THE EFFECTS OF A SUPPLEMENTAL EARLY READING INTERVENTION ON THE LITERACY DEVELOPMENT OF KINDERGARTEN CHILDREN EXHIBITING CONCURRENT WEAKNESSES IN ATTENTION AND EMERGENT LITERACY SKILLS

By

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A thesis submitted in conformity with the requirements for the degree of Doctor of Philosophy

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Abstract

This study investigated the effects of a supplemental prereading intervention on the early literacy skills of kindergarten children with co-existing weaknesses in emergent literacy skills and attention. Four children (3 boys, 1 girl) received one-on-one tutoring 4 days a week for approximately 18 weeks. A multiple-baseline across individuals design was used to analyze the effects of the intervention on children’s letter knowledge and phonemic awareness. Biweekly progress monitoring was conducted using curriculum-based measures throughout the baseline and intervention phases. Maintenance of skills was assessed six weeks after the conclusion of the program. The results indicated that children’s letter knowledge and phonemic awareness skills improved over time. The findings support the use of targeted early intervention to improve the emergent literacy skills of kindergarten students who are inattentive and at risk for reading failure.
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<tr>
<td>ADHD</td>
<td>Attention-Deficit/Hyperactivity Disorder</td>
</tr>
<tr>
<td>CBM</td>
<td>Curriculum-based measure</td>
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<tr>
<td>CAI</td>
<td>Computer assisted instruction</td>
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<tr>
<td>CPT</td>
<td>Computer-based continuous performance task</td>
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<tr>
<td>CVC</td>
<td>Consonant-vowel-consonant</td>
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<td>DIBELS</td>
<td>Dynamic Indicators of Basic Early Literacy Skills</td>
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<td>DSM</td>
<td>Diagnostic and Statistical Manuel</td>
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<td>EBD</td>
<td>Emotional or Behavioural Disorder</td>
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<td>EDI</td>
<td>Early Development Inventory</td>
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<tr>
<td>ELL</td>
<td>English language learner</td>
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<tr>
<td>EQAO</td>
<td>Education Quality and Accountability Office</td>
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<tr>
<td>FCRR</td>
<td>Florida Center for Reading Research</td>
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<td>FI</td>
<td>French immersion</td>
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<td>IEP</td>
<td>Individual education plan</td>
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<td>ISF</td>
<td>Initial Sound Fluency</td>
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<td>LD</td>
<td>Learning disorder</td>
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<td>LNF</td>
<td>Letter Name Fluency</td>
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<td>LS</td>
<td>Letter Sound</td>
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<td>MTA</td>
<td>Multimodal Treatment of ADHD Study</td>
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<td>NELP</td>
<td>National Early Literacy Panel</td>
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<td>NRP</td>
<td>National Reading Panel</td>
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<td>NWF</td>
<td>Nonsense Word Fluency</td>
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<tr>
<td>PAND</td>
<td>Percentage of all non-overlapping data</td>
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<tr>
<td>PND</td>
<td>Percentage of non-overlapping data</td>
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<td>PSF</td>
<td>Phoneme Segmentation Fluency</td>
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<tr>
<td>PPVT</td>
<td>Peabody Picture Vocabulary Test</td>
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<td>RTI</td>
<td>Response to Intervention</td>
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<tr>
<td>SDQ</td>
<td>Strengths and Difficulties Questionnaire</td>
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<tr>
<td>SK</td>
<td>Senior kindergarten</td>
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<td>TSRI</td>
<td>Teacher School Readiness Inventory</td>
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<td>WRD</td>
<td>Word reading disorder</td>
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CHAPTER ONE

Introduction and Literature Review
1.1 Introduction

Reading is one of the most critical academic skills that children learn in elementary school (Stanovich, 1986). Acquiring proficient reading skills is necessary to be able to thrive academically (Stanovich, 1986). Children who display early reading difficulties tend to continue to struggle in this domain as they progress through school in the absence of targeted support (Juel, 1988). Due to the detrimental effect that reading difficulties can have on academic achievement or success, a preventative approach consisting of early screening and intervention is recommended to reduce the number of children with significant reading difficulties in later grades (Torgesen, 2002).

Children with behavioural attention problems are at particular risk for reading difficulties (Dally, 2006; Stephenson, Parrila, Georgiou, & Kirby, 2008; Willcutt, Pennington et al., 2007) with recent evidence indicating that this association is evident in preschool prior to formal reading instruction (e.g., Sims & Lonigan, 2013). Despite the recognition of an association between behavioural inattention and emergent literacy skill deficits (Dice & Schwanenflugel, 2012; Sims & Lonigan, 2013; Willcutt, Betjemann et al., 2007), few studies have examined how to address these deficits in this high-risk population. The present study aims to fill this gap in the literature by informing intervention practices for kindergarten children who are inattentive and at risk for reading failure. It is important to examine the effectiveness of supplemental kindergarten prereading programs for children with attention problems to identify effective practices given that the association between attention and academic underachievement may grow stronger over time (Rabiner & Coie, 2000).
This dissertation examines the effects of a prereading intervention on the emergent literacy skills of kindergarten children with concurrent weaknesses in behavioural attention and emergent literacy skills. Chapter 2 presents the research design and methodology. Chapter 3 describes the findings of the study. Chapter 4 provides a personal reflection and exploration of the experience of teaching highly inattentive kindergarten students with weak emergent literacy skills through a self-study methodology (Samaras & Freese, 2006). Chapter 5 discusses the results of the study within the context of the wider literature. Theoretical and practical implications are also discussed.

The present chapter provides a brief overview of the key concepts that are the focus of this dissertation including relevant definitions and background literature. First, I provide an introduction to those skills needed for successful reading development. Next, I provide a brief introduction to attention-deficit/hyperactivity disorder (ADHD) and describe the academic, cognitive, and behavioural characteristics of children with ADHD. I then review the literature on the overlap between ADHD, particularly inattention and word reading disorder (WRD) and highlight research that sheds light on the nature of the comorbidity.

Overall, this review of the literature highlights the unique risk that children with behavioural inattention and reading difficulties face as well as areas requiring further investigation. In particular, relatively little is known about reading interventions for this population. This chapter is followed by the rationale and research objectives for this dissertation.
1.2 Literature Review

1.2.1 Foundations of Reading Development

A number of skills have been identified as important to word reading development. These include phonological and phonemic awareness (the ability to identify and manipulate the auditory aspects of spoken language), rapid naming (the ability to rapidly name a sequence of random stimuli), and alphabet knowledge (knowledge of the names and sounds associated with printed letters). These are considered to be among the most important emergent literacy skills because of their role in the development of decoding and word reading ability (e.g., Hume & Snowling, 2013; NELP, 2008).

The National Early Literacy Panel (NELP, 2008) reviewed over 300 studies to provide quantitative data on early preschool and kindergarten skills that are predictive of later reading (e.g., decoding, comprehension) and writing (e.g., spelling) outcomes. Specifically, alphabet knowledge, phonological awareness, rapid automatized naming, writing (letters or name), and phonological memory were found to strongly predict later reading and writing skills with correlations ranging from .50 to .26. Moreover, deficits in any of these skills are causally related to problems in reading acquisition (Hume & Snowling, 2013).

Studies have found a high degree of stability in the reading related skills assessed in preschool and later proficiency in these skills (e.g., Hume, Brow yer-Crane, Carroll, Duff, & Snowling, 2012; Lonigan, Burgess, & Anthony, 2000; Wagner, Torgesen et al., 1997; Whitehurst & Lonigan, 1998). For example, Lonigan and colleagues (2000) reported that children’s phonological awareness and alphabet knowledge were highly
related from preschool to kindergarten indicating stability in these skills. Moreover, the authors reported that preschool phonological awareness and letter knowledge accounted for 54% of the variance in kindergarten and first grade decoding abilities. Given that this high degree of stability in early reading skills is present even before the onset of formal reading instruction, it suggests that targeting these skills in kindergarten, before formal reading instruction occurs, may enable children to begin formal reading instruction with less of a disadvantage than their peers. Below I describe each of these skills and highlight their importance to reading development.

**Phonological and Phonemic Awareness.** According to Justice (2006), “Phonological awareness is the child’s sensitivity to various phonological units that make up spoken speech, including words, syllables, onsets, rimes, and phonemes.” (p. 291). Phonemic awareness, a subcomponent of phonological awareness, involves the ability to identify and manipulate phonemes (the smallest meaningful parts of oral language) in orally presented words (Adams, 1990). The development of phonological and phonemic awareness follows a developmental continuum with word-level awareness developing before subsyllabic and phonemic awareness (Anthony, Lonigan, Driscoll, Phillips, & Burgess, 2003; Carroll, Snowling, Hume, & Stevenson, 2003). Phonological awareness enables children to “break the code” by facilitating their understanding of the alphabetic principle which is the knowledge that the sounds in words correspond to letters in words (NRP, 2000). This knowledge is key to the ability to decode words. Not surprisingly, phonological awareness stands out as a strong predictor of successful reading even after controlling for nonverbal intelligence, vocabulary, and listening comprehension (Stanovich, Cunningham, & Cramer, 1984). In fact, the NELP (2008) identified
phonological awareness assessed in preschool or kindergarten as one of the strongest predictors of later decoding (.40), later reading comprehension (.44), and later spelling (.40).

Phonemic awareness is assessed orally by tasks that require the identification of phonemes in words (i.e., What is the first sound in ball?), by phoneme manipulation tasks (i.e., say “blend” without saying /l/), by blending (e.g., what word do these sounds make /k/ /a/ /l/?) and by segmenting tasks (e.g., say pit one sound at a time). Both the conscious awareness of phonemes in words and the ability to accurately identify them within words is thought to enable learning to decode words (Wagner, Torgesen, & Rashotte, 1994). It is important for children to acquire this skill in kindergarten because weak phonemic awareness can lead to deficits in decoding skills, which in turn results in problems with reading fluency and comprehension (Stanovich, 1986).

It is important that phonemic awareness be taught explicitly because some children, particularly those at risk for reading difficulties may otherwise not acquire this skill (Torgesen, 2002). The National Reading Panel (NRP; 2000) found that explicit phonemic awareness instruction produced positive effects on both word reading and pseudoword reading, compared to control groups who received no phonemic awareness instruction, indicating that it enables children to decode novel words. The NRP (2000) also found that phonemic awareness instruction helped children with a range of skill levels, including typically developing readers, children at risk for future reading problems, children with reading disabilities, and children in preschool through to grade six to improve their reading. However, the effect sizes were largest for children in preschool and kindergarten which suggests that this type of instruction is best delivered
early, before grade 1, as a means of preventing reading difficulties. Moreover, explicit phonemic awareness is a key component of early reading prevention programs because children at risk for reading difficulties may otherwise not acquire this skill which is so crucial to reading development (Foorman, & Torgesen, 2001).

**Rapid Naming.** Individuals with reading difficulties often exhibit deficits in rapid naming, the rapid recognition and retrieval of visually presented stimuli (Kirby, Georgiou, Martinussen, & Parrila, 2010). Studies have demonstrated that it is the speed of naming serially presented visual stimuli rather than the accuracy with which they are named that distinguishes children with reading difficulties from their peers (Denckla, 1972; Denckla & Rudel, 1974).

Rapid naming and reading are similar in that they both require the identification of visual stimuli, the production of a verbal response, and the process is repeated as the individual visually scans to the next stimulus or line (Wolf & Bowers, 1999). While the association between the speed with which individuals name colours, objects, letters or digits and their reading ability has been demonstrated by numerous studies (e.g. Denckla & Cutting, 1999; Wolf & Bowers, 1999; Wolf, Bowers, & Biddle, 2000), alphanumeric (letter and digit) naming speed are the more robust predictors of reading ability (Denckla & Cutting, 1999). Despite the strong relation between naming speed and reading proficiency, few intervention studies have specially targeted naming speed (e.g., Fugate, 1997; Conrad & Levy 2007; Nelson, Stage, Epstein, & Pierce, 2005; Vaughn Linan-Thompson, & Hickman, 2003) and those that have, have had mixed results. Naming speed is difficult to improve and children’s reading skills can improve without corresponding improvements in naming speed (For review, Kirby et al., 2010).
**Alphabet Knowledge.** Alphabet knowledge, which is comprised of letter-name and letter-sound knowledge is an important milestone of early literacy development and is recognized as a robust predictor of later reading ability (National Research Council, 1998; Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004). Letter name knowledge predicts later reading and spelling ability even after controlling for other relevant variables (i.e., phonological awareness and socio-economic status) (Roberts, 2003). Letter name knowledge is also directly related to word reading ability in that letter names provide a link between letters and print (Foulin, 2005; Treiman & Kessler, 2003). As well, Evans and colleagues (2006) found that kindergarten letter name knowledge was a better predictor of first grade word reading ability than letter sound knowledge. Research has also shown that while children with good letter name knowledge tend to develop strong reading skills, children with poor letter name knowledge tend to experience difficulties in reading acquisition (National Research Council, 1998; O’Connor & Jenkins, 1999; Snowling, Gallagher, & Frith, 2003).

Letter-sound knowledge is important because this skill is closely related to children’s reading acquisition (e.g. Hume et al., 2012). In fact, it enables beginning readers to sound out word segments and blend these parts to form words (NLP, 2000). As well, research has shown that learning letter-sound correspondences facilitates sensitivity to the phonological structure of words (Foy & Mann, 2006; Treiman, Tincoff, Rodriguez, Mouzaki, & Francis, 1998; Treiman & Kessler, 2003). Knowledge of letter-sound correspondences also helps children to predict words more accurately in context. Overall, knowledge of the alphabetic system contributes greatly to children’s ability to read words in isolation or connected text (NLP, 2000).
Letter name and letter sound knowledge appear to be related in that letter name knowledge facilitates letter-sound knowledge (Levin, Shatil-Carmon, & Asif-Rave, 2006). Several recent studies have shown that children use their knowledge of letter names to learn their sounds (e.g., Cardoso-Martins, Mesquita, & Ehir, 2011; Kim, Petscher, Foorman, Zhou, 2010; Treiman, Pennington, Shriberg, & Boada, 2008) and are more likely to correctly identify the sounds of letters for which they know the name (e.g., Kim et al., 2010). Since many letter names contain the sound the letter makes, either in the initial position (i.e., T) or in the final position (i.e., M) teaching children letter names may make it easier for them to learn letter sounds. In fact, children are more readily able to identify the sound of letters for which the name contains the sound versus letters for which the name does not contain its sound. As well, letters for which the sound appears at the beginning of its name are easier to recognize than those for which the sound appears at the end (Cardoso-Martins et al., 2011; Evans, Bell, Shaw, Moretti, & Page, 2006; Treiman et al., 2008).

In summary, emergent literacy skills are related to word reading development because these skills both facilitate and are the stepping stones towards decoding ability. Growing evidence shows that children in preschool or kindergarten who perform poorly on key skills such as phonemic awareness and letter knowledge tend to be those who struggle to learn to read in first grade (Ortiz et al., 2012). These skills are important to English reading development in children learning to read in English (NELP, 2008), those learning to read in French who speak English as a first language (Genesee & Jared, 2008; Lesaux, Geva et al., 2008) and those learning English who speak another language at home (Geva & Clifton, 1994; Geva & Wang, 2001; Chiappe, Siegel, & Gottardo, 2002).
Due to the strong relation between emergent literacy skills and later reading ability (NLP, 2000), it is important that children with weaknesses in these skills be identified as early as possible in order to facilitate targeted early intervention. Currently, there are multiple methods for teachers to assess young children’s school readiness and emergent literacy skills (e.g., questionnaires, observations, objective measures) (Snowling, 2013). Curriculum-based measures (CBM) are one such method; the tests are empirically validated and easy to use.

**CBM and Progress Monitoring.** CBMs of prereading can be used to give educators simple, accurate, and efficient means of monitoring students’ progress (Shinn & Shinn, 2002). The purpose of these prevention oriented assessment tools is to assess the degree to which students have acquired the prerequisite skills required for the development of reading fluency and comprehension (Hintze, Ryan, & Stoner, 2003). Assessing students’ skills in key emergent literacy domains allows teachers to identify those who are experiencing reading difficulties early on in the child’s learning trajectory.

Dynamic Indicators of Basic Early Literacy Skills (DIBELS) is one type of CBM assessment that can be used both to monitor students’ progress and determine whether they meet benchmark goals. Benchmark goals are achievement norms that have been established for each of the DIBELS measures. Benchmark assessments can be administered at three time points during the school year (fall, winter, and spring). The benchmarks represent the level of proficiency children should obtain in a particular skill in order to be able to develop proficient reading skills. At each time point, children’s
scores can be compared to scores derived from a normative national sample. Scores can then be classified into risk categories (low, some, or at risk) with the associated instructional recommendations (Good & Kaminski, 2002). Scores in the low risk and some risk ranges indicate that children have an 80% and 50% chance respectively of achieving future proficiency. At risk performance indicates that children have an 80% chance of not achieving future proficiency (University of Oregon, 2009).

Multiple equivalent forms of each measure are available for monitoring children’s growth in literacy skills over time. They can be administered as often as twice per week within the context of an intervention in order to determine whether children are benefiting from instruction (Good, Kaminski, Simmons, & Kame’enui, 2001). By identifying students who are at risk of developing reading difficulties before they experience failure, the use of CBM assessment probes could reduce the need for remediation in later grades (Good et al., 2001). All of the DIBELS measures have demonstrated reliability and have been useful in the identification of students who are not progressing adequately (Hintze et al., 2003). Research has found that evidence for Letter Naming Fluency (LNF) is particularly robust across multiple indices (e.g., test-retest, alternate forms, and inter-rater), suggesting that this measure can consistently assess children’s performance across time periods, forms, and examiners (Goffreda & DiPerna, 2010). Students who get high scores on the DIBELS measures are likely to become fluent readers, whereas those with low scores are likely to develop reading difficulties if no intervention is implemented (Wilson, 2005).

CBM are especially useful for monitoring the progress of at risk children because, contrary to most standardized tests, they are sensitive to even minimal growth (Good et
al., 2004). This is important for providing feedback data about the effectiveness of an intervention. As well, the performance of at risk children, especially those with attention problems, can vary from one assessment to another. It is therefore useful to be able to administer multiple equivalent probes to obtain information about students’ skill levels over time. In the next section, I provide an introduction to ADHD, describe the characteristics of children with ADHD, including instructional considerations, review the literature on the comorbity of ADHD and word reading disorder, and the importance of these findings for the early intervention of children with attention and early reading risk.

1.2.3 Introduction to ADHD

**Prevalence and Diagnosis.** ADHD is a common neurodevelopmental disorder with epidemiological studies showing that it affects approximately 5% to 7% of school-aged children worldwide (Willcutt et al., 2012). This disorder is characterized by developmentally inappropriate levels of inattention and/or hyperactivity-impulsivity that are functionally impairing (American Psychiatric Association, 2000). According to the DSM 5, a diagnosis of ADHD is given when the following criteria are met: a) the child exhibits at least 6 of the 9 symptoms of inattention and/or 6 of the 9 symptoms of hyperactivity-impulsivity in two or more settings (e.g., home and school), b) the symptoms have persisted for at least 6 months to a degree that is impairing, and the onset occurred before age 12. Although ADHD is most commonly diagnosed in school-aged children, it has been estimated that 6% of preschool-aged children meet ADHD diagnostic criteria (Angold & Egger, 2004; Gadow, Sprafkin, Nolan, 2001).
**ADHD in Preschool.** Longitudinal investigations of ADHD among preschoolers confirm that ADHD symptoms and the associated impairment persist into elementary school (Lahey et al., 2004; Lahey & Willcutt, 2010; Riddle et al., 2013). Specifically, in a four-year longitudinal study, Lahey and colleagues (2004) found that 79% of children (aged 3.8 to 7.0) who met full ADHD diagnostic criteria in year 1 continued to meet criteria at least twice during years 2 to 4 compared to 3% of the comparison group who did not meet diagnostic criteria at year 1. Similarly, Riddle and colleagues (2013) found that approximately 90% of preschoolers initially diagnosed with ADHD continued to be diagnosed with ADHD 6 years later, despite receiving a parent training intervention and pharmacological treatment.

Despite the diagnostic stability of ADHD, studies have found that the behavioural classifications (ADHD – predominantly inattentive, ADHD – predominantly hyperactive/impulsive, ADHD – combined type) are unstable over time (Lahey et al., 2005; Lahey & Wilcutt, 2010). That is, many children with ADHD (39%) will change from one subtype to another over an 8-year period, adding to the challenge of diagnosing preschool children with ADHD (Lahey et al., 2005). It is therefore the symptom severity and impairment that determine long-term outcomes rather than classification as a particular subtype.

Given that ADHD persists from preschool through to elementary school and beyond, McGoey, Eckert, and DuPaul (2002) noted the importance of providing effective early intervention in order to change the negative developmental trajectory facing young children with ADHD. Lahey and colleagues (2004) found that preschool children with ADHD exhibited significant global, social, and academic impairments over a 4-year
period compared to non-ADHD peers. Parent training is one of the most effective
treatments for preschool ADHD symptoms (Charach et al., 2013). For example, Sonuga-
Barke Daley, and Thompson (2002) reported significant reductions in ADHD symptoms
that persisted for 15 weeks post-treatment, following a parent training program. It is
encouraging that early interventions can decrease ADHD symptoms in preschool children
because such interventions have the potential to increase children’s exposure to academic
concepts in preschool classrooms (McGoey et al., 2002).

**Characteristics of Children with ADHD.** Children with ADHD are often
described as careless, non-reflective, disorganized, and carefree by parents and teachers
(Campbell, 2002). They experience difficulties in a range of key domains including
academic (DeShazo, Lyman, & Klinger, 2002; Jensen et al., 2004; Lahey et al., 2004;
LeFever, Villers, & Morrow, 2002; Massetti et al., 2008), and social (Lahey et al., 2004;
Wiener & Mak, 2009). The academic weaknesses associated with ADHD (Jensen et al.,
2004; LeFever et al., 2002) are highly relevant to this dissertation.

Children with ADHD are more likely than their peers to be held back in school,
receive lower scores on standardized reading and mathematics achievement tests, and use
special education services (Jensen et al., 2004; LeFever et al., 2002). They tend to show
lower rates of engagement in classrooms, particularly when independent seatwork is
required or during teacher directed large group instruction (Junod, DuPaul, Jitendra,
Volpe, Cleary, 2006). This lack of attention to task, common to children with ADHD
combined or inattentive subtype, may give rise to the robust relation between inattention
symptom severity and academic underachievement (Daley & Bichwood, 2010).
Observational studies (e.g., Kofler, Rapport, & Alderson, 2008; Rapport, Kofler, Alderson, Timko, & DuPaul, 2009) suggest that inattentive children may miss out on classroom instruction because they are frequently off-task. Kofler and colleagues (2008) conducted a meta-analysis of observation studies of children with ADHD. Direct observation in classroom settings revealed children with ADHD were able to focus their attention and remain on-task significantly less than typically developing peers. Consistent with these findings Rapport and colleagues (2009) reported that their direct classroom observations showed that all children shifted between attentive and inattentive states. However, children with ADHD shifted between states more frequently and were attentive for shorter periods of time. As well, children with ADHD were most attentive during small group or one-on-one instruction. This phenomenon may impact multiple academic areas, particularly the development of literacy skills in the early elementary grades.

There is also a growing body of evidence with clinical and community samples that inattention at sub-clinical levels can have detrimental effects on children’s academic and social functioning (Lambert, 1988; Currie & Stabile, 2006). For example, Currie and Stabile (2006) found that an increase in 1 symptom of ADHD was associated with a corresponding increase in academic impairment in two large national longitudinal datasets. Pingault et al. (2011) conducted a more recent longitudinal study examining the effects of inattention and hyperactivity symptoms on educational attainment in a community sample. Teacher ratings of inattention and hyperactivity were collected each year from kindergarten to sixth grade. The authors identified four developmental trajectories of inattention (stable low trajectory, stable high trajectory, declining trajectory, and rising trajectory). The results showed that approximately 70% of children
with high inattention trajectory, from kindergarten to sixth grade, had not graduated from high school by age 23. However, children with low inattention trajectories were at significantly lower risk of not having completed high school. Moreover, hyperactivity was not a significant predictor of high school completion. These findings suggest that children with attention problems, regardless of whether they are diagnosed with ADHD, may be good candidates for early intervention to reduce the risk of academic underachievement (Pingault et al., 2011).

**ADHD and Word Reading Disorder (WRD).** Children with ADHD are significantly more likely than their typically developing peers to exhibit a co-occurring learning disorder (LD) (e.g., DuPaul, Gormely, & Laracy, 2013; Pastor & Reuben, 2008). One of the most common comorbid LDs exhibited by children with ADHD is word reading disorder (WRD) with approximately 20-40% of children with ADHD exhibiting this LD (Willcutt & Pennington, 2000).

Several possible explanations of the comorbidity between ADHD and WRD have been proposed (e.g., Ebejer et al., 2010; McGee, Prior, Williams, Smart, & Sanson, 2002; Willcutt, Pennington et al., 2007). First, it is possible that early reading problems cause later inattention with frustration due to early reading problems resulting in off-task behaviour (e.g., Pennington, Groisser, & Welsh, 1993) and academic disengagement (e.g., McGee et al., 2002). Most studies, however, do not support this hypothesis of comorbidity (e.g., Dittman, 2013; Willcutt, Pennington et al., 2007).

A second hypothesis is that ADHD (particularly the inattention symptoms domain) and reading have common genetic influences that give rise to their frequent
overlap (Pennington, 2006). The common genetic etiology hypothesis has received research support (e.g., Ebejer et al., 2010; McGrath et al., 2011; Shanahan et al., 2006; Willcutt, Pennington et al., 2007; Willcutt et al., 2010). For example, Willcutt and colleagues (2010) examined the etiology of the comorbidity between WRD and ADHD in a sample of twins. Their findings indicated that deficits in phonological processing, verbal reasoning, and naming speed were associated with WRD, while poor response inhibition and processing speed were related to ADHD. These results also suggested that processing speed may be a common deficit associated with ADHD and WRD.

In one of the first investigations of the shared or common deficit hypothesis in preschool children, Willcutt, Betjemann et al. (2007) examined whether the association between ADHD symptoms and the prereading difficulties was present before school entry using a sample of twins from four countries. Higher levels of inattention were associated with significantly lower performances on the following pre-reading composites: phonological awareness, rapid naming, verbal memory, vocabulary, grammar, and print knowledge in preschool. As well, the genetic analyses revealed there were common genetic influences on inattention symptoms and the prereading skills. In contrast, hyperactivity-impulsivity symptoms were not significantly associated with any of the prereading skills after controlling for the effects of inattention (Willcutt, Betjemann et al., 2007). Similarly, Massetti et al. (2008) found that children who met modified diagnostic criteria for the predominantly inattentive subtype of ADHD between the ages of four and six had consistently lower reading, spelling, and mathematics scores over an eight year period than controls as well as children who met criteria for other subtypes of ADHD.

Similar findings were reported by Ebejer and colleagues (2010) who examined the
developmental trajectories of reading, attention, and hyperactivity from kindergarten to second grade in twins from four countries. Inattention was the symptom dimension that showed the strongest relation to word reading proficiency. Taken together, these studies provide evidence that the relation between inattention and reading is not restricted to the time period of formal reading instruction and there seem to be common influences on the development of both domains. Regardless of the underlying reason for the co-occurrence of WRD and ADHD, research has shown that children with a clinical diagnosis of ADHD as well as those with sub-clinical symptoms are at increased risk for reading difficulties. In the next section I discuss the relation between symptoms of behavioural inattention and the emergent literacy skills, which are necessary for the acquisition of reading.

**Inattention and Emergent Literacy Skill Development.** Several studies have examined the relation between behavioural inattention and emergent literacy skills. For example, Walcott and colleagues (2010) found that high levels of teacher-rated inattention in preschool predicted lower levels of phonemic awareness and letter knowledge one year later, in kindergarten, even after controlling for language ability and performance in these skills in preschool (Walcott, Scheemaker, Bielski, 2010). As well, Sims and Lonigan (2013) examined the relation between emergent literacy skills and ADHD symptoms, measured using two different methods of assessing inattentive and hyperactive-impulsive behaviours (i.e., teacher ratings and a computer-based continuous performance task [CPT]) in preschool children. Their findings showed that inattention and hyperactivity-impulsivity were related to children’s emergent literacy skills in preschool and that these relations were evident using multiple methods of assessing inattention and hyperactivity-impulsivity. Importantly, it was primarily inattention that
was associated with emergent literacy skills. Specifically, both teacher ratings of inattentive behaviour and the CPT index were uniquely associated with all three emergent literacy skills (i.e., phonological awareness, print knowledge, and definition vocabulary). Dice and Schwanenflugel (2012) also found that attention in preschool was related to the development of early literacy skills even after controlling for maternal education. They extended these findings to word reading by showing that emergent literacy skills (e.g., alphabet knowledge, phonological awareness, and receptive and expressive vocabulary) in preschool mediated the relation between preschool teacher-rated attention and end of kindergarten word reading ability.

Studies have also demonstrated the negative relation between behavioural inattention in preschool and reading ability in first grade. Specifically, Dally (2006) found that children’s task-focused behaviour in kindergarten (as rated by teachers) significantly predicted grade one word reading skills above and beyond phonological awareness, rapid naming, letter knowledge, and word recognition. Dally (2006) hypothesized that children with inattentive behaviour may miss out on key phonological instruction in the early elementary grades causing them to fall behind their age-matched peers in reading. In addition, Stephenson and colleagues (2008) found that children’s task-focused behaviour as rated by their kindergarten teachers strongly predicted kindergarten and grade one word reading ability after controlling for IQ and vocabulary.

Costa and colleagues (2013) found that in a community sample of children, those with a family history of reading difficulties were at increased risk for both reading difficulties and attention problems from kindergarten to grade 5. In fact, children may enter school with weakness in both attention and emergent literacy skills putting them at
increased risk for developing significant reading problems. As well, it is possible that inattention may further increase this risk in the absence of explicit instruction. According to McGinty and colleagues (2012), explicit instruction may serve as a protective factor by mitigating the risk of early inattention.

Taken together, these studies suggest that significant inattention during the development of early literacy skills could increase pre-reading difficulties even in the absence of early genetic or environmental risk factors (Willcutt, Betjemann et al., 2007). As well, the presence of many inattentive behaviours may interfere with the extent to which a child demonstrates engagement in learning activities. In contrast, high levels of hyperactive-impulsive behaviours may not negatively influence reading ability to the same extent as inattention symptoms (Sims & Lonigan, 2013).

1.2.4 Supporting Young Children with Early Reading Difficulties

Interventions focusing on developing letter and letter-sound knowledge and phonemic awareness in young children can produce improvements in these underlying literacy skills which in turn impact reading ability (Justice & Pullen, 2003). In fact, according to Torgesen (2000) three quarters of elementary school students at risk of experiencing reading difficulties can catch up to their average achieving peers through effective comprehensive beginning reading instruction. Coyne et al. (2004) extended these findings by showing that between 75% and 100% of the kindergarten students who participated in a supplemental reading intervention in kindergarten and had caught up with peers by the beginning of first grade continued to make acceptable reading progress through February of first grade without any additional intervention.
Studies have also examined the effects of early reading interventions on children with additional risk characteristics such as emotional or behavioural disorders (EBD), which include both internalizing (e.g., anxiety, depression) and externalizing behaviours (e.g., aggression, noncompliance). For example, Nelson, Benner, and Gonzalez (2005) investigated the effectiveness of the Stepping Stones to Literacy program on the early reading skills of kindergarten students with EBD and reading difficulties. Stepping Stones to Literacy is a supplemental prereading program, which aims to develop the emergent literacy skills of kindergarten children in order to better prepare them to benefit from regular classroom instruction. The at risk children received the program daily for 10 to 20 minutes for a total of 25 lessons. Children who received the tutoring program demonstrated significant gains in phonological awareness, word reading, and rapid naming. This indicates that Stepping Stones to Literacy is effective at developing the early literacy skills of children with EBD and that students with EBD respond to explicit evidence-based reading instruction (Nelson, Benner et al., 2005).

Based on the extant literature, several characteristics of successful code-focused instruction have emerged. The NELP report (2008) notes that explicit, intentional instruction is most effective at promoting core emergent literacy skills. Small-group or individual instruction appears to be more effective than large group or whole class instruction with at risk children (e.g., Denton et al., 2013; NELP, 2008; Wanzek & Vaughn, 2007). High levels of corrective feedback are another important aspect of effective instruction for struggling students (Reutzel, Child, Jones, & Clark, 2014). In fact, feedback procedures are extremely important to the effectiveness of an intervention because it allows students to correct their mistakes. For feedback to be most effective it
must be presented in a timely manner that is as soon as an error is made. As well, effective feedback is explicit (Reutzel et al., 2014).

Lastly, ensuring that students have multiple opportunities to respond contributes to the success of an intervention (e.g., Mathes & Torgesen, 1998). Frequent opportunities to respond allow children to be actively engaged and practice the skills being taught (Wanzek, Roberts, & Al Otaiba, 2014). This can be related to intervention group size in that, generally speaking, the more children in the group the fewer opportunities each child will have to respond. Direct Instruction programs (Adams & Carnine, 2003) follow the “model, practice, and test” intervention format and meet all of these criteria. Children are explicitly taught new concepts in the “model” step, they are then given the opportunity to practice, and receive immediate corrective feedback when they “test” their skills independently with the goal of achieving a certain level of proficiency before moving on to the next concept or skill (Adams & Carnine, 2003),

Despite the plethora of evidence around best practices in reading instruction for typically developing children as well as those with reading difficulties, studies have shown that children with reading difficulties have few opportunities to practice reading print during reading instruction in general education classrooms (e.g, Chard & Kameenui, 2000; Kent, Wanzek, & Al Otaiba, 2012). Specifically, Kent et al. (2012) examined the amount of time that kindergarten children at risk for reading difficulties spent actively engaged in reading print (sounds, words, and connected text). Analysis of the mandated 90 minute literacy block revealed that only 50% of instructional time was devoted to literacy instruction. At risk students spent approximately 1 minute actively engaged in reading print of any kind, only 10% of this time accounted for individual reading
opportunities. Approximately 35% of instructional time was spent teaching children foundational literacy skills. However, at risk children had few opportunities to practice the application of these skills. Thus, opportunities for children to be actively engaged in reading print could be considered an important part of reading instruction (Brophy & Good, 1989), particularly for those at risk for reading difficulties (Kent et al., 2012).

### 1.2.5 Supporting Students with Attention and Reading Problems

Given that young children with attention and reading problems are at particular risk for reading failure, examining effective interventions for these children is especially important. However, few intervention studies have targeted kindergarten or elementary school children with co-existing reading and behavioural attention problems (Sexton, Gelhorn, Bell, & Classi, 2012). In one of the first studies addressing the combined profile, Rabiner and Malone (2004) examined the effectiveness of individual reading instruction for first grade children with both early reading and attention problems. The intervention occurred throughout the first grade year and included three components. A universal social-behavioural intervention was implemented by grade 1 teachers who taught two to three lessons per week on topics such as self-control, social problem solving, and emotional understanding. Children identified as at risk participated in an individual reading intervention that focused on phonetic decoding for 30 minutes a day, three times per week. As well, at risk children and their parents were invited to participate in weekly parent and children social skills training groups. The results indicated that grade one children with early reading difficulties improved significantly from individual (one-on-one) reading instruction, whereas children with attention difficulties made only modest gains in their reading skills. Children who were inattentive and poor readers
showed no improvement as a result of the intervention and continued to perform well below their peers at year’s end (Rabiner & Malone, 2004).

Dion and colleagues (2011) also reported little growth in reading skills in their sample of first grade children with attention problems. These researchers conducted a peer tutoring reading intervention with and without an evidence-based behaviour intervention program (the Good Behavior Game). Peer tutoring occurred for 30 minutes per day, three times per week. Students were paired so that stronger readers were partnered with weaker readers. The intervention targeted letter-sound knowledge, blending, reading sight words, and reading decodable connected text. They found that although there was a significant effect of the Good Behavior Game on inattentive children’s attention, the children did not become better readers despite receiving both the behaviour and reading interventions (Dion, Roux, Landry, Fuchs, Wehby, & Dupéré, 2011). These results highlight the challenges associated with intervening to improve the reading skills of this population. In fact, results from the Multimodal Treatment of ADHD Study (MTA) follow-up studies show that although community treatments can improve ADHD symptoms and associated academic impairment they do not increase the functioning of children with ADHD to a level comparable with that of their peers (Molina et al., 2009). As well, children with ADHD in the MTA study did not make gains in reading achievement (Langberg et al., 2010).

Overall, this pattern of findings is consistent with data examining predictors of children’s responsiveness to instruction. Generally, children with reading and attention problems tend to show a less positive response to reading instruction (Al Otaiba & Fuchs, 2006; Nelson, Benner, & Gonzalez, 2003) in a variety of contexts (Dion et al., 2011;
Rabiner & Malone, 2004). In fact, attention and behaviour problems have been identified as one of the seven characteristics associated with children who do not respond to reading instruction (Al Otaiba & Fuchs, 2006; Nelson et al., 2003). The attention that children pay to reading instruction may affect their responsiveness to instruction or children with attention problems may exhibit cognitive difficulties that negatively affect their reading development (Shanahan et al., 2006; Stage, Abbott, Jenkins, & Berninger, 2003).

There is a dearth of studies addressing the effects of emergent literacy skills instruction in children with clinically significant attention problems. It is possible that interventions for children with both reading and attention problems must address both issues concurrently and may require different strategies than for children with reading difficulties alone (Walcott, Marett, & Hessel, 2014). For example, meta-analytic data on reading interventions suggests that a group reading intervention with 2 to 6 children is as effective as one-to-one instruction (Elbaum, Vaughn, Hughes, & Moody, 2000). Given the significant challenges of teaching students with attention and reading problems, however, it may be important to provide even more intensive instruction in a one-to-one tutoring setting where the instructor can provide sufficient scaffoldings and redirects to the task at hand (Sáez, Folsom, Al Otaiba, & Schatschneider, 2012).

A second limitation of the research on interventions for children with early attention and reading problems is that the majority of the studies have taken place in grade one or later (Sexton et al., 2012). It appears that regardless of the intensity of instruction, a reading intervention in grade one may not be able to compensate for the lost learning opportunities caused by behavioural inattention in the early years (Dion et al., 2011). Therefore, in order to reduce their risk of reading failure, these children may
require intervention before the onset of formal reading instruction, in kindergarten or earlier.

1.2.6 Rationale for Intervention Design

The choice of intervention design and program in the present study was guided by several factors. First, research suggests that explicit instruction is a core characteristic of effect emergent literacy interventions (NELP, 2008; Reutzel et al., 2014). Moreover, evidence indicates that children with a diagnosis of ADHD benefit from highly structured lessons with multiple opportunities for feedback (Piffner & Barkley, 1998; Raggi & Chronis, 2006). As well, the findings of Sáez and colleagues (2012) highlight the importance of providing redirects (i.e., directions to focus on the task at hand) to inattentive students who are off-task during reading instruction because without these prompts they may miss out on key components of reading instruction. Findings also suggest that children with a diagnosis of ADHD respond positively to individual or small group instruction (Raggi & Chronis, 2006) compared to whole class instruction. As well, Al Otaiba, Connor and colleagues (2011) highlighted the importance of individualization to enhance children’s responsiveness to instruction. As a result, the intervention program used in the present study was highly explicit, systematic, and was conducted on a one-to-one basis with the participating students.

1.2.7 Current Research Objectives

The primary goal of this study was to examine the effects of a supplemental evidence-based prereading program in a one-to-one tutoring context on the literacy development of children with marked behavioural inattention symptoms who are at risk
for reading difficulties. I was interested in determining whether such an intervention would result in gains and functional improvement in children’s phonemic awareness, letter knowledge, and decoding ability. Few studies have examined supplemental reading programs for kindergarten (e.g. Rabiner & Malone, 2004). As well, early reading intervention studies are often designed for young children with behavioural or emotional problems but not specifically for those who are inattentive. For example, Nelson, Benner, and Gonzalez (2005) showed that the Stepping Stones to Literacy program is effective at improving the reading-related skills of children with EBD. However, this program has never been used with children who have significant behavioural inattention and early reading difficulties.

It is important that studies examine the effectiveness of supplemental reading programs for children with attention problems and weaknesses in emergent literacy skills because both inattention and poor reading skills are predictive of negative outcomes in a range of domains (e.g., academic achievement, high school completion). For example, Rabiner and Malone (2004) hypothesized that since inattentive children in grade one failed to make gains from individual reading instruction, it is possible that more intensive instruction is needed in kindergarten in order to reduce their risk of reading failure in later grades. As a result, the present study attempted to change the negative trajectories of children with behavioural inattention and early reading problems by providing an emergent literacy tutoring program in kindergarten. The following research questions were examined:
1. Does providing a systematic supplemental early reading program improve the core pre-reading skills (e.g., letter knowledge and phonological awareness) of kindergarten children who are inattentive and have weak emergent literacy skills?
   a. Will the improvements constitute a functional change in early literacy skills in that children will no longer be identified as at risk at post-test on the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) Letter Naming Fluency and Initial Sound Fluency measures?

2. Will students’ gains in pre-reading skills be maintained over time (6-week follow-up)?

3. Will teachers view the supplemental intervention as a positive and useful component of the students’ academic programs?
CHAPTER TWO

Methods
2.1 Participants

The first stage in this study involved the recruitment of kindergarten teachers who were interested in having their class take part in this study. After receiving consent from the school board to conduct the study, approval was gained from the principal of an urban elementary school and two kindergarten teachers. A two-step consent process was utilized to recruit children with behavioural inattention and emergent literacy difficulties. Initially, all parents of the children in the participating teachers’ classes received a consent form asking for permission for their child to participate in the screening phase of the study. The two participating teachers completed the Teacher’s School Readiness Inventory (TSRI; Simner, 1987) for all children in their class for whom parental consent was obtained. This teacher-rated questionnaire asks teachers to rate students on five key areas of school readiness (distractibility and attention, verbal fluency, motivation, letter knowledge, and printing skills) and is commonly used in schools as a means of identifying kindergarten children who may be at risk for early school failure (see Pre-Intervention Measures section for further details).

Children who received a score of 1 (highly distractible) on the first item and a score of 3 or less on the fourth item (able to identify fewer than 50% of the letters of the alphabet) were eligible to participate in the intervention. At the second stage of the consent process, a consent form was sent only to the parents of children who were eligible to participate in the intervention asking for permission for their child to participate in the intervention phase of the study. Six children were eligible to participate in the study based on the screening results. One parent did not provide consent for their child to participate in the intervention. Another child received consent and began the
study but moved away from the school after six weeks (26 sessions). I was unable to obtain further information about this child. As a result, his data have been excluded from the analyses.

Four kindergarten students from three different classes took part in the study (1 girl and 3 boys). At the start of the study, the participants ranged in age from 4 years, 11 months to 5 years, 5 months. Two participants, Jordan and Matthew, spoke English as a primary language at home. Lily and Jamal spoke Bengali as their primary language at home. All participants had attended pre-kindergarten in English at the same school the year before the study took place.

Teachers also completed the *ADHD Rating Scale-IV Preschool Version* (McGoey DuPaul, Haley, & Shelton, 2007) and the *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 1997) for each participant. Both are well-validated scales (see Pre-Intervention Measures section for further details). Children’s scores on the ADHD Rating Scale were calculated for the inattentive, hyperactive/impulsive and total scale. Raw scores were converted to percentiles (see Table 1). All four participants were reported by their teacher to exhibit significant behavioural attention problems and few symptoms of hyperactivity/impulsivity. Of the four participants, Jamal’s scores were the highest on all three scales. According to Purpura, Wilson, & Lonigan’s (2010) method of calculating ADHD symptoms in preschool children, 3 children (Jordan, Matthew, and Lily) exhibited 6 behavioural inattention symptoms and one child (Jamal) exhibited 9 symptoms. It is important to note that the number of inattention symptoms exhibited by all four participants would be considered clinically relevant as they each met the minimum

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1 All names are pseudonyms.
criteria (6 or more of the 9 symptoms of inattention) for the predominantly inattentive subtype of ADHD (American Psychiatric Association, 2000). None of the children had previously been formally diagnosed with ADHD. Jordan, Matthew, and Jamal had 2, 1, and 4 hyperactivity/impulsivity symptoms present respectively. Symptoms were considered “present” if the teacher rated them as 2 or 3. Symptoms were considered “absent” if the teacher rated them as 0 or 1. Few preschool children tend to exhibit the level of symptom severity observed in this study. In fact, in a representative sample of 3 to 5 year old children only 8.5% exhibited sustained high levels of ADHD symptoms (Willoughby, Pek, & Greenberg, & the Family Life Project Investigators, 2012)

A baseline assessment was conducted to confirm that the participants exhibited weaknesses in early literacy skills (see Table 2). The DIBELS Initial Sound Fluency (ISF; Good & Kaminski, 2002) and Letter Naming Fluency (LNF; Good & Kaminski, 2002) were administered. These CBM tools are valid and reliable measures of early reading skills (Good et al., 2004; Hintze et al., 2003) (see Time-Series Measures section for further details). All four participants scored in the at risk range on the ISF confirming that they had poor phonemic awareness. Matthew and Jamal also scored in the at risk range on the LNF, confirming that they had limited letter knowledge. Jordan and Lily scored in the low risk range on LNF despite teacher reported low alphabetic knowledge. Jordan, Matthew, and Jamal scored in the average range on the Peabody Picture Vocabulary Test- 4 (PPVT- 4; Dunn, & Dunn, 2007). However, Lily scored in the extremely low range indicating that she also had receptive language difficulties. The PPVT – 4 assesses receptive language skills and is commonly used with young children (see Pre-Intervention Measures section for further details).
Children’s SDQ scores were calculated for each of the five sub-scales (emotional symptoms, conduct symptoms, hyperactivity, peer problems, and pro social) as well as the total difficulty score (see Table 1). All four children were in the normal range on the emotional and conduct symptoms scales. Jordan scored in the normal range on all subscales as well as the total difficulty score. Matthew and Jamal were in the abnormal range on the hyperactivity subscale while Lily scored in the borderline range. It is important to point out that the hyperactivity subscale on the SDQ contains only two behavioural inattention items (distractibility and attention span) and all of the participants received high scores on these items. Jordan and Matthew scored in the normal range on the total difficulty score while Lily and Jamal’s scores were in the borderline range.

In general, the children’s behaviour during instruction was consistent with their scores on the behavioural measures. Jordan was easily distracted during tutoring and exhibited difficulty focusing on difficult tasks. Although Matthew displayed inattentive behaviours during tutoring, he responded positively to praise and took pride in completing tasks successfully. Lily was very quiet and easily distracted during tutoring, however she was eager to please and responded positively to praise. Jamal was visibly happy and proud of the progress he made in tutoring. He also exhibited significant difficulty beginning a task and focusing on an activity for any length of time.
Table 1.

Teacher Ratings of Behaviour

<table>
<thead>
<tr>
<th></th>
<th>Jordan</th>
<th>Matthew</th>
<th>Lily</th>
<th>Jamal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADHD Rating Scale</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IN Scale(^1)</td>
<td>17</td>
<td>20</td>
<td>18</td>
<td>27</td>
</tr>
<tr>
<td>HI Scale(^1)</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Total ADHD(^1)</td>
<td>21</td>
<td>26</td>
<td>18</td>
<td>42</td>
</tr>
<tr>
<td>IN Symptoms</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>HI Symptoms</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td><strong>SDQ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Conduct</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>HI</td>
<td>5</td>
<td>10(^b)</td>
<td>6(^b)</td>
<td>9(^a)</td>
</tr>
<tr>
<td>Peer Problems</td>
<td>0</td>
<td>0</td>
<td>2(^b)</td>
<td>1</td>
</tr>
<tr>
<td>Prosocial</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>5(^b)</td>
</tr>
<tr>
<td>Total Difficulty</td>
<td>5</td>
<td>10</td>
<td>12(^b)</td>
<td>12(^b)</td>
</tr>
</tbody>
</table>

Note. The ADHD Rating Scale – Preschool Version was used; \(^1\)Raw Score; IN = Inattention; HI = Hyperactivity/Impulsivity; Symptoms present if teacher rated them as 2 or 3; SDQ = Strengths and Difficulties Questionnaire; \(^a\) Abnormal score; \(^b\) Borderline Score
Table 2.

Baseline Measures

<table>
<thead>
<tr>
<th></th>
<th>PPVT-4 Standard Score (%ile)</th>
<th>Letter Naming Fluency</th>
<th>Initial Sound Fluency</th>
<th>Letter Sound Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jordan</td>
<td>88 (21)</td>
<td>15</td>
<td>3.3*</td>
<td>3</td>
</tr>
<tr>
<td>Matthew</td>
<td>106 (66)</td>
<td>0*</td>
<td>1.1*</td>
<td>0</td>
</tr>
<tr>
<td>Lily</td>
<td>70 (2)</td>
<td>13</td>
<td>0.72*</td>
<td>1</td>
</tr>
<tr>
<td>Jamal</td>
<td>98 (45)</td>
<td>0*</td>
<td>1.67*</td>
<td>0</td>
</tr>
</tbody>
</table>

*At risk based on beginning of kindergarten DIBELS benchmark norms

2.2 Setting

2.2.1 The Canadian Context – Urban

This study took place at an urban public school in a large metropolitan city in Ontario, Canada. The student population of the participating school is diverse and represents over 40 countries and languages. Approximately 60% of the students have a primary language other than English. Students were not selected for the study based on their English Language Learner (ELL) status but given the demographics of the school some of the selected participants were ELL. Results of the Education Quality and Accountability Office (EQAO) assessments administered to students in grade 3 and 6 during the school year in which the study took place showed that 51% and 50% of students respectively were at or above the provincial standard in reading. The participants were enrolled in a half-day senior kindergarten (SK) program offered to all five-year-old
children in the school board. Two participants, Matthew and Lily, attended kindergarten in the morning, while Jordan and Jamal attended in the afternoon.

2.2.2 The Canadian Context – French Immersion

Canada is a bilingual country with English and French recognized as the two official languages. English is the majority language in 9 of the 10 provinces, including Ontario where this study took place. Bilingualism is promoted by the federal government and is valued by many Canadians. As a result, parents choose to enrol their children in French Immersion (FI) programs, which are designed to promote bilingualism among English speaking children. As a result, the sociocultural context for these children is very different from that of minority-language children such as Spanish speakers in the United States (Farver, Xu, Lonigan, & Eppe, 2013). For example, resources such as reading materials and educational programming are more readily available in English than in minority languages.

Jordan, Matthew, and Lily had the same classroom teacher and were in a FI program. In this school board, the early FI program begins in kindergarten and students receive instruction exclusively in French until third grade. Approximately 6% of all students (kindergarten to grade 12) in the school board in which the study took place are enrolled in FI with the highest rate of enrolment (14.1%) in kindergarten (Sinay, 2010). It is common in the Canadian context for students to be both ELL and enrolled in a FI program. In fact, the primary home language of approximately 30% of students enrolled in FI is not English (Sinay, 2010). Jamal was therefore the only participant who attended an English only program in a split junior kindergarten/senior kindergarten class.
2.2.3 Description of Classroom Context

Teachers were asked to complete a survey (See Appendix A) about their classroom literacy practices. Four types of practices were reported to be the focus of classroom instruction (alphabet knowledge, phonological awareness, concepts of print, and oral language). Teachers varied in the extent to which they reported implementing these four target skills. As well, personal observations of the kindergarten classrooms indicated that each included several centres (e.g., drama, construction, sandbox, book corner, computer station) and students were given choice in terms of the centre they would work at and the activities they would participate in.

2.3 Pre-Intervention Measures

The following measures were completed once before the intervention began. The purpose of these measures was largely descriptive. The measures were administered only once because these domains were not the focus of the intervention and it was expected that they would not change.

2.3.1 Teacher School Readiness Inventory

The TSRI (Simner, 1987) is a questionnaire that requires teachers to rate students on five key items (distractibility and attention, verbal fluency, motivation, letter knowledge, and printing skills) using everyday observations. Each item is rated on a five-point scale (e.g., 1 easily distracted; 5 good attention span). This questionnaire is commonly used in schools as a means of identifying kindergarten children who may be at risk for early school failure. Inter-rater reliability for the TSRI is 0.86. Concurrent validity between the TSRI and the Wide Range Achievement Test for kindergarten
children is 0.71 (Simner, 1987). Predictive validity of the TSRI in kindergarten with the Woodcock Reading Mastery Test and the KeyMath Diagnostic Arithmetic Test in first grade range from and 0.57 to 0.65 (Simner, 1987).

2.3.2 ADHD Rating Scale – IV Preschool Version

The ADHD Rating Scale-IV Preschool School Version (McGoey et al., 2007) is an 18-item questionnaire that requires the respondent to rate the frequency of occurrence of ADHD symptoms based on the DSM-IV criteria. The respondent rates each item on a Likert scale from 0 (not at all) to 3 (very often). Scores can be obtained for the Inattentive, Hyperactive/Impulsive and Total Scale. Internal consistency alpha coefficients are 0.95, 0.93, and 0.93 for the Total Score, Inattentive, and Hyperactivity/Impulsivity scales respectively (McGoey et al., 2007). As well, the authors report significant correlations between the ADHD Rating Scale IV Preschool School Version and the Conners Teacher Rating Scale - Revised ranging from 0.54 to 0.96.

2.3.3 Strengths and Difficulties Questionnaire

The SDQ (Goodman, 1997) is a 25-item questionnaire, which is comprised of five subscales (Emotional Symptoms, Conduct Problems, Hyperactivity, Peer Problems, and Prosocial). It can be used reliably with children four years and older. The SDQ was used to characterize the sample by providing information about participants’ behaviours in these five key domains. Items are scored on a three point scale (Not true = 0; Somewhat true = 1; Certainly true = 2). One item in each scale is reverse scored. A range in scores from 0 to 10 is possible for each subscale. Raw scores for each of the subscales as well as the total difficulty score can be categorized as normal, borderline, or abnormal using
normative data provided by the developers of the SDQ (www.sdqinfo.org). Goodman & Scott (1999) showed significant correlations between the Child Behavior Checklist and each of the 5 SDQ scales ranging from 0.59 to 0.87. As well, recent study with a large Canadian sample of elementary school children demonstrated the reliability and validity of the SDQ in young Canadian children (Aitken, Martinussen, Wolfe, & Tannock, 2014).

2.3.4 Peabody Picture Vocabulary Test – 4

The Peabody Picture Vocabulary Test – 4 (PPVT- 4; Dunn, & Dunn, 2007) was used to assess children’s receptive vocabulary. In this task, children are presented four pictures. They must select the picture that most accurately illustrates the definition of the word presented orally by the examiner. The PPVT – 4 is a sound psychometric measure of receptive vocabulary, which was normed on a sample of over 3000 individuals. According to the authors, the concurrent validity of the PPVT – 4 with the CELF – 4 Receptive Language Scale is 0.67 for young children.

2.4 Time-Series Measures

Participants’ letter and letter-sound knowledge as well as their phonemic awareness were assessed continuously throughout baseline and intervention. The following measures were administered during baseline and intervention as well as at immediate post-test and 6-week follow-up.

2.4.1 Letter Naming Fluency

The DIBELS Letter Naming Fluency subtest (LNF; Good & Kaminski, 2002) was administered biweekly from the beginning to the end of the intervention, as well as once
at the immediate post-test and 6-week follow-up. LNF measures the speed with which children can name letters. Children are presented with a page of upper and lower case letters arranged in random order and are asked to name as many letters as they can in one minute. The score is the number of letters named correctly in one minute. Benchmark norms have been established for the fall, winter, and spring of kindergarten. Risk status (low risk, some risk, and at risk) can be determined based on these norms. LNF scores less than or equal to 1 in the fall of kindergarten are considered at risk. Scores between 2 and 7 and scores of 8 and higher are considered some risk and low risk respectively.

There are twenty equivalent versions of this subtest. Alternative form reliability of LNF is 0.96 (Good et al., 2004). The median concurrent validity of LNF with the Woodcock-Johnson Psycho-Educational Battery-Revised Readiness Cluster in kindergarten is 0.70 (Good et al., 2004). The concurrent validity of LNF with the Comprehensive Test of Phonological Processing is 0.58, 0.53, and 0.52 with the rapid naming, phonological awareness, and phonological memory subtests respectively (Hintze et al., 2003). The predictive validity of kindergarten LNF is 0.66 and 0.72 with end of first grade Woodcock-Johnson Revised Reading Cluster and CBM oral reading fluency respectively (Good et al., 2004).

2.4.2 Initial Sound Fluency

The DIBELS Initial Sound Fluency (ISF; Good & Kaminski, 2002) was administered biweekly from the beginning to the end of the intervention, as well as once at the immediate post-test and 6-week follow-up. ISF assesses children’s ability to identify the initial phonemes in words. The examiner asked questions requiring the child
to either identify the initial sound in a word or select the word that contains the target sound. The number of correct initial sounds produced in one minute determines the final score. Risk status (low risk, some risk, and at risk) can be determined based on established DIBELS benchmark norms for the fall and winter of kindergarten. ISF scores less than or equal to 3 in the fall of kindergarten are considered at risk. Scores between 4 and 7 and scores of 8 and higher are considered some risk and low risk respectively.

There are twenty equivalent versions of this subtest. Alternative form reliability of ISF is 0.89 (Good et al., 2004). The median concurrent validity of ISF with the Comprehensive Test of Phonological Processing is 0.60 and 0.46 with the phonological awareness and phonological memory subtests respectively (Hintze et al., 2003). The predictive validity of kindergarten ISF is 0.37 and 0.36 with end of first grade Woodcock-Johnson Revised Reading Cluster and CBM oral reading fluency respectively (Good et al., 2004).

2.4.3 Phoneme Segmentation Fluency

The DIBELS Phoneme Segmentation Fluency (PSF; Good et al., 2001) assesses children’s ability to segment three and four phoneme words into their individual phonemes fluently. The examiner presented three to four phoneme words orally and children are required to produce verbally the individual phonemes for each word. The number of correct phonemes produced in one minute determines the final score.

Benchmark norms have been established for the winter and spring of kindergarten and this subtest can be administered reliably during this timeframe. Risk status (low risk, some risk, and at risk) can be determined based on these norms. PSF scores less than or
equal to 6 in the winter of kindergarten are considered at risk. Scores between 7 and 17 and scores of 18 and higher are considered some risk and low risk respectively.

Twenty equivalent versions of this subtest are available for progress monitoring. Alternative form reliability of PSF is 0.90 (Good et al., 2004). The median concurrent validity of PSF with the Comprehensive Test of Phonological Processing is 0.53 and 0.39 with the phonological awareness and phonological memory subtests respectively (Hintze et al., 2003). The predictive validity of kindergarten PSF is 0.60 and 0.52 with end of first grade Woodcock-Johnson Revised Reading Cluster and CBM oral reading fluency respectively (Good et al., 2004).

Participants demonstrated a floor effect on PSF. Throughout the baseline and intervention phases, all of the participants answered too few items correctly and testing was discontinued.

2.4.4 Letter Sounds

The easyCBM Letter Sounds subtest (LS; University of Oregon, 2009) was administered once per week throughout the intervention to assess children’s letter-sound correspondences. Children were presented with a page of lower case letters in random order and they had to identify as many letter sounds as possible in one minute. This is a task that assesses both accuracy and fluency in letter-sound correspondence knowledge. The number of correct letter-sounds produced in one minute represents the final score. Twenty equivalent form of this measure are available. Alternate-form reliability ranges from 0.76 to 0.88 (Alonzo & Tindal, 2009).
2.5 Immediate Post-Test and Follow-up

An immediate post-test was administered when the intervention ended in March. A follow-up assessment was conducted in May six weeks after the intervention ended. The following measures were administered at both time points: DIBELS LNF, ISF, PSF, NWF (Good & Kaminski, 2002) and LS (University of Oregon, 2009).

2.5.1 Nonsense Word Fluency

The DIBELS Nonsense Word Fluency (NWF; Good et al., 2001) assesses children’s familiarity with the alphabetic principle, letter sound correspondence, and the ability to blend letters into words. Children were presented with a sheet of paper with randomly ordered consonant-vowel (CV) and CVC nonsense words and asked to say the individual letter sounds of each letter or read the whole nonsense word. Children are allowed one minute to produce as many letter-sounds as they can. The final score is the number of letter-sounds produced correctly in one minute. This measure was administered at three time-points (before the intervention began, immediate post-test, and 6-week follow-up). Progress monitoring forms do not exist for kindergarten.

Benchmark norms have been established for the winter and spring of kindergarten and this subtest can be administered reliably during this timeframe. Risk status (low risk, some risk, and at risk) can be determined based on these norms. NWF scores less than or equal to 4 in the winter of kindergarten are considered at risk. Scores between 5 and 12 and scores of 13 and higher are considered some risk and low risk respectively.

There are twenty equivalent versions of this subtest. Alternative form reliability of NWF is 0.95 (Ritchey, 2008). The median concurrent validity of NWF with the
Woodcock-Johnson Psycho-Educational Battery-Revised Letter-word Identification in kindergarten is 0.91 (Speece, Mills, Ritchey, & Hillman, 2003). The predictive validity of kindergarten NWF is 0.59 with end of first grade Woodcock-Johnson Revised Letter-Word Identification and Word Attack (Speece et al., 2003).

2.6 Procedures

2.6.1 Baseline

No supplemental instruction occurred during baseline. The participants received regular classroom instruction and the measures described above were administered biweekly. The intervention began in October and took place over a period of 18 weeks. A follow-up assessment was conducted six weeks after the conclusion of the program. The primary investigator, a certified teacher with special education credentials, conducted all assessments and tutoring sessions individually in a quiet room in the children’s school.

2.6.2 Intervention

Participants received supplemental early reading lessons 4 days per week beginning in October. The core curriculum was the Stepping Stones to Literacy program (Nelson, Cooper, & Gonzalez, 2004). The program comprises 25 lessons that target prereading skills (e.g., alphabet knowledge, rhyming, syllables, and phoneme deletion, identification, segmentation, and substitution) and are designed to enhance children’s pivotal literacy skills so that they can benefit more from core kindergarten literacy instruction (Nelson, Benner et al., 2005).
All of the lessons in the Stepping Stones to Literacy program follow the same format. Activities change over the course of the program as more complex skills are targeted. Each lesson begins with an introductory rhyme (e.g., *Little Bo Peep*). The rhyme is incorporated into some of the subsequent activities. Four domains of emergent literacy (listening, conventions, phonological awareness, and phonemic awareness) are included in the program. Each domain is divided into multiple sub-domains designed to teach children the skills necessary to master the larger concept (see Appendix B for the scope and sequence of the program and Appendix C for details on each lesson). Each lesson follows the same predictable pattern. For example, lesson 7 begins with the *Teddy Bear* nursery rhyme. The child listens to and practices the rhyme. In the next activity, the child practices sounds (e.g., dog, cat, donkey) in sequence. The instructor produces difference animal sounds and the child must identify which sound they hear and the order in which they heard them. In the next activity, sound expectation, the child reviews the *Little Bo Peep* nursery rhyme, which they are familiar with from previous lessons. Then the instructor inserts words into the rhyme and asks the child to raise their hand when they hear a word that does not belong. The next activity focuses on rhyme identification. The *Teddy Bear* rhyme is repeated and the child must identify the rhyming words. The next activity focuses on developing the child’s sentence generation skills. First the instructor models making sentences that describe what is happening in each of three pictures. Then, the child must make up their own sentence to go with each picture. The final part of each lesson consists of letter name instruction. First, the child and instructor sing the alphabet song. Next, a new letter in introduced (e.g., O). Then, the child must identify the names of letters presented in rows (the new letter and three review letters are included). Then,
the instructor writes the new letter as well as previously learned letters on a white board. The child must find the letters that the instructor names (e.g., circle the lower case o). Then, the child practices writing letters dictated by the instructor. The final part of the lesson includes practice in letter naming fluency. A mix of previously learned upper and lower case letters are presented in rows (the newly learned letter O is not included) and the student practices naming as many letters as they can in one minute.

Additional materials were added to this curriculum as needed based on individual participants’ response to the core program and all changes were documented. Participants required high levels of repetition of the concepts to develop skill mastery. To address this need, one participant repeated lessons and three received addition materials targeting the same skill in another format. These secondary materials were drawn from the Florida Center for Reading Research (FCRR). The FCRR tasks were game-like and similar to those used in other intervention programs (e.g., Connor et al., 2013). Specifically, activities included matching, identifying the outlier, spinning wheels, and dice. In addition to being fun and motivating for young children, the FCRR activities were selected because they each have an explicit objective and target a specific skill (e.g., identifying initial phonemes) within a broader literacy construct (e.g., phonemic awareness). Modifying instruction based on participants’ progress is educationally appropriate within a response to instruction framework and individualization may increase responsiveness (Al Otaiba, Connor et al., 2011; Vaughn et al., 2011).

As the Stepping Stones to Literacy program is highly scripted, instructor training required only reading the instructor manual and lesson book and practice administration
of each lesson to a volunteer graduate student. Participants received between 25 and 26 minutes of instruction per session on average (see Table 3). The number of tutoring sessions ranged from 40 to 59. Participants received between 17.5 and 25 hours of instruction. The discrepancy in number of sessions and total hours of instruction is due to absentee rates (e.g., Jordan and Jamal missed over 30% of sessions).

Table 3.

Summary of Tutoring Program

<table>
<thead>
<tr>
<th></th>
<th>Number of Tutoring Sessions</th>
<th>Mean Time per Session</th>
<th>Total of Instructional Time</th>
<th>Percentage of Days Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jordan</td>
<td>42</td>
<td>25 minutes</td>
<td>17 hrs 39 mins</td>
<td>38.2</td>
</tr>
<tr>
<td>Matthew</td>
<td>59</td>
<td>25 minutes</td>
<td>25 hours</td>
<td>13.23</td>
</tr>
<tr>
<td>Lily</td>
<td>52</td>
<td>26 minutes</td>
<td>22 hrs 15 mins</td>
<td>13.3</td>
</tr>
<tr>
<td>Jamal</td>
<td>40</td>
<td>26 minutes</td>
<td>17 hrs 30 mins</td>
<td>33.33</td>
</tr>
</tbody>
</table>

2.7 Experimental Design

A multiple-baseline across individuals design was used, with all four participants beginning baseline simultaneously and the intervention was introduced in a time-lagged manner across pairs of children. The baseline phase lasted for two weeks for Jordan and Matthew (who were randomly selected to receive intervention first) and for four weeks for Lily and Jamal. This extended baseline provided a form of control demonstrating that participants’ emergent literacy skills improved only when the intervention was introduced and not before (Kazdin, 1982).
2.8 Treatment Fidelity

The authors of the Stepping Stones to Literacy program (Nelson, Cooper, & Gonzalez, 2004) provide a detailed treatment fidelity self-evaluation form for instructors to complete after each lesson. The self-evaluation consists of 15 items outlining behaviours to be implemented before, during, and after teaching. I used this form to rate my implementation of each target behaviour on a 4-point scale ranging from “never” to “always”. Based on this self-evaluation, treatment fidelity was 99.4%. In addition to the self-evaluation, graduate student research assistants with teaching backgrounds observed a random sample of 25% lessons. I created a treatment fidelity checklist based on the points outlined by Nelson and colleagues (2004) in the self-evaluation form and in the instructor manual. The treatment fidelity checklist was comprised of seven items outlining behaviours that should take place before, during, and after teaching. Each item is rated on a 4-point scale (Never = 0; Rarely = 1; Some of the time = 2; Always = 3). Treatment fidelity was 99.8%. As well, an experienced special educator with a PhD observed four lessons (two from the first half of the program and two from the second half of the program). She provided feedback and training as needed after each observation.

2.9 Data Analysis

The baseline, progress monitoring, and follow-up data for each participant were graphed and inspected visually for change and trends. Next, the percentage of all non-overlapping data (PAND; Parker, Hagam-Burke, & Vannest, 2007) was calculated to estimate the effects of the intervention on each participant’s emergent literacy skills.
Conceptually, PAND is the percentage of data remaining after removing the fewest data points that would eliminate all overlap (Parker, Vannest, & Davis, 2011). PAND equals the remaining data, divided by the total and is scaled from 50 to 100, where 50% is chance level. PAND was designed to provide nonoverlap with a well-established effect size (Phi) which is calculated using a 2 X 2 crosstabs.

The procedure outlined by Schneider, Goldstein, and Parker (2008) was used to calculate PAND using Excel. SPSS version 21 was also used to calculate Phi. It is possible to calculate PAND by hand however; this can result in human error which is one criticism of the technique (Parker & Vannest, 2009). Recently, Parker et al. (2011) have reported that the Excel sorting method has proved cumbersome and sometimes inexact, such that only the hand-calculation method should be followed. As a result, hand-calculation was performed to confirm the accuracy of the results (they were the same).

There are currently 9 techniques used to analyze single case subject data (Parker et al., 2011). PAND was selected because it offers several advantages over other methods. First, it uses all of the data, unlike other methods such as percentage of non-overlapping data (PND), which use only the highest baseline point. This makes for a more accurate representation of the results. Second, effect sizes such as Phi and Cohen’s d can be calculated from PAND. Such analyses are useful for determining the magnitude of the effect of an intervention (Parker et al., 2007). Third, PAND has withstood comparison with other techniques and has proved to be a strong index against most criteria (Parker & Vannest, 2009).
CHAPTER THREE

Results
3.1 Individual Results

3.1.1 Brief Description of Jordan’s Behaviour During Instruction

Jordan would try to finish activities as quickly as possible. He was successful at this in his areas of relative strength such as letter naming. However, he was sometimes in such a hurry that he would begin without waiting to hear all of the instructions. He would then get frustrated when he responded incorrectly and had to repeat the task. Jordan was easily distracted and it was difficult for him to focus, especially on difficult tasks. Jordan had an aversion to tasks that were difficult for him and his fidgeting would get worse with increased task demands. He once fell off a chair because he was squirming so much. Although Jordan clearly wanted to do well, he did not respond positively to praise. After being praised for successfully completing a task he would respond, “that was so easy”. Jordan enjoyed the game-like PA activities. He was able to work for longer periods of time on them and would ask to do them again.

3.1.2 Jordan’s Response to the Intervention

Visual inspection of the data (see Figure 1) shows that Jordan’s letter knowledge improved over time. Figure 1 shows a clear positive trend in Jordan’s LNF scores. Although his performance was variable during the intervention phase, only one score was below baseline levels (session 8, week 3). Jordan’s immediate post-test and 6-week follow-up scores were 33 and 22 letter correct per minute respectively and were above baseline (mean = 11.6). Although Jordan’s score decreased from post-test to 6-week follow-up, it remained well above baseline levels.
Visual inspection of the data (see Figure 2) shows that Jordan’s phonemic awareness improved over time. Figure 2 shows that Jordan’s performance over the intervention period tended to be variable, but there was a positive trend in Jordan’s ISF scores. In week 14, it can be seen that his scores steadily increased. It was at this time that a slight modification in his program was made which is discussed below. This gain was followed by a sharp decline in scores from 12.5 to 4.6 initial sounds correct between weeks 14 and 16 of the program. During this time period, Jordan was absent 12 of the 15 school days and thus participated in only 3 intervention sessions during this time.

Jordan’s immediate post-test and 6-week follow-up scores were 10.31 and 9.6 initial sounds correct per minute respectively and were above baseline levels (mean = 2.75). Although there was a slight decrease in his 6-week follow-up score, Jordan’s score remained well above baseline levels.

As noted above, Jordan was making slow growth in phonemic awareness up to week 14 of the intervention. As a result, the Stepping Stones to Literacy program was supplemented with activities from the teacher professional development materials created by the Florida Center for Reading Reseaech (FCRR; www.fcrr.org) to provide Jordan with more opportunities to practice key phonemic awareness skills before moving on to the next lesson in the Stepping Stones to Literacy program. The activities selected from the FCRR were game-like and focused on developing the same skills as the Stepping Stones to Literacy program. The activities that Jordan participated in specifically targeted the areas in which he struggled (e.g., counting syllables, segmenting and blending syllables, and identifying and manipulating initial sounds in words).
3.1.3 Brief Description of Matthew’s Behaviour During Instruction

Matthew was very talkative and enthusiastic to improve his skills. He responded very positively to praise and was proud of himself for successfully completing a task. In fact, he would like to share his success during tutoring with his classmates and teacher. Matthew struggle significantly with learning the letters of the alphabet and was often unable to name or recognize the letters that appeared in him name. Matthew was very active; he would often fidget and jump out of his seat. It was also difficult for Matthew to focus on a particular task or activity for any length of time. Once engaged in an activity, he would lose interest quickly and get distracted by sounds, objects, or activities going on around him.

3.1.4 Matthew’s Response to the Intervention

Visual inspection of the data (see Figure 1) shows that Matthew’s letter knowledge improved from a mean of 2.3 letters correct per minute at baseline to immediate post-test and 6-week follow-up scores of 15 and 10 letters correct per minute respectively. However, it is apparent from the slope that the gains he made were achieved slowly and his performance varied significantly from session to session until the 8th week of the intervention. In fact, due to the general lack of response to the standard program in the first week of the intervention, I determined that the program was moving too quickly for him to master the content. As a result, over the next two weeks, lessons three through eight were each taught twice. Despite this repetition, Matthew’s performance did not improve over baseline levels. As a result, lessons one through eight were repeated once again over the next four weeks. After this repetition of the first 8 lessons, it became
evident based on progress monitoring data that Matthew was making adequate progress in phonemic awareness but not in letter knowledge as his performance in this domain continued to fluctuate. The intervention program was modified so that the letter knowledge portion from lesson 8 and onwards was taught twice. The phonological awareness portion of the lessons was taught as outlined in the program and Matthew was able to move through these lessons at a faster pace. Overall, Matthew required increased exposure to each lesson to master the skills being taught. Following the modification implemented at week 8 his performance became more consistent and he made slow but steady improvement until the end of the program. Although his score decreased from post-test to 6-week follow-up, it remained well above baseline levels.

Visual inspection of the data (see Figure 2) shows that Matthew’s phonemic awareness also improved over time. Figure 2 shows a clear positive trend in Matthew’s ISF scores. Although his scores continued to fluctuate over the course of the intervention, they were consistently above baseline levels following 4 weeks of intervention. Matthew’s immediate post-test and 6-week follow-up scores were 13.63 and 12 initial sounds correct per minute respectively and were above baseline levels (mean = 3.16). Although there was a slight decrease in his 6-week follow-up score, Matthew’s score remained well above baseline levels.

As with letter knowledge, Matthew received increased exposure to the phonemic awareness portion of lessons 1 to 8 during weeks 1 to 7 of the intervention. As his progress monitoring data indicated that at 7 weeks he was making steady gains in phonemic awareness, he received the standard program for this strand without modification from that point forward.
3.1.5 Brief Description of Lily’s Behaviour During Instruction

Lily was very quiet. She did not speak voluntarily and would answer most questions with “yes” or “no”. She knew the alphabet song and could sing it along with several other songs. Lily had difficulty staying on task for more than a few minutes. During an activity, she would stop responding and stare out the window. Lily also had difficulty follow instruction and they would have to be repeated multiple times. Despite this, Lily was eager to please and responded positively to praise.

3.1.6 Lily’s Response to the Intervention

Visual inspection of the data (see Figure 1) shows that Lily’s letter knowledge improved over time. Figure 1 shows that although her performance was variable during the intervention phase, there is a clear positive trend in Lily’s LNF scores. Lily’s immediate post-test and 6-week follow-up scores were 26 and 32 letter correct per minute respectively and were above baseline levels (mean = 2.7). Interestingly, Lily’s 6-week follow-up score was greater than her score at immediate post-test. Five data points during the intervention are greater than or equal to her 6-week follow-up score and four data points are within two points of this score. This highlights the variability in her performance and the fact that the 6-week follow-up score is not an anomaly.

Visual inspection of the data (see Figure 2) shows that Lily made minimal gains in phonemic awareness over time. One challenge to interpreting Lily’s intervention gains is that there is a positive trend in Lily’s baseline data, making it difficult to conclude whether gains were the result of the intervention. Specifically, after 7 weeks of instruction Lily’s scores remained above baseline levels except for the last data point.
which was lower. Lily’s immediate post-test and 6-week follow-up scores were 2.9 and 4.9 initial sounds correct per minute respectively and were slightly above baseline levels (mean = 1.6).

As the progress monitoring data showed that Lily was making minimal growth in phonemic awareness by week 12, the standard program was modified. As with Jordan, the Stepping Stones to Literacy program was supplemented with activities from the FCRR to provide Lily with more opportunities to practice skills before moving on to the next lesson in the Stepping Stones to Literacy program. The activities selected from the FCRR were game-like and focused on developing the same skills as the Stepping Stones to Literacy program which Lily struggled to acquire (e.g., rhyming, and identifying and manipulating initial sounds in words). After the modifications to the program were implemented, Lily showed minimal improvement in phonemic awareness.

3.1.7 Brief Description of Jamal’s Behaviour During Instruction

Jamal was easily distracted. As well, he had difficulty beginning a task and focusing on an activity for any length of time. Jamal would often fidget with his hands and feet as well as anything that was within reach. He would also rock in his seat, jump up, sit on the floor, and crawl under the table periodically. As the program progressed, Jamal’s behavior became increasingly disruptive and oppositional. He often refused to comply with requests And It is possible that he became frustrated with the level of difficulty of the PA activities in the program. When the games were introduced, he was more willing to participate. Jamal was visibly happy and proud of his success.
3.1.8 Jamal’s Response to the Intervention

Visual inspection of the data (see Figure 1) shows that Jamal’s letter knowledge improved over time. Figure 1 shows a positive trend in Jamal’s LNF scores. Although his performance was somewhat variable, Jamal made considerable gains following the implementation of the intervention and his scores were above baseline levels for the duration of the program. Jamal’s immediate post-test and 6-week follow-up scores were 21 and 13 letter correct per minute respectively and were above baseline levels (mean = 3.7). Although Jamal’s score decreased considerably from post-test to 6-week follow-up, it remained well above baseline levels.

Visual inspection of the data (see Figure 2) shows there was no change in Jamal’s phonemic awareness despite a modification to his program at 12 weeks. Figure 2 shows a flat trendline throughout the baseline and intervention phases. Although his performance was somewhat variable, Jamal’s scores never surpassed baseline levels. Jamal’s immediate post-test and 6-week follow-up scores were 1.76 and 3.07 initial sounds correct per minute respectively and were similar to baseline levels (mean = 1.75).

As a result, the standard program was modified following 12 weeks of instruction. Similar to Jordan and Lily, the Stepping Stones to Literacy program was supplemented with activities from the FCRR to provide Jamal with more opportunities to practice skills before moving on to the next lesson in the Stepping Stones to Literacy program. The game-like activities focused on developing the same skills as the Stepping Stones to Literacy program which Jamal struggled to acquire (e.g., rhyming, and identifying and manipulating initial sounds in words).
Figure 1. Effects of the intervention on Letter Naming Fluency.
Figure 2. Effects of the intervention on Initial Sound Fluency.
3.2 PAND

An analysis of the percentage of all non-overlapping data (PAND) was conducted to determine the overall effectiveness of the tutoring program on the participants’ letter knowledge. PANDs for Jordan, Matthew, Lily, and Jamal were 93.9%, 94.4%, 88.8%, and 94.1% respectively which indicates that the tutoring program had a significant positive effect on participants’ letter knowledge.

Although visual analysis of the data shows that only two children seemed to make improvements as a result of the intervention, an analysis of the percentage of all non-overlapping data indicated that there were positive effects on phonemic awareness for three of the four children. PANDs for Jordan, Matthew, Lily, and Jamal on the ISF were 81.8%, 94.5%, 83.7%, and 65.7% respectively. However, it is important to note that PAND calculations may overestimate the effects of the intervention (Parker et al., 2011).

3.3 DIBELS Risk Status

DIBELS benchmark norms were used to identify each participant’s risk status on both the LNF and ISF at baseline (in October, before the intervention began), immediate post-test (March), and 6-week follow-up (May).

Figure 3 shows each participant’s LNF score at baseline, immediate post-test, and 6-week follow-up compared to the DIBELS low risk benchmark for each timepoint. At baseline, Matthew and Jamal were able to name fewer than 2 letters correctly in one minute. They were therefore considered to be at risk on this core emergent literacy skill. In contrast, Jordan and Lily were at low risk on LNF at baseline. This means that they were able to name more than 7 letters correctly in one minute.
Although the participants showed growth in letter knowledge, not all children made gains that moved them into the low risk category at post-test or 6-week follow-up. At immediate post-test, Matthew and Jamal moved from at risk to the some risk category for LNF which is a functional improvement from their baseline performance. Jordan maintained his low risk status on LNF at post-test; he was able to name more than 26 letters correctly per minute. However, Lily who was in the low risk category at baseline moved to the some risk category at post-test. Six weeks after the tutoring program ended, all four participants scored below the DIBELS benchmark. Jordan, Matthew, and Jamal were identified as at risk on LNF, while Lily’s score indicated that she was at some risk. The shift in risk status at the 6-week follow-up suggests that without continuous support these students struggled to acquire literacy skills and demonstrate appropriate levels of growth.

*Figure 3. Effects of the intervention on Letter Naming Fluency DIBELS risk status.*

Figure 4 shows each participants’ ISF score at benchmark, immediate post-test, and 6-week follow-up compared to the DIBELS low risk benchmark for each timepoint.
Jordan, Lily, and Jamal scored below the DIBELS benchmark and were in the at risk range on the ISF measures at each time point. Their poor performance in this domain is particularly notable given that the benchmark for ISF only exists for the beginning and middle of kindergarten suggesting that most students are able to meet this benchmark before the end of the school year. These three participants, however, were at risk in the spring of kindergarten based on mid-year norms. Phonemic awareness is a complex skill and it is possible that despite the relatively long duration of the program (18 weeks) these children required yet more intensive instruction to make functional gains in this domain. At both the immediate post-test and 6-week follow-up Matthew scored in the some risk range. This represents a functional improvement in his phonemic awareness.

**Figure 4. Effects of the intervention on Initial Sound Fluency DIBELS risk status.**

![Initial Sounds Correct Per Minute](chart.png)

<table>
<thead>
<tr>
<th></th>
<th>Jordan</th>
<th>Matthew</th>
<th>Lily</th>
<th>Jamal</th>
<th>ISF Benchmark</th>
</tr>
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3.4 **Letter-Sound Knowledge**

Figure 5 shows that there were no improvement in participants’ letter-sound correspondence knowledge as a result of the intervention. This is not surprising as the intervention did not specifically target this skill. The DIBELS NWF was also
administered at baseline, immediate post, and 6-week follow-up as an additional means of assessing letter-sound knowledge and decoding ability at each time point. However, participants demonstrated a floor effect on NWF.
Figure 5. Effects of the intervention on Letter-Sound Fluency.
3.5 Social Validity

To assess the social validity of the intervention, the teachers completed a three-item open-ended questionnaire after the completion of the program (See Appendix D). The teachers reported that overall the students enjoyed participating in the intervention. One teacher noted that the students particularly enjoyed and benefited from working one-on-one with the intervention teacher. Both teachers reported that the students benefitted from participating in the program in several ways including: increased vocabulary, improved literacy skills, greater ability to participate in class activities (e.g., shared reading), better attention, and increased effort to participate in class activities. Despite the positive effects, one teacher noted that enthusiasm waned in his students.
CHAPTER FOUR

Self-Study
4.1 Self-Study Rationale

In this chapter, I examine my teaching practice during the early literacy intervention using the self-study paradigm (Samaras & Freese, 2006). “In self-study, teachers critically examine their actions and the consequences of those actions as a way of developing a more consciously driven mode of professional activity […]” (Samaras, 2011, p. 43). Rather than relying on habit and reactionary teaching, self-study enables teachers to purposefully change their teaching practices as a result of personal reflection and critical insight from colleagues.

I conducted an early literacy intervention for four kindergarten students who were inattentive (based on ratings completed by their classroom teacher) and had weak emergent literacy skills. I planned to work with these students individually for 20 minutes per day, 4 days per week over a period of 6 weeks using the Stepping Stones to Literacy program, a scripted intervention, to teach them critical emergent literacy skills such as phonemic awareness and letter knowledge. I also planned to monitor the students’ progress in these areas biweekly using CBMs.

4.2 Identifying the Challenges

Based on the progress monitoring data I collected as well as my field notes, I quickly realized that the students were not making adequate progress. Each lesson tended to take more than double the allotted 20 minutes to implement. Based on their low skill level at baseline before the intervention began, it was not surprising that the students found participating in the intervention effortful. This was confirmed by the students’ words and actions. For example, one student routinely refused to complete the part of the
lesson that was especially challenging for him. Another frequently reported that he was too tired to complete the activities. As well, all of the students were extremely inattentive during the lessons, which meant that I had to redirect their attention to the task at hand frequently. The difficulty the students showed in maintaining their attention was compounded by the length of the lessons. Based on my observations, as the length of the lesson increased so did their disruptive and avoidant behaviours and it became more and more difficult for them to focus their attention on the task at hand. This may have been the result of a mismatch between the lessons and students’ ability. According to the Stepping Stones to Literacy manual, lessons could be taught in 10 to 20 minutes. However, it was impossible to complete a lesson in that amount of time.

4.3 Addressing the Challenges

I discussed the unexpected challenges that I faced in teaching these students with my thesis committee. Taking their recommendations into account, I devised a two-pronged plan of action to better meet the needs of my students. Since both the content of the lessons and paying attention for the duration of a lesson was challenging for the students, I decided to address both of these issues.

First, I felt that the fact that the program I was using was mastery-based but did not have review activities incorporated was problematic. I therefore re-taught lessons when students were clearly unable to move to the next lesson and provided supplemental activities to ensure that students mastered the skills being taught before moving on to subsequent lessons. This is in line with the response to intervention framework (RTI) by which the intensity of instructional support is modified to meet individual students’
needs. For example, if one tier or level of instructional support is deemed to be insufficient for students to make gains, he or she is provided with more intensive support (Al Otaiba et al., 2014). Research has shown that children with reading and attention problems may not respond to otherwise effective reading instruction (e.g., Al Otaiba & Fuchs, 2006; Rabiner & Malone, 2004) As a result, even more intensive instruction may be necessary. In fact, children with behavioural inattention and reading problems may require more intensive and targeted instruction immediately rather than waiting to see if less intensive forms of intervention are successful (Fuchs, Fuchs, & Compton, 2012). My decision to make this instructional shift was therefore consistent with prior research.

As well, using progress monitoring data, I tailored the modifications to meet students’ individual needs. For example, Matthew exhibited difficulties in learning letter names and required significantly more exposure to target letters to consolidate this knowledge. In contrast, Jordan, Lily, and Jamal acquired letter name knowledge from the standard program but required supplemental activities to make gains in phonemic awareness. This pattern of results is in line with previous research showing that individualization may enable kindergarten children at risk for reading difficulties to benefit from instruction (Al Otaiba, Connor et al., 2011). Second, I reduced the length of each session to no more than 30 minutes. This made sense given the students’ age and their marked attention problems.

Together these changes meant that the students progressed through the program at a markedly slower rate than expected according to the core program guidelines. I spent considerable time reviewing and consolidating skills and at the same time the duration of each session was only 30 minutes. As a result, lessons had to be taught over multiple
sessions. It was therefore impossible to complete the standard program in the allotted 6 weeks that it was typically to be conducted. I decided that I would re-evaluate whether or not to continue the program beyond the initial 6 weeks based on the students’ progress.

As the 6 weeks of instruction came to an end some students’ performance on progress monitoring measures remained similar to baseline levels. I decided to continue the intervention in the hopes that, given more time and exposure, the students’ emergent literacy skills would improve. At 8 weeks Matthew’s letter naming skills began to improve steadily. Jordan and Lily also made gains in phonemic awareness following 14 weeks of instruction. All told, the intervention took place over a period of 18 weeks. Considering the intensity and the duration of the intervention, the participants showed less growth than anticipated. I realized that if I had ended the program after 6 weeks as originally planned, the students would have made no gains in their emergent literacy skills. Therefore, it is incredibly important to be responsive to students’ needs even if this means modifying instructional plans.

Overall, I found that closely monitoring students’ progress can greatly inform teachers’ instructional decisions. In this case, progress monitoring enabled me not only to identify areas of the intervention that were not working for my students but, it also made being patient and persisting with the intervention possible. Frequently monitoring my students’ emergent literacy skills reassured me that continuing with the intervention was the right decisions because, however slowly, change was taking place and the students’ skills were improving.
In summary, this case demonstrates that persistence and patience are extremely important for teachers working with students who are inattentive and have poor emergent literacy skills. Progress was achieved slowly and gains were effortful. This is consistent with Allor and colleagues’ (2010, 2014) findings that children with intellectual disabilities required reading instruction to be implemented over an extended period of time in order to acquire new skills. Taking into account what I have learned from this experience, if I were to conduct this type of study again in the future I would do two things differently. First, I would increase the frequency of lessons to twice a day such that each student would receive instruction in the morning and afternoon. It is possible that the increased exposure from participating in two lessons per day would facilitate skill consolidation. As well, working with students at different times during the day may decrease the effects of fatigue. Second, I would include a systematic behaviour management component because it was difficult to maintain students’ attention despite my use of individualized instruction, one-to-one instruction, and high rates of feedback and task redirects. As such, the addition of a behaviour management component could enable students to benefit more readily from the intervention. However, it is possible that similar to children with other developmental disorders (intellectual disabilities) patience is required as gains occur but at a rate that is much slower.
CHAPTER FIVE

Discussion
5.1 General Discussion

The current study examined the effects of a supplemental early literacy intervention on the emergent literacy skills of kindergarten children with concurrent behavioural attention problems and weak emergent literacy skills. The primary goal of the study was to determine whether an individualized early literacy tutoring program would improve the participants’ letter knowledge and phonemic awareness.

Stepping Stones to Literacy was used as the core curriculum. The program is highly scripted and includes five key emergent literacy domains. Multiple activities are used to teach sub-components of each domain (see Appendix B). The activities and skills they target get progressively more complex over the course of the program (see Methods section for details).

The letter knowledge of all four participants improved over time, as did the phonemic awareness of three participants on the basis of visual inspection of the data and PAND. However, on the basis of the biweekly progress monitoring data the pace of the intervention had to be modified (slowed) for the participants to be able to consolidate the skills being taught. As well, participants’ scores tended to be in the at risk range on the DIBELS LNF and ISF at 6-week follow-up which suggests that without continued intensive instruction they were not able to maintain growth in these two domains. The findings of this study are significant because few intervention studies have been conducted with participants who display both reading and attention problems and the majority of studies that do exist have targeted older children (e.g., Rabiner & Malone, 2004). Given the consistent relation between behavioural inattention and poor literacy
skills (e.g., Dally, 2006; Dice & Schwanenflugel, 2012; Sims & Lonigan, 2013; Willcutt, Betjemann et al., 2007) as well as the importance of early intervention to reduce the risk of reading difficulties (e.g., Torgesen, 2002), the present study fills a gap in the literature and informs future research and practice.

5.2 Results of the Intervention

The intervention examined in this dissertation focused on developing prereading skills such as letter name knowledge and phonemic awareness that are critical to reading development and predictive of later reading ability (NELP, 2008). It is important to note that the participants were not exposed to word reading instruction or connected text as part of the intervention as the intent was to focus on foundation skills for early reading acquisition.

5.2.1 Letter Knowledge

Each of the four participants made improvements in letter knowledge. Although these improvements were likely aided by the intervention, it was difficult to determine a functional relationship between the children’s letter knowledge scores and the intervention because of the marked variability in the performance from week to week and the short baseline (for Jordan and Matthew). The slow growth that was observed throughout the intervention is interesting as it shows the significant challenges the participants faced, despite individual tutoring, in developing this skill. This finding is especially pertinent given that letter name knowledge is predictive of later reading and spelling ability even after controlling for other relevant variables (i.e., phonological awareness and socio-economic status) (Roberts, 2003). Letter name knowledge is also
directly related to word reading ability in that letter names provide a link between letters and print (Foulin, 2005; Treiman & Kessler, 2003). As well, Evans and colleagues (2006) found that kindergarten letter name knowledge was a better predictor of first grade word reading ability than letter sound knowledge. Research has also shown that while children with good letter name knowledge tend to develop strong reading skills, children with poor letter name knowledge tend to experience difficulties in reading acquisition (National Research Council, 1998; O’Connor & Jenkins, 1999; Snowling et al., 2003).

5.2.2 Phonemic Awareness

Although the results were less robust for phonemic awareness, there was a marked improvement for two of the participants and a third made some gains in this skill. However, there does not appear to be a functional relationship between participants’ gains in PA skills and the onset of the intervention. Deficits in phonemic awareness often characterize individuals with reading problems regardless of general verbal ability (e.g., Torgesen et al., 1999). Interventions such as the one provided in this study, which explicitly teach phonological skills, prepare children for later reading instruction and may prevent the development of reading problems (Torgesen, 2002). The majority of participants in this study made gains in phonemic awareness, which is important in terms of reducing the chances that they will continue to experience difficulties in learning to read.

5.2.3 DIBELS Risk Status

To provide information about the impact of the intervention on children’s risk status, I examined whether the children in the study scored sufficiently high on the post-
test and 6-week follow-up measures to meet criteria for a lower DIBELS risk status than at baseline. At immediate post-test, Jordan was at low risk in letter knowledge while Matthew, Lily, and Jamal were at some risk. At 6-week follow-up, three of the participants experienced a shift from some risk to at risk on letter knowledge. This shift suggests that without continued intensive instruction the participants were not able to maintain growth in letter knowledge. All four participants began the intervention at risk in phonemic awareness. According to the normative data provided for the DIBELS ISF by the authors (Good & Kaminski, 2002), kindergarten students should master this skill by mid-year and thus only mid-year norms are provided. Unfortunately, none of the students’ scored high enough to meet the mid-year norms at post-test or the 6-week follow-up. Matthew did, however, shift risk status to some risk at post-test. Although his score decreased slightly at 6-week follow-up, Matthew remained in the some risk category. These results suggest that without continued intensive instruction participants were not able to maintain growth in these two domains. In fact, Hume and Snowling (2013) caution that early interventions may not eliminate the risk of children developing reading difficulties because additional support may be required in subsequent years. For example, Al Otaiba, Folsom et al., (2011) examined first grade reading performance in relation to children’s response to kindergarten tier 1 instruction, after controlling for end of kindergarten reading ability. They found that children who met end of kindergarten goals but had steep growth trajectories were less likely to demonstrate satisfactory performance in first grade. It is therefore possible that for children who begin kindergarten with characteristics associated with poor response to instruction such as relatively more behaviour and attention problems, good response to tier 1 instruction in
kindergarten does not guarantee good performance in later grades. This means that, for children who enter kindergarten with very low literacy skills, these problems are likely to persist. Additional support in first grade may be required to maintain positive response (Al Otaiba, Folsom et al., 2011).

A challenge of the current study was the participants’ high rate of absence. High rates of school absences are troubling because research has shown that absences are important predictors of school performance and educational attainment (Ou & Reynolds, 2008). Studies have also shown that children and adolescents with ADHD are absent from school significantly more frequently than peers without ADHD (Barbaresi, Katusic, Colligan, Weaver, & Jacobson, 2007; Kent et al., 2011). As well, sleep disturbance is associated with school absences in children and adolescents with (Sung, Hiscock, Sciberras, Efron, 2008) and without ADHD (Paavonen et al., 2002). In fact, Sung and colleagues (2008) found that in a sample of children and youth (aged 5 to 18 years) with ADHD over 70% of had sleep problems. Those with moderate to severe sleep problems were significantly more likely to be absent or late for school than those without sleep problems. It is possible that the missed learning opportunities due to frequent absences contributed to the participants’ poor response to the intervention in this study.

5.2.4 Letter-Sound Knowledge

Participants’ progress in knowledge of letter-sound correspondences was also monitored because this skill is closely related to children’s reading acquisition (e.g., Hume et al., 2012) and evidence indicates that letter name knowledge can facilitate letter-sound knowledge (Levin et al., 2006); that is, learning the names of letters may make it
easier for children to learn the sounds that letters make (e.g., Cardoso-Martins et al., 2011; Kim et al., 2010; Treiman et al., 2008). No effects, however, were evident on this emergent literacy skill. This is consistent with recent findings by McGinty and colleagues (2012) showing that preschool children with attention problems benefited only from explicit print instruction. It is possible that children with marked behavioural inattention may need targeted and intensive instruction to make gains in this domain.

In summary, participants’ emergent literacy skills that were the target of the intervention (letter knowledge and phonemic awareness) improved. However, more intensive instruction and a longer duration of the intervention may be necessary for participants to make more robust gains and to maintain these gains over time. Below I discuss some key factors that need to be considered when interpreting the results. I also highlight implications for designing interventions for this population. As well, I explore considerations for educators, and teacher training in light of the results. Finally, theoretical implications are discussed.

5.3 Context

It is important to interpret the present findings in light of the context in which the study was conducted because it can provide greater insight into the results and their generalizability. With intervention research in particular, it is critical to keep in mind the larger context in which the children live and learn.

The current study was conducted in an urban elementary school in Toronto, a large city in Ontario, Canada. The participants were typical of those in the urban school board where this study took place. In this board, students speak over 115 different
languages and 34% speak a language other than English as their mother tongue (Toronto District School Board, 2013). Significantly, two of the participants of the current study were ELL. Of particular relevance to the current study is research demonstrating that the development of code-based reading skills in ELLs in kindergarten is very similar to children who speak English as their first language with code-based skills developing at the same rates in both groups (Chiappe & Siegel, 1999; Geva, Yoghoub-Zodeh, & Schuster, 2000; Wade-Woolley & Siegel, 1997). As a result, it is likely that the challenges faced by the students in the present study who were ELL students were the result of significant reading-related challenges rather than ELL status per se.

Another key contextual factor to consider is that as a result of the recent findings by the Best Start Expert Panel on Early Learning (2007), there has been a push to reform early childhood education and kindergarten in Ontario. In an effort to increase school readiness, full day kindergarten is now required for all 4 and 5 year old children. The curriculum is child-centred and developmentally appropriate with both an early childhood educator and a kindergarten teacher present in each classroom. The program seeks to promote a strong foundation for learning in young children through a play-based environment. According to the Full-Day Early Learning Kindergarten curriculum document (FDELK, 2010), play is important to children’s development and learning can be enabled through various kinds of play (e.g., pretend play, socio-dramatic play, constructive play). It is the teacher’s role to promote learning by facilitating authentic play experiences for their students.

The guidelines for full day kindergarten state that letter knowledge and phonological awareness should be taught incidentally through games (p. 19). As well,
despite expressing a commitment to teaching the curriculum Pyle and DeLuca (2013) found that kindergarten teachers differed in the way in which they enact the curriculum in their classrooms. While some teachers may prioritize cognitive and social development and base teaching approaches on an individual child’s readiness to learn, others prioritize achievement of curriculum standards, and yet others may take a blended approach (Pyle & DeLuca, 2013). In contrast, the findings of the NRP (2000) and NELP (2008) reports emphasize the importance of systematic and explicit instruction in these domains. In addition, the literature on reading disabilities has shown that without systematic and explicit instruction in these areas children at risk for LDs and those with WRD will struggle to learn to read (e.g., Fuchs & Fuchs, 1988; Torgesen, 2002). As well, evidence suggests that children who are inattentive benefit from highly structured instruction (Pfiffner & Barkley, 1998; Raggi & Chronis, 2006), which they may not receive in a play-based environment (Callaghan & Madelaine, 2012). For example, rhyme is widely viewed by teachers as a fun language activity that helps develop children’s sensitivity to the sound structure of words (Yopp & Yopp, 2000). However, given that rhyme (which is considered the easiest skill within the hierarchical sequence of phonological skills) is a poor predictor of subsequent decoding skills (NELP, 2008), preschool and kindergarten teachers should include intentional phonemic awareness instruction (e.g., in play-based activities) in their literacy curriculum (Callaghan & Madelaine, 2012). Participants may have received explicit instruction through play-based tasks in their classroom context. However, information gathered through observation and teacher questionnaires (See Appendix A) indicated that this was likely not the case within the context of the present study.
Daily intentional phonological awareness instruction is particularly important for at risk preschoolers, who typically require more teaching sessions than those not at risk, to acquire phonological awareness skills (Byrne, Fielding-Barnsley, & Ashley, 2000; Hindson et al., 2005). Therefore, research is needed to examine how core literacy skills such as letter knowledge and phonological awareness are taught in full day kindergarten classrooms and whether the literacy instruction provided in this new program meets the needs of children at risk for reading failure and in particular those who are inattentive.

5.4 Screening Children for Early Reading Risk

The current study utilized the TSRI to screen children for participation in the intervention. This teacher report 5-item questionnaire successfully identified kindergarten children at risk for reading failure as well as those that demonstrated significant inattentive behaviour. The DIBELS fall kindergarten benchmark assessment was also used to confirm that the participants had weak literacy skills. Two of the participants were identified as at risk on the LNF and all four were identified as at risk on the ISF. As well, none of the participants were able to complete the PSF. Teachers also completed the SDQ and the Preschool Version of the ADHD Rating Scale –IV; each of which confirmed that all of the participants were extremely inattentive. These findings are significant because they suggest that even a brief screener can successfully identify at risk kindergarten students. Currently, universal screening of kindergarten students does not exist in Ontario. Given the negative trajectories associated with behavioural inattention (e.g., Brennan, Shaw, Dishion, & Wilson, 2012; Breslau et al., 2010; Duncan et al., 2007) incorporating screening for attention problems into school readiness assessments for all kindergarten children would greatly benefit inattentive children who may otherwise not
receive the instructional support they need. Consistent with previous research (Rabiner & Malone, 2004), the findings of this study suggest that children with behavioural inattention may require more intensive multifaceted instruction (e.g., including systematic behaviour management) than children with reading difficulties alone. Screening children would therefore enable teachers to provide targeted instruction to better meet students’ needs.

It is important to note that a recent school board report from the board in which this study took place noted that children are most likely to be formally identified with an exceptionality between grades 3 and 6 with few students being formally identified or given an individual education plan (IEP) in kindergarten (Brown & Parekh, 2010). This is concerning given the fact that students identified as high risk on a population-level screening instrument (i.e., the Early Development Inventory; EDI) in SK in the board were more likely to score below the provincial standard on the EQAO in grade 3 and 6 than their peers who were not at risk. As well, 57% of students identified as high risk on the EDI in SK in the school board were formally identified with a non-gifted exceptionality by grade 9, suggesting that their risk status in kindergarten was a sensitive indicator of later and long-lasting academic problems.

The goal of screening is not to diagnose children with a particular disorder. Nor does it replace a psycho-educational assessment that describes a child’s full profile of strengths and weaknesses. However, it is useful in identifying children who need to be monitored closely and who are candidates for early intervention. Universal screening has been successfully implemented within an RTI framework in schools in the United States. The delivery of early intervention through RTI decreases the chances of a child
experiencing future reading difficulties by combining screening, progress monitoring, and incrementally more intensive levels of instructional support (Fuchs & Fuchs, 2007). In fact, this is now the focus of the revised description of the learning disabilities category in Ontario (Ontario Ministry of Education, 2014).

5.5 Program Modification

A key finding from the study was that the pace of standard intervention program was a challenge for the participants and as a result it was modified for all four participants. The Stepping Stones to Literacy program includes an average of four lessons per emergent literacy skills (ranging from 3 to 7 lessons) other than letter names, which are included in each lesson. A significant amount of time (e.g., 7 lessons) is used to teach basic skills such as rhyme identification. In contrast, more complex skills such as phoneme identification are taught during only four lessons. Two letter names are introduced in the first lesson and an additional letter is taught in each subsequent lesson. Each lesson (except lesson 1) includes a review of previously learned letters. However, not all the letters are reviewed in each lesson and there is no procedure for re-teaching letters from previous lessons that children have not mastered.

In most cases the modifications involved re-teaching of content to increase exposure to the lesson and promote mastery or the provision of additional activities to provide students with more opportunities to review key skills before moving forward in the standard program. For example, Matthew required increased exposure to each lesson in order to improve his letter knowledge. After receiving multiple exposures to each lesson during the first 8 weeks of the program Matthew made sufficient gains such that he
no longer required modification for the phonemic awareness portion of the lessons but continued to receive increased exposure to the letter knowledge portion of each lesson. Reducing the pace of the program by repeating lessons ensured that he was able to master the content. The standard program was also modified for Jordan, Lily, and Jamal to include supplemental phonemic awareness activities. Supplemental activities were required for these three participants because the Stepping Stones to Literacy program is mastery-based but does not include review lessons. Therefore, if a child had not mastered what was taught in one lesson, it would be difficult for him or her to apply the skills in subsequent lessons. Supplementing the program with the additional materials helped to reinforce the skills that were introduced in the Stepping Stones program and provided the participants with more opportunities to practice these skills. Even with the modifications Jamal did not make gains in phonemic awareness. It is possible that he may have needed an even more intensive intervention to make gains in this domain. Overall, these response patterns are consistent with previous studies demonstrating that children who exhibit attention and reading difficulties tend to respond poorly to instruction (Al Otaiba & Fuchs, 2006), even individual targeted intervention (Rabiner & Malone, 2004).

Future studies are needed to examine the effects of different intervention formats on the emergent literacy skills of children with behavioural inattention. It is possible that game-like activities may be more engaging and thus more effective than traditional teacher directed methods of instruction. The use of technology to deliver interventions should also be investigated. Currently, many classrooms have access to computers or tablets. Therefore, computer assisted instruction and instructional applications should be examined for their potential to provide engaging systematic instruction to inattentive
children (Walcott et al., 2010). Future studies should also include direct observation of children’s behaviour during literacy instruction. This would reveal what inattentive children are doing when instruction is taking place. It is possible that these children miss out on key instruction due to their off-task behaviour, which further impedes their ability to acquire early literacy skills.

Fuchs and colleagues (2012) found that it is possible to identify children who will not respond to supplementary instruction based on their performance in regular core instruction. Although it is common in prevention models for students to receive gradually more intensive instruction that matches the intensity and duration of instruction with the severity of a student’s needs, they recommend accelerating the intensity of instruction for these children so that they do not experience continued failure before receiving the level of intensity of instruction that they require. Our findings support the notion that children with attention and reading problems may require more intensive and longer duration instruction. For this population it may be more effective to move directly from regular core instruction to intensive individualized intervention support (Fuchs et al., 2012).

The current study was needed to examine how the emergent literacy skills of kindergarten children with weaknesses in both attention and early literacy skills develop in response to supplemental prereading instruction. Future studies building on the findings of the present study should examine the effects of single and multiple-component (e.g. behaviour plus reading) interventions delivered in preschool and kindergarten to determine the best route for inoculation against later reading problems in children displaying marked attention problems. A randomized-control trial in which participants are randomly assigned to one of the intervention conditions (reading
instruction only, reading plus systematic behaviour management, reading plus parent training, or wait-list control) would tease apart which aspects of the intervention are necessary for this population. The benefits of parent training for children with ADHD has been noted (e.g., Anastopoulos, Shelton, DuPaul, & Guevremont, 1993; Charach et al., 2013; Pelham & Fabiano, 2008; Smith, Barkely, & Shapiro, 2006) however, it is possible that those with attention and reading difficulties would require behaviour management during reading instruction to help them stay on task. As well, direct observation of children’s behaviour during instruction would provide insight into their engagement. Assessing children’s progress over time in key literacy skills would also shed light on their rate of growth as well as the optimal duration of reading interventions for this population.

Studies should also compare the effects of early literacy interventions on the emergent literacy skills of kindergarten children with early literacy skills deficits with and without attention problems. As well, longitudinal studies are needed to examine the long-term outcomes of early interventions for inattentive preschool children with co-occurring early reading difficulties.

5.6 Implications

5.6.1 Implications for Designing Interventions

The findings of this dissertation suggest that it is important to support kindergarten students who are inattentive and have weak early literacy skills prior to the advent of formal reading instruction in first grade to reduce their risk for later reading failure. Consistent with previous research, our findings demonstrate that children with
this profile respond less positively to instruction than their peers without attention
difficulties (Al Otaiba & Fuchs, 2006). Although the present study did not include a
systematic behavioural intervention program, it would be important for educators to
consider concurrent interventions that also promote children’s task-focused behaviour
(Rabiner & Malone, 2004). As well, our findings show that mastery-based interventions
that can be tailored to meet individual children’s needs (Al Otaiba, Connor et al., 2011)
may be most effective. In addition, our findings support the use of on-going progress
monitoring to assess skill development and to determine the effectiveness of instructional
support.

Recently several studies have examined the effects of computer assisted
instruction (CAI). Deault and colleagues (2009) examined the responsiveness of grade
one children with varying attention abilities to the ABRACADBRA web-based synthetic
phonics program. The results indicated that although both parent rated attention and
scores on a sustained attention task predicted literacy growth in the control group (regular
classroom instruction), children in the synthetic phonics group made significant
improvements in key reading skills irrespective of their attention skills suggesting that the
explicitness of instruction may have compensated for the difficulties with inattention
(Deault, Savage, & Abrami, 2009).

As well, Walcott and colleagues (2014) found that CAI significantly improved
grade one children’s oral reading fluency and phonemic awareness as well as the oral
reading fluency of grade two children. Children also showed an increase in attention-to-
task during the CAI compared to teacher led small-group instruction. These findings
suggest that CAIs may be a useful tool for helping children with reading and attention
problems to catch up to their peers in reading (Walcott et al., 2014). CAI may be particularly appealing to inattentive children because of the use of a game-like format that may be more engaging than tradition intervention formats (Walcott et al., 2014).

Without effective multi-faceted intervention, inattentive children are at increased risk for negative outcomes including poor academic achievement (Bussing et al., 2012; Breslau et al., 2010; Massetti et al., 2008; Rabiner & Coie, 2000) and early school leaving (Pagani, Vitaro, Tremblay, & McDuff, 2008).

5.6.2 Implications for Educators

The results of both the early literacy intervention and the self-study highlight the importance of patience and persistence when teaching young children with significant attention problems. Allor et al. (2010) found that although children with intellectual disabilities benefited from reading instruction, it took significantly longer for these students to acquire reading skills than children with learning disabilities. Research has shown that the Stepping Stones to Literacy program has previously been used successfully with children at risk for EBD over a 5-week period (Nelson, Benner et al., 2005). However in the present study, children with early literacy skills deficits and attention problems did not acquire early literacy skills at the same rate. These children may acquire literacy skills at a slower rate than children with WRD (without attention problems) and therefore require instruction over an extended period of time. Another explanation for this difference in response maybe be the proficiency level at which the participants started the program. The participants in the study conducted by Nelson and colleagues had higher literacy skills at pre-test than the participants in the current study.
Specifically, the mean score of the participants in the Nelson et al. study at pre-test was 9.6 and 4.4 on the DIBELS ISF and PSF respectively. The mean score of the participants in the current study on the DIBELS ISF was 1.7 (Jordan had the highest score of 3.3). As well, in the current study PSF was discontinued at each time point because participants were unable to respond to practice items. Due to the modifications to pacing that the participants of the current study required in order to develop skill mastery, this intervention lasted 18 weeks and mastery in the core domains was not attained for the majority of the students.

5.6.3 Implications for Teacher Training

Several recent studies have shown that in-service teachers and pre-service teacher candidates have limited knowledge of oral language concepts, such as phonemic awareness, that are important for reading development (Cheesman, McGuire, Shankweiler, & Coyne, 2009; Cunningham, Perry, Stanovich, & Stanovich, 2004; Washburn, Joshi, & Binks-Cantrell, 2011). These are precisely the skills that at risk students need to be taught explicitly. Therefore, teachers may lack the ability to effectively teach the foundation skills that struggling students need to become more proficient at reading. As a result, teacher-training programs should focus on areas such as literacy development and explicit instruction in emergent literacy skills. Teachers need in depth procedural knowledge in order to teach language and literacy effectively (Hindman & Wasik, 2011). Procedural knowledge is often acquired through practicum placements. As such, mandatory practicum placements in kindergarten classrooms would be one way to increase procedural knowledge of effective early literacy instruction among teacher candidates. However, placements may expose teacher candidates to a limited number of
instructional practices (Snow, Griffin, & Burns, 2007) or to ineffective literacy instruction (Cunningham et al., 2004). This could be remedied by having teacher candidates view video exemplars of literacy instruction that specifically demonstrate and reinforce the concepts addressed during coursework. Evidence suggests that video demonstrations of teaching practices may increase: student engagement, conceptual knowledge of literacy instruction, and their understanding of and ability to apply instructional strategies (Cochran-Smith & Zeichner, 2005; Scott-Little et al., 2011; Towers, 2007). Findings from our own lab also support the use of video exemplars in pre-service teacher education. Teacher candidates found video demonstrations engaging and beneficial to their learning (Ferrari, Aitken, & Martinussen, 2013). As well, a video-enhanced lecture increased teacher candidates’ knowledge of key phonological awareness concepts (Martinussen, Willows, Ferrari, & Aitken, In Press).

5.6.4 Theoretical Implications

The findings of the present study have important theoretical implications. First, this study informs our understanding of the comorbidity between reading problems and behavioural inattention. Current explanations for this comorbidity include that a predisposition due to shared genetic risk factors may increase the chances of having both disorders (e.g., Ebejer et al., 2010; Hart et al., 2010; Willcutt, Pennington et al., 2007; Willcutt et al., 2010). Another explanation suggests that a pathway resulting from overt inattention during literacy instruction has a negative effect on emergent literacy skills and in turn later reading ability (e.g., Brennan et al., 2012; Breslau et al., 2010; Dally, 2006; Duncan et al., 2007; Dice & Schwanenflugel, 2012). Consistent with previous studies (e.g., Dice & Schwanenflugel, 2012; Sims & Lonigan, 2013; Willcutt, Betjemann et al.,
2007) this study shows that co-existing attention and reading problems are present at the beginning of kindergarten, suggesting that the attention problems are not simply the result of poor reading skills in the later grades (Pennington, 2006). Some evidence suggests that a common genetic or environmental factor is responsible for the development of both inattention and reading difficulties (Hart et al., 2010). For example, research on the genetics of reading difficulties found that executive attention mediates the relation between the DRD4 gene and alphabetic skills (Kegel & Bus, 2013). Carriers of the long variant of this gene have an increased chance of experiencing delays in reading development.

Second, this study helps to explain the role that behavioural inattention plays in reading development. Consistent with prior research (e.g., Dally, 2006; Pagani, Fitzpatrick, & Parent, 2012), the findings of this study suggest that behavioural inattention may impede children’s ability to profit from instruction and therefore acquire early literacy skills. Behavioural inattention may exacerbate children’s early literacy deficits by causing them to miss out on important learning opportunities (e.g., Dally, 2006).

5.7 Limitations

The findings of the present study must be interpreted in light of its limitations. First, including multiple time lags in multiple baseline designs increases experimental rigor. Due to the constraints of the school year and the length of time required for change to occur, only one time lag and two sequential replications of the results were conducted.
Second, the initial baseline period was relatively short (two weeks). Longer baselines demonstrate more definitively that no change occurred in the target skills until after the intervention was introduced. This allows for experimental inferences to be made with a higher degree of certainty.

Third, PAND calculations may overestimate the effects of the intervention. As well, the short baseline phase for two participants made it difficult to correct for positive baseline trends during baseline. However, the fact that participants’ performance tended to decrease after the intervention ended (e.g., 6-week follow-up) suggests that the intervention may have had a positive effect on their emergent literacy skills.

Fourth, the sample was relatively heterogeneous making it difficult to account for all possible variables. However, as in any kindergarten classroom, children vary in terms of their background and skill level. Although two participants were ELL and three participants attended a FI program, the participants in our study exhibited extremely low phonemic awareness, letter, and letter-sound knowledge. It is therefore unlike that the difficulties experienced by the participants were primarily the result of their ELL status or their enrolment in a FI program. Previous research has shown that predictors of word reading ability in English L1 (e.g., phonemic awareness and letter-sound knowledge) are also significant predictors of word reading in students who are ELL (Genesee & Jared, 2008; Lesaux, Geva et al., 2008). As well, research with FI students has shown high correlations between performance on English and French reading tasks (Geva & Clifton, 1994) such that students with reading difficulties tend to perform poorly on reading tasks in both languages. Similarly, phonemic awareness skills in English were found to
differentiate FI students who were poor readers from good readers in both English and French (MacCoubrey, Wade-Woolley, Klinger, & Kirby, 2004).

5.8 Conclusions

The present study constitutes a much-needed first step in examining reading interventions for kindergarten children with weak emergent literacy skills with behavioural inattention. This study demonstrates that kindergarten children who are inattentive and at risk for reading failure require a program that is sensitive to their needs in terms of pacing and maintaining engagement. While it is difficult to determine the functional relationship between the intervention and the participants’ gains, it is interesting to note that their scores did begin to drop at the six-week follow-up indicating that without the additional tutoring the children were not able to maintain their growth rates over time. Consistent with prior research, this study highlights that children with both reading and attention problems are challenging to remediate (Al Otaiba & Fuchs, 2006). More research is needed to examine the design and process of successful interventions for this at risk population. It is possible that more intensive and longer duration interventions are needed to maintain positive trajectories of growth in key emergent literacy skills over time in this at risk group of children.
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Appendix A

Current Literacy Practices

I am interested in learning more about how pre-reading skills are taught in kindergarten classrooms. I would greatly appreciate it if you would answer the following questions about your current literacy program. You may leave out any questions you do not wish to answer.

1. **What type of literacy skills are you planning to focus on with your students in the winter term (January to March)?**

2. **What kinds of activities will you use to address these literacy skills?**
## Appendix B

### Scope and Sequence of Stepping Stones to Literacy Program

<table>
<thead>
<tr>
<th>Instructional Activity</th>
<th>Lessons</th>
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<tr>
<td>Sounds Relationships</td>
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<tr>
<td>Sounds in Sequence</td>
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<td>Sounds Expectations</td>
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<tr>
<td>Omit a Sound</td>
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<td>Conventions</td>
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<tr>
<td>Sentence Generation</td>
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<tr>
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<td>Letter Name Practice</td>
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<tr>
<td>Letter Name Review</td>
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<td>Rhyme Generation</td>
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<td>Word Segmentation</td>
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<td>Syllable Blending</td>
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<td>Onset-Rime Blending</td>
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### Phonemic Awareness

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Appendix C

Stepping Stones to Literacy Instructional Activities

The following instructional activities are used to teach listening skills:

1. Sounds in isolations. This activity (lessons 1-5) teaches children to listen for and identify specific sounds (e.g., the name of an animal).
2. Sound relationship. In this activity (lessons 1-5) children learn that sounds are associated with symbols by identifying the picture of an animal in relation to its sound.
3. Sounds in sequence. In this activity (lessons 6-10) children learn to identify the sequence in which environmental sounds (e.g., animal sounds) are produced by the instructor.
4. Sound expectations. In this activity (lessons 6-10) children learn to direct their attention to specific sounds by identifying unexpected words inserted into a familiar nursery rhyme.
5. Omit a sound. In this activity (lessons 11-14) children must identify a specific environmental sound (e.g., dog barking) that has been omitted from a sequence.

The following instructional activities are used to teach conventional early literacy skills:

1. Sentence recognition. In this activity (lessons 1-6) children must identify what is happening in each sentence of a nursery rhyme.
2. Sentence generation. In this activity (lessons 6-10) children must generate a sentence based on a picture prompt.
3. Letter names. In this activity (lessons 1-25) children point to and name the letters presented in a left to right format.
4. Letter name practice. In this activity (lessons 4-25) children practice reviewing letter names and serial processing by naming as many letters as they can in one minute.

5. Letter name cumulative review. This activity (lessons 11, 15, 19-20, 23-25) provides children with cumulative review of letter names. They must point to and name as they can in one minute.

The following instructional activities are used to teach phonological awareness:

1. Rhyme identification. In this activity (lessons 1-7) children identify rhyming words in the context of a nursery rhyme.

2. Rhyme generation. In this activity (lessons 8-14) children generate several words that rhyme with a target word.

3. Word segmentation. In this activity (lessons 11-14) children clap each time they hear a word in a nursery rhyme.

4. Syllable blending. In this activity (lessons 12-14) children must produce the target word by blending two or more orally presented syllables together.

5. Onset-rime blending. In this activity (lessons 15-17) children must generate the word associated with the initial sound and the rest of the word provided by the instructor.

The following instructional activities are used to teach phonemic awareness:

1. Phoneme deletion. In this activity (lessons 15-18) children must produce the remaining word after deleting the initial phoneme from an orally presented word.
2. Phoneme identification. In this activity (lessons 18-21) children must identify each phoneme in orally presented words.


4. Phoneme change. In this activity (lessons 19-25) children must generate a new word by changing the initial, medial, or final phoneme in an orally presented word.
Appendix D
Social Validity of Tutoring Program

Some of your students participated in an individual tutoring program between February and April aimed at developing pre-reading skills. We would appreciate your input regarding the usefulness of this program and the effects it had on your students. Please complete the questions below. You may skip any questions you do not wish to answer.

1. In your opinion, do you think that your students enjoyed participating in the tutoring program? Why?

2. Did you notice any benefits to the students who participated in the literacy program? If so, what were the benefits?

3. Where are any drawbacks to having students participate in this program? For you? For the students?