling, Schrank, & Schmitt, 2007). The letter-word identification sub-test has a reported median reliability of 0.91 (WJ-III; Woodcock, McGrew, & Mather, 2001).

Woodcock-Johnson III: Tests of Achievement Word Attack (WJ-III; Woodcock, McGrew, & Mather, 2001). The WJ-III: Tests of Achievement word attack subtest was used to measure non-word reading. This sub-test examines the ability to apply phonic and structural analysis skills to the reading of non-words, and has a reported median reliability of 0.87 (WJ-III; Woodcock, McGrew, & Mather, 2001). For both sub-tests, basals are established by correctly

reading the lowest six items; and ceilings are established by incorrectly identifying the highest six items.

Social Competence Measures

PATHS Student Evaluation Questionnaire (Kusché & Greenberg, 2005). The Student Evaluation Questionnaire evaluates student progress in areas integral to the PATHS Curriculum two times per school year. Classroom teachers respond to behavioural statements about students grouped into three key domains (aggressive/disruptive behaviours, attention and concentration, and social and emotional competency). For example on the aggression sub-scale, items ask teachers to report whether a student “Takes others’ property”. Respondents use a 6-point Likert scale ranging from 0 (never or almost never) to 5 (almost always) to rate students in comparison to others at the same age and grade. Three sub-scales are derived from items on this questionnaire: (1) aggressive/disruptive behaviours; (2) attention and concentration; and (3) social and emotional competence. Higher scores on the aggressive/disruptive behaviours subscale are indicative of increased levels of aggressive/disruptive behaviour, whereas higher scores on the attention/concentration and social and emotional competence subscales are indicative of increased attention and social competence, respectively. Reliability of these subscales from the current sample is low to moderate, with coefficients ranging from 0.51 to 0.73.

Procedure

Sampling Procedures

School board administration determined assignment to intervention or control groups. Two school sites were assigned to receive the intervention with the earliest grades (i.e., grades primary, one, and two) selected to participate in PATHS at the study’s inception. Remaining grades in the intervention schools had the PATHS phased in over the next two years. The control

school acted as a waitlist condition in which students and teachers engaged in the standard provincial curriculum for two years prior to implementing PATHS.

Intervention Program

Teacher and school training. The PATHS intervention was integrated into intervention schools over a three-year period. During the first year, all students in grades primary, one, and two received the intervention. As such, all classroom teachers, as well as any support teachers who were directly involved in a teaching role with students in these grades (e.g. resource teacher, physical education teacher) were included in the PATHS training. A PATHS trainer provided training for the two intervention schools over a two-day period. Training content during the first day was comprised of background information about Social Emotional Learning, the importance of SEL for healthy development, teaching practices to support SEL and PATHS programs, neuro-cognitive development, child development, and strategies to create caring classrooms. Content during the second day enhanced day one content and reviewed specific PATHS goals, strategies, daily practices such as the ‘complement of the day’, problem-solving, emotion coaching, and PATHS curricular information and supportive materials. Over the next 14 months, the PATHS coach made on-site visits two to four times per month, during which time PATHS lessons were observed, coaching was provided to intervention teachers, and any questions or problems were addressed.

Delivery of the PATHS intervention. The PATHS intervention is delivered through direct-instruction lessons with students using scripted lessons, activities, posters, photographs, and manipulatives to enhance generalization. The objective in early elementary grades (i.e. grades primary – three) is to complete one to two lessons per week. Teachers in the intervention schools aimed to meet this goal, however, unforeseen interruptions including school closures due

to inclement weather, class and school outings, and school engagements (i.e. guest speakers, assemblies) sometimes prohibited meeting this outcome. Therefore, in the weeks toward the end of the school year (i.e. May and June), classroom teachers may have taught more than two lessons per week to complete the total number of lessons intended for their grade. Lessons are typically delivered at the start of the school day and take approximately half an hour to complete. The total number of lessons scripted for each grade is as follows: grade primary ($N = 41$), grade one ($N = 50$), and grade two ($N = 48$).

In addition to weekly lessons, daily activities are used to support overarching SEL and PATHS goals. For example, a PATHS student of the day is identified every day and he or she receives a compliment from all other students in the class. Also, each PATHS classroom has a PATHS mailbox where students are encouraged to place questions, concerns or problems that are subsequently addressed by the classroom teacher as s/he models appropriate problem solving and conflict resolution strategies.

Student Assessment

Trained research assistants who had completed a minimum of a bachelor's degree conducted all individual student assessments. Individual student assessments included a word recognition task (i.e. letter-word identification; WJ III: Tests of Achievement; Woodcock, McGrew & Mather, 2001), and a decoding task (word attack; WJ III: Tests of Achievement; Woodcock, McGrew & Mather, 2001). Research assistants took students from their classrooms to a quiet spot in the school (e.g., the library) and administered the two tasks after attaining student assent. Individual assessments were conducted in January, 2011 at the study's inception and again in May and June, 2012. Teachers completed online social competence measures for each student at the study's inception and again at the end of the next school year.

Results

Procedures for Handling Missing Data

The majority of students (98%) who participated in data collection at the study's inception were available for re-assessment at the post-test time point. Three students moved out of the school district before the post-intervention assessment. However, incomplete data for some participants resulted in fewer participants used for some of the analyses than were reported in the original subject groups. Cases in which individual items had missing scores were excluded for analysis. More than 20% of social-competence questionnaires were incomplete. Social-competence data for these students was excluded from the analysis. Participant demographics are presented in Table 1. Correlations between variables are presented in Table 2. Correlations are reported using the Pearson Product Moment correlation statistic.

The Effect of PATHS on Social Competence and Reading Achievement

Social competence. The first research question examined the efficacy of the PATHS intervention at improving students' scores on teacher ratings of aggressive/disruptive behaviours, attention, and social-emotional competence. Means and standard deviations for these measures are reported in Table 3. Independent samples t-tests indicated that participants in the intervention and waitlist control groups did not differ significantly on measures of aggression ($t(72) = .22, p = 0.65$), attention ($t(76) = -.32, p = 0.09$) or social-emotional competence ($t(76) = 1.02, p = 0.66$) at the inception of the study.

A 2 (Group: intervention or control) x 2 (Time: baseline or post-intervention) mixed repeated measures Analysis of Variance (ANOVA) was conducted to examine differences on social competence variables between baseline and post-test, and between intervention and control groups at post-test. A main effect of time was observed, such that attention scores and social-

emotional competence scores increased significantly from baseline to post-test ($F(1,72) = 10.31$, $p < 0.05$, $\eta_p^2 = 0.13$; $F(1,72) = 14.49$, $p < 0.05$, $\eta_p^2 = 0.17$ respectively). No other main effects or interactions were observed.

In the analysis, the size of the intervention group ($n = 41$) differed from the waitlist control group ($n = 26$). Analysis of Variance relies on particular assumptions of the data for valid and reliable interpretation of significant findings determined through its use. One such assumption is that the groups used for comparison share somewhat equivalent error variances (Pedhauzer, 1997). The concern in uneven groups is the heterogeneity of variance. Keppel (1991) suggests that there is no benchmark at which different group sizes would affect the heterogeneity of variance assumption. However, Levine's test of equality of error variance was used to examine possible effects of unequal error variance. None of the social-competence variables (i.e. aggressive/disruptive behaviours, attention, social-emotional competence) were significantly different with respect to error variance.

Reading achievement. Means and standard deviations for measures of reading achievement are reported in Table 4. Independent samples t-tests indicated that there were no significant differences between groups on letter-word identification ($t(96) = .24$, $p > 0.81$) or word attack ($t(96) = -.74$, $p > 0.46$) at the study's inception. A 2 (Group: intervention or control) x 2 (Time: baseline or post-intervention) mixed repeated measures ANOVA was conducted to examine differences in reading achievement variables between intervention and control groups and from baseline to post-intervention. Results indicated a significant difference in both letter-word identification scores ($F(1,93) = 52.89$, $p < 0.05$, $\eta_p^2 = 0.36$) and word attack scores ($F(1,93) = 19.87$, $p < 0.05$, $\eta_p^2 = 0.98$) between the first and the second time point, such that both letter-word identification and word attack scores decreased between pre-test and post-test (refer

to Table 4). No other main effects or interactions were observed. A second 2 (Group: intervention or control) x 3 (Grade: grade 1 or grade 2 or grade 3) x 2 (Time: baseline or post-intervention) mixed repeated measures ANOVA was conducted to determine whether there was an intervention effect as a function of grade. No significant intervention effects or interactions were observed.

A post hoc analysis of the reading achievement data was conducted. First, the possibility of differential effects that grade (i.e., grade primary, one, two) may have had on the efficacy of PATHS on reading achievement was examined. Each grade was analysed separately using a 2 (Group: intervention or control) x 2 (Time: baseline or post-intervention) ANOVA. Results for grade one and two students mirrored those for the larger participant sample and no other interactions or effects were observed. The oldest grade (grade three at post-test) did not show significant improvement over time, nor was there an intervention effect in this group. Therefore, their reading achievement scores did not change significantly over time. Second, the data was analysed to examine the effect of the PATHS intervention on reading achievement in the sample of students enrolled in the English curriculum (i.e. participants enrolled in French Immersion classes were excluded from this analysis). This resulted in an intervention group of ($n = 47$) and a control group of ($n = 17$) for the 2 (Group: intervention or control) x 2 (Time: baseline or post-intervention) ANOVA. Results for both the letter-word ID and word attack mirrored those of the larger sample and no additional main effects or interactions were noted. Finally, each ANOVA for the social competence variables and the reading achievement variables was run a second time with age as a covariant to examine whether there were differential effects across age groups. No additional interactions or effects were observed over those reported within the first set of analysis.

Social competence and word recognition. A series of linear regression analyses was used to examine whether aggression, attention or social-emotional competence predicted reading achievement at baseline or post-intervention. First, a step-wise linear regression analysis using scores on measures of aggressive/disruptive behaviour, attention, and social-emotional competence as predictors of letter-word identification at baseline was conducted. Neither baseline attention nor social-emotional competence emerged as significant predictors of letter-word identification scores at baseline. However, baseline aggressive/disruptive behaviour scores emerged as a significant predictor of baseline scores on letter-word identification ($R^2 = 0.06$ $F(1,73) = 5.54, p < 0.05; \beta = 0.28, < .05$). Next a step-wise linear regression was conducted to examine whether any of the social-competence variable scores at baseline would predict word recognition at post-test, over and above the contribution of previous word recognition skills (i.e., letter-word identification scores at pre-test). None of the social-competence variable scores at pre-test emerged as significant predictors of letter-word identification skills at post-test. Finally, a regression analysis examined whether social-competence variables at post-test could predict letter-word identification scores at post-test. None emerged as significant in the regression equation.

Social competence and word attack. A second step-wise linear regression analysis was conducted to examine whether any of the social-competence variables (i.e. aggressive/disruptive behaviours, attention, social-emotional competence) at baseline could predict scores on the word attack task either at baseline or at post-test. None of the social-competence variables emerged as significant in the regression equation at baseline or at post-test. The last linear regression was used to examine whether post-test social-competence scores contributed significantly to variability in concurrent reading achievement. None emerged as significant predictors.

Discussion

The current study had three main objectives. The first objective was to examine the efficacy of the PATHS intervention on measures of social-competence including aggressive/disruptive behaviours, attention and concentration, and social-emotional competence in a population of elementary school children. A second objective of the present investigation was to examine the effect of PATHS on measures of word identification, and word decoding in the same population. A third objective of this study was to investigate the relation between social-competence (specifically aggressive/disruptive behaviours, attention/concentration, and social-emotional competence) and reading achievement (i.e., word identification and word decoding). The hypothesis that social competence would improve as a function of PAHTS was not supported. Further, the hypothesis that word identification and word decoding would improve after the PATHS intervention was not supported. Finally, whereas the hypothesis that attention would predict individual differences in reading achievement was not supported, aggressive/disruptive behaviours was associated with word identification skills.

The variables of interest in the current study are extremely important to children's experiences during childhood in the school setting, and influence the nature of adjustment as children transition through adolescence into adulthood (Caspi & Elder, 1990; Miles & Stipek, 2006; Parker & Asher, 1989). The educational literature suggests that a unified approach using SEL programming may have the ability to address social competence and academic achievement for all children (Greenberg et al., 2003; Zins, 2004; CASEL, 2013). Further, the PATHS intervention has been widely validated with respect to its utility in reducing externalizing behaviours and improving prosocial behaviours in typically developing populations and those

with identified special needs positioning it as a highly regarded SEL intervention (CASEL, 2013).

The Effect of PATHS on Social Competence and Reading Achievement

Social competence. A significant change in two of the three social competence variables was observed in the 14 months between time points (refer to Table 3). Teacher reports of participating students indicated improved attention and concentration and improved social-emotional competence. Whereas participants' scores on these two measures of social competence improved over time, this improvement cannot be attributed to the PATHS intervention, as both intervention and control groups showed improvements in this area. There are several possible explanations for this finding. First as previously mentioned, the regional school board for participating schools determined school assignment to either the intervention or waitlist control group, thereby making it impossible to conduct a true randomized controlled study. That is, because schools and students were not randomly assigned to groups, it is difficult to determine the causal factors that influenced improvements on social competence variables over time. Further, because specific demographic information for participants was not available to the researcher due to privacy and consent parameters within the greater *SEAK* project, it is possible that schools (and participating students) differed from one another on meaningful demographic variables at the study's inception, which may have influenced outcomes of the intervention. For example, intervention and control schools were situated within a primarily rural setting. Logically, students in a rural setting may come from homes reflecting a wide range of socioeconomic status (SES), maternal education, occupational attainment, and parental employment status. However, without specific information regarding intervention and control school demographics in these areas, there is a chance that the control school was situated among a

population of families with higher SES, reflecting higher levels of maternal education, or more consistent and higher-paying employment. Because these variables contribute to trajectories of positive childhood adjustment, if there was uneven representation of such demographic variables between intervention and control schools, the absence of group differences could be attributable to such factors, rather than specific factors associated with PATHS. Analyses confirmed that groups did not differ significantly on social competence variables at the study's inception.

Whereas this provides confidence in the validity of the results, extraneous variables may have interacted with either the participants or the intervention causing no effect of the intervention.

Third, it is possible that treatment fidelity influenced treatment effects. Specifically, PATHS was developed as a "whole-school" intervention to increase opportunities for 'real life' practice of skills, and to facilitate generalization and transfer of skills beyond the classroom or specific PATHS lessons (Kusché & Greenberg, 1994). To achieve this whole-school objective, all members of a PATHS school (i.e. school personnel) are intended to participate in the PATHS training. In this way, all school personnel are educated in the philosophy and practical components of PATHS, and can consequently support PATHS students in all environments within a school (e.g. the playground, the library, the school bus). The Conduct Problem Research Prevention Group (2010) describe the importance of the school ecology to intervention efficacy. They assert that the ecology of the school environment affects the implementation and efficacy of the intervention (CRPRG, 2010).

PATHS training workshops in the present study included classroom teachers for grades primary, one, and two (at the study's inception), and any additional personnel who would have a direct teaching role with PATHS students (e.g. the resource teacher). Because the PATHS intervention was phased into intervention schools, teachers from upper elementary grades (i.e.,

grades three to six) would not have received training before the inception of the current study. Similarly, students in upper grades were not participating in the PATHS intervention concurrently with intervention students. Given the nature of the phasing in of PATHS in intervention schools, generalization of PATHS skills beyond intervention classrooms may have been limited. Opportunities to generalize PATHS skills throughout the school facilitate internalization of and fluency with using improved social-emotional skills (Kusché & Greenberg, 1994). Restricted opportunities to practice and generalize skills across the school environment in intervention schools may have limited greater improvements for intervention students than control students.

Another limitation to maintaining treatment fidelity in the present study emerged in intervention schools in French Immersion classrooms. French Immersion teachers expressed reluctance in delivering PATHS lessons because there was not a French translation available. Consequently a variety of modes of intervention delivery occurred in these classrooms. Some French Immersion teachers invited a specialist teacher (e.g. a resource teacher) to deliver PATHS lessons in their classrooms. Others did not implement weekly lessons, and chose to focus on daily activities which they could translate into French easily, such as the daily compliment period for the PATHS student of the day. While the number of French Immersion classrooms was fewer than English only classrooms in intervention schools, this may have introduced bias into the effectiveness of the intervention. Other studies in the PATHS literature cite problems with treatment fidelity as a limitation to intervention efficacy (see CPRPG, 2010; CPRPG, 1999a). Being that the present study, in addition to other studies in the PATHS literature, report treatment fidelity as a limitation to program effectiveness, this is a meaningful obstacle for students gaining the full benefits of PATHS.

Whereas some findings in the PATHS literature support significant improvements on measures of prosocial skills after one year of intervention (e.g. Kam, et al., 2004), other research has reported curvilinear findings on measures of conduct problems, and aggressive/disruptive behaviours (Crean & Johnson, 2013). Therefore, it is possible that after two or more years in the intervention, *SEAK* students may demonstrate reductions in aggressive/disruptive behaviours. As such, investigating social competence variables over a longer period may result in finding significant between-group differences. As well, some PATHS research, such as Crean and Johnson (2013), and CPRPG (1999b) employed multiple measures to assess each variable of interest. For example, peer-report, teacher-report, parent-report, observation technique, and student response to vignettes describing interpersonal scenarios were all employed to assess various dimensions of aggression in the CPRPG (1999b) study examining ‘Fast Track’. In these studies, student behaviour reflected significant changes on some measures, but not on others. In particular, teacher-report measures have not consistently shown group differences after the intervention has taken place (see CPRPG 1999a; 1999b; Crean & Johnson, 2013). The *SEAK* study has multiple measures of each social competence variable and as such, may find significant changes on different dimensions of domain areas that were not found to be significantly improved in the one year of intervention in the present study.

An important finding in the present study was improved attention/concentration across both intervention and control students during the 14 months of PATHS. One explanation for the change in attention across students comes from a developmental perspective. Participants involved in the present study were aged four to eight years. Executive processes that contribute to increases in focus, attention, and concentration mature consistently across the early childhood period in typically developing populations (National Research Council and Institute of Medicine,

2000). Maturational peaks in executive processes, namely attention and concentration, occur at age four to six years, and again at age 10 years, before stabilizing through adolescence (National Research Council and Institute of Medicine, 2000). Since participants in the present study are positioned directly within this developmental period, significant increases in attention observed between pre-test and post-test may be attributable to changes associated with child development, explaining why attention/concentration improved in all children within the sample population.

Similar to changes in attention, all children in the present study showed improvements in their social-emotional competence between pre-test and post-test. A developmental perspective may explain this finding as well. Rushberg (1982) suggests that prosocial skills or social-emotional development, once established, will continue to develop along a relatively stable trajectory. Crick and Dodge (1994) suggest that with improved language and social-information processing, prosocial skills also reflect progressive maturation and growth with age. Further Beauchamp and Anderson (2010) point to developments in cognition including understanding others' perspectives and perspective taking, which mature during the early elementary period, as integral to the development of prosocial skills. Given the chronological ages of students in the present study, maturation and development of the aforementioned skills and processes may have contributed to increases in social-emotional competence across intervention and control groups.

Reading achievement. Results indicated a significant main effect of time on the two reading achievement variables (i.e. letter-word identification, and word attack), but no significant effect of the intervention. Further, student standard scores decreased over time (refer to Table 4). This finding can be explained in a number of ways. First, an integral tenet in the extant reading literature asserts that the acquisition of strong and efficient reading skills is supported by systematic, direct, and explicit instruction in the alphabetic principle, phonemic awareness,

phonetic skills, and practice in word recognition (Adams, 1990; National Reading Panel, 2000; D'Angiulli et al., 2004; Share, 1999). Students in the current study spanned grades primary to two at the study's inception. It is important to bear in mind that reading instruction in these grades is essential to developing strong and efficient reading skills, and as such, should include the aforementioned instructional components. Consequently, any significant gains in reading achievement for students in early elementary grades could be related to the effect of instruction in reading, rather than due to an SEL intervention. The direct effect of reading instruction on reading outcomes has been supported and replicated within the reading literature (see National Reading Panel, 2000). While PATHS developers and materials promote its utility to extend beyond improving students' social-emotional processing and social competencies to improvements in academic gains, this has not been entirely validated through research. The PATHS intervention has shown utility across a breadth of social-emotional skills, externalizing behaviours, and internalizing behaviours in improving children's functioning, however, it has not done so with academic achievement as an outcome measure (e.g. CPRPG, 1999b).

A second important finding showed participants in both the intervention and control groups with a reduction in letter-word and word attack standard scores over the 14 months of the intervention. This may reflect an effect of the assessment measures, rather than a meaningful decrease in the reading skills targeted for assessment. It is possible that the measures used to assess word identification and word decoding resulted in inflated standard scores at the study's inception. Thus, at post-test, when these tools were more developmentally appropriate for participants, standard scores reflected what appeared as a decrease. Specifically, the WJ-III: Tests of Achievement is a widely used achievement battery with excellent reliability and validity. However, because of the very young age of participants, and the nature of the skills that are

related to reading abilities at this age, either multiple reading achievement measures, or a more sensitive measure may have captured participants' reading skills and sub-skills more accurately. Measures that could separately assess abilities integral to developing strong and efficient reading such as an alphabet knowledge test, selective sub-tests from the Comprehensive Test of Phonological Processing (C-TOPP; a measure of separate skills that contribute to phonological processing including phonemic awareness, sound blending, and rapid naming; Wagner, Torgesen, & Rashotte, 1999), and the Test of Word Reading Efficiency (TOWRE; a timed measure of word identification, and pseudoword reading; Torgesen, Wagner, & Rashotte, 1999) may have been more sensitive to individual skills, and change in sub-skills over time.

The use of precise and varied measures in young children is reflected in the reading literature. Whitely, Smith, and Connors (2007) investigated the development of reading achievement in young children over time. In their study, participants were as young as four years, six months at the study's inception. These investigators employed individual subtests to measure phonemic awareness (i.e., phoneme discrimination, and rhyme detection) and alphabet knowledge (i.e., letter naming). Similarly, Lovett and colleagues (2000) investigated reading achievement over time in a population that included participants between the ages of 6 and 13 years. In their study, multiple measures of reading achievement were employed including separate sub-tests for letter knowledge, word recognition, and reading comprehension. Gallagher and colleagues (2003) investigated changes in reading achievement over time as well, and also included individual measures of non-word reading (which were experimentally derived and included 20 words for each subject), alphabet knowledge, and sight-word reading.

Using a more developmentally appropriate tool has also been demonstrated in the PATHS literature. In the CRPRG (1999b) study in which "Fast Track" was examined, researchers

determined that the Woodcock-Johnson letter-word ID sub-test was too challenging for participants in the first of three grade one cohorts. Subsequent cohorts were assessed using the word attack subtest of the Wide Range Achievement Test (WRAT; Wilkinson, 1993). Including measures that specifically address individual skills (e.g. alphabet knowledge, phonemic awareness) is important to evaluation of reading achievement at this developmental level and is appropriate because it allows for an accurate measure of skills that predict later reading achievement and reading comprehension (Adams, 1990; National Reading Panel, 2000; Cunningham & Stanovich, 1997). The Woodcock-Johnson letter-word identification task measures word-reading efficiency, which is extremely important to strong and efficient reading skills, however, this sub-test may be better employed as one of multiple measures.

Social competence and reading achievement. In the present study, teacher-report scores of aggressive/disruptive behaviours (measured at pre-test) emerged as a significant predictor of individual differences in word reading ability (i.e., letter-word identification) concurrently at pre-test. Given the relation between these two scores, students with higher levels of aggressive/disruptive behaviours had a more limited ability to identify individual words. Results of the present study indicate that 5.8% of unexplained variance in word reading skill can be accounted for by aggressive/disruptive behaviour. These findings are similar to those of Arnold (1997) in which he demonstrated significant concurrent relations between aggressive behaviour and academic achievement, and those by Maleki and Elliott (2002) who demonstrated that aggressive/disruptive behaviour was meaningful to academic achievement concurrently, but not to later academic achievement. However, the current findings are in contrast to those by Carpara (2000) who did not demonstrate a contribution of aggressive/disruptive behaviour to academic

achievement. The current findings contribute another piece of evidence through which to elucidate this relation.

This finding is both statistically and clinically significant. Shaw and colleagues, (1997), Coie and Dodge, (1998), Perry, Perry, and Rasmussen, (1986) describe the negative experience of children who exhibit aggressive/disruptive behaviours upon school entry. Children with aggressive/disruptive behaviours experience a higher incidence of peer rejection, poor quality in the teacher/student relationship, challenges with academic tasks due to immature cognitive preparation, more instances of teacher corrections and disciplinary actions, and distractibility. The variance contributed by aggressive/disruptive behaviour scores to individual differences in word-identification ability may be attributable to any of these factors and is likely related to the negative climate that results from aggressive/disruptive behaviour in the school setting. Arnold (1997) asserts that disruptive children ultimately receive less instructional time due to work avoidance (through their disruptive behaviours) and student-teacher interactions that illustrate correction and discipline rather than support and teaching as a consequence of distracted and disruptive behaviour. As children progress through school, this negative climate can cause disengagement from the teaching and learning process resulting in wider gaps between a student's skills and age and grade level expectations (McIntosh, 2005). For aggressive children who illustrate hostile –attribution bias (the association of a negative intention to interpersonal actions that are objectively neutral) toward their peers and teachers, who have less experience in the routines and tasks required in a school setting, and who may also be distracted, or absent from lessons (due to disciplinary measures), the repetitive association required for individual words to internalize into the mental lexicon (Share, 1999) may not occur. Thus, the interaction between the student's behaviour and the school environment described in the literature provides one way to

explain the finding in the current study between aggressive/disruptive behaviour and word identification ability.

This finding meaningfully contributes to understanding relations between maladaptive social behaviours and academic achievement. It also informs a clinical understanding of the experience of children who exhibit aggressive/disruptive behaviours as they begin to learn to read. Given that reading is fundamental to academic success and positive adjustment (Miles & Stipek, 2006; Torgesen, 2002) the finding that students with aggressive/disruptive behaviours may have difficulty with early word recognition could be used to inform multi-component interventions where targeted reading interventions and social-skills lessons are used to supplement universal interventions for aggressive students. The ‘Fast Track’ intervention examined by the CPRPG (1999b) included such components as was efficacious in improving some aspects of students’ aggressive behaviours as well as word decoding skills.

Strengths of the Present Study

An examination of the efficacy of the PATHS curriculum to improve students’ word-identification and word decoding abilities using norm referenced, standardized measures is a meaningful contribution to the extant PATHS literature. The CASEL Report (2013) describes PATHS as effective in simultaneously improving social-emotional and academic skills in elementary school children. Results of the present study did not find measureable gains in word-identification, or word attack, two areas of reading achievement that are integral to building efficient reading abilities (Adams, 1990). This finding is a strength of the current study and also indicates an area for future research.

A second strength of the current study is the finding that in some elementary school children those who have higher levels of aggressive/disruptive behaviours also have less well-

developed word-identification abilities. Regression analysis indicated that aggressive/disruptive behaviour made an independent contribution to sight-word reading, concurrently. This finding adds to the extant educational and psychological literature regarding children with aggressive behaviour and the acquisition of word-identification abilities.

Limitations of the Present Study

The present study examined three behaviours that fall within the domain of social-competence. Aggressive/disruptive behaviours and inattention have been shown to be extremely meaningful and maladaptive for students' academic success. They also have a relatively stable and enduring nature across childhood and negative relation with academic achievement. This makes these variables important to examine within the context of resiliency promotion, moderating the effects of vulnerability, and efforts to promote healthy adjustment for children. However, the absence of an intervention effect in the present study may have been limited by the teacher-report questionnaire used to measure these behaviours. Firstly, alpha reliability coefficients for the present sample indicated low to moderate reliabilities for the three sub-scales (aggressive/disruptive behavior, attention, social-emotional competence). Low reliability of the measure may have limited finding significant treatment effects across social competence behaviors because one or more items within the scale may not have captured the domain(s) of interest. Secondly, a social competence measure with more detail on each sub-scale may have been more sensitive to change within the 14-month intervention period. Therefore, measurement of social competence variables is a limitation in the current study.

A second limitation of the current study is the quasi-experimental design. Whereas it is not unusual to use quasi-experimental designs for the purpose of accommodating the needs of schools, this can often be detrimental to the integrity of the research, as it makes analysis and

interpretation of findings challenging. The efficacy of PATHS has varied across studies and across individual measures (i.e. student sociometric measures, teacher-report, standardized measures), however an intervention effect on students' social functioning typically occurs after one year. Therefore, the absence of an intervention effect in the present study is unexpected and may have been limited by the study's design.

Treatment fidelity is a third limitation of the present study. Possible sources of inconsistency between French Immersion classrooms and English Language classrooms, and the nature of "phasing in" the PATHS curriculum may have affected intervention effects. Examining the PATHS literature, some research has used a 'whole-school' PATHS approach to examine intervention effects (e.g. Curtis & Norgate, 2013), while others have targeted only one or two classrooms within a school (e.g. Kam et al., 2004). In either design, treatment effects have been seen. However, a larger number and more varied sources used to measure student response to the intervention in these studies may explain previously demonstrated intervention effects, and the absence of such findings here. Therefore, issues with consistent implementation of PATHS in intervention schools may represent a limitation to the present study.

Finally, sample and group size may have limited the present study. There are two ways in which group size may have limited the present study. The first limitation is a small participant group ($N = 98$) leading to a possible reduction in power. With reduced power, ANOVA is less sensitive to detect an actual intervention effect. The second limitation may have been the unequal group sizes between intervention and waitlist control groups for analysis of social-competence variables, which may violate ANOVA assumptions. With respect to the small overall sample, whereas larger numbers of participants will result in increased power to detect significant differences on variables of interest, upon examination of the means for outcome variables (see

Tables 3 and 4), the overall mean change in social competence variables favours the waitlist-control group, and for the reading achievement variables the mean reductions in scores are almost equivalent. This provides confidence in the ANOVA results reported. Another potential concern with a small sample size occurs with regression analysis. In the regression analysis conducted in the present study, 77 participants were included. Given that the analysis used three predictor variables, a sample of 77 participants provides a sufficient size to consider the regression reliable (Tabachnick & Fidell, 2001).

Future Directions

Results from the present study in which word-identification and word decoding did not change as a function of the PATHS intervention provide one avenue for future research. Zins (1990) asserts that the demonstrated effect of SEL programming on students academic achievement and social-competence requires empirical validation. Durlak and colleagues (2011) suggest that SEL programs demonstrate utility in improving both social-competence and academic achievement simultaneously. Further, CASEL (2013) reports that PATHS is effective in reaching these goals, however, the extant empirical research remains unclear as to whether PATHS demonstrates an effect on academic achievement. In the present study, improved word identification and word decoding was not observed. Certainly this may have been due, in part, to factors associated with the experimental design, treatment fidelity, and sources of measurement. However in future, research studies examining the effect of PATHS on student's academic achievement would be meaningful both within the literature, and clinically. Therefore, research investigating PATHS and intervention effects in areas of reading achievement that include word identification and non-word reading, student engagement in reading, and reading comprehension would be meaningful. Additionally, PATHS intervention effects on math achievement such as

numeracy, calculation, problem-solving, and attitudes toward math is also an area for future research directions.

Further research is needed to understand the relations between social competence and academic achievement. Algozzine et al., (2011) assert that commonly used methods including teacher-report measurements for social competence, social skills, and academic competence are not conducive to developing an empirical understanding of how these constructs operate because they are confounded by subjective bias. The literature around the nature and direction of relations between adaptive and maladaptive social behaviours and academic achievement remains unclear, suggesting the need for additional investigation.

In sum, it is clear that social competence and reading achievement are extremely meaningful to positive adjustment in childhood. General curriculum as well as interventions for students with familial socio-economic, and socio-cultural vulnerabilities is important. Recognising and addressing the potentially aversive outcomes associated with economic vulnerabilities, as well as familial factors (e.g. generational illiteracy) is meaningful to research and practice with children. Treatment effects in the present study may have been limited by the fact that the data analysed here was sampled from the first year of the four year *SEAK* study. Certainly findings reported here reflect a portion of participants, and dimensions of the domains of interest. Whereas the present study did not illustrate an effect of the PATHS intervention on the aspects investigated, analysis of data reflecting two or more years of the PATHS intervention is likely to illustrate treatment effects. Universal interventions are important to the well-being of children and families and the present study contributes to our understanding of how best to service these at-risk children and their families.

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Table 1

Participant Demographic Factors By Group at Pre-Test and Post-Test

	Intervention	Control	Totals
<i>N</i>	57	41	98
Male	27	18	45
% Male	47	43	
Grade primary	5	7	12
P/1	11	6	17
Grade 1	12	6	18
1/2	7	-	7
Grade 2	10	12	22
2/3	1	-	1
French Immersion Students	10	24	34
Mean-age at pre-test	80.58 (SD 8.96)	79.80 (SD 10.24)	
Mean-age at post-test	95.33 (SD 8.95)	92.85 (SD10.16)	

*Note: Information regarding whether participants were enrolled in a single grade class or a split grade class was unavailable for 11 intervention and 10 control students.

* Note: Independent samples t-test indicated no significant difference in mean age of participants at the study's inception ($t(96) = 0.40, p = 0.69$).

Table 2

Correlations Between Variables

Measure	1	2	3	4	5	6	7	8	9	10
1. LW ₁	-	.864**	.836**	.753**	-.238	.081	.103	-.112	.149	.003
2. WA ₁		-	.743**	.695**	-.213	.007	.059	-.156	.090	-.033
3. LW ₂			-	.886**	-.150	.137	.128	-.115	.194	-.033
4. WA ₂				-	-.137	.208	.207	-.163	.233	.028
5. A/D ₁					-	-.424**	-.564**	.562**	-.393**	-.211
6. Att ₁						-	-.586**	-.400**	.576**	.361**
7. SEC ₁							-	-.404**	.422**	.337**
8. A/D ₂								-	-.597**	-
9. Att ₂									-	.629**
10. SEC ₂										-

Note. LW = letter-word identification, WA = word attack, A/D = aggressive/disruptive behaviours, Att = attention/concentration, SEC = social-emotional competence. ₁ = pre-test, ₂ = post-test.

** $p < 0.01$.

Table 3

Means and Standard Deviations at Pre-Test and Post-Test for Social-Emotional Competence Variables

Measures	Inception		Post-Test	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	Intervention Condition			
Aggression/Disruptive	24.98	10.59	25.29	8.78
Attention	28.95	8.43	31.26	8.42
Social-Emotional Competence	38.26	6.99	40.48	7.34
	Waitlist Control Condition			
Aggression/Disruptive	24.19	9.26	21.54	8.55
Attention	28.89	9.85	32.65	9.15
Social-Emotional Competence	36.38	7.28	41.35	7.35

Note. Aggression/disruptive, attention, and social-emotional competence are reported using raw scores.

Table 4

Means and Standard Deviations of Standard Scores on Reading Achievement Measures at Pre-Test and Post-Test

Measures	Inception		Post-Test	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Intervention Condition				
Letter-Word ID	108.39	16.00	101.78	13.87
Word Attack	105.44	14.89	100.94	13.57
Waitlist Control Condition				
Letter-Word ID	106.83	15.71	99.71	14.67
Word Attack	107.49	2.23	102.00	14.20

Appendix A

Social Competence Student Evaluation

Use this scale at the beginning and the end of the school year to assess how often this child exhibits each behaviour listed below compared to other students of the same grade level and gender.

0 = never or almost never; 1 = rarely; 2 = sometimes; 3 = often; 4 = very often; 5 = almost always

A. Aggression/Disruptive Behavior	Beginning of School Year	End of School Year
1. Takes others' property		
2. Yells at others during conflicts		
3. Fights		
4. Is stubborn		
5. Loses temper when there is a disagreement		
6. Lies		
7. Breaks classroom rules		
8. Teases classmates		
9. Harms others		
10. Easily irritated when he/she has trouble with some task (reading, math, etc.)		
11. Is disliked by classmates		
12. Rejects limits set by adults		
13. Stays excited or upset		
14. Handles disagreements in a negative way		

15. Gets angry when provoked by other children		
AVERAGE SCORE		

B. Concentration and Attention	Beginning of School Year	End of School Year
1. Works hard		
2. Works through distractions		
3. Concentrates		
4. Stays on track		
5. Pays attention		
6. Maintains focus		
7. Performs at grade level		
AVERAGE SCORE		

C. Social and Emotional Competence		
1. Feels at ease to talk to you		
2. Shows empathy and compassion for others' feelings		
3. Is liked by classmates		
4. Provides help, shares materials, and acts cooperatively with others		
5. Takes turns, plays fair, and follows rules of the game		
6. Listens carefully to others		

7. Initiates interactions and joins in with others in a positive manner		
8. Recognizes and labels his/her feelings and those of others appropriately		
Average Score		